THE EVOLUTION OF SINGAPORE’S GOVERNMENT INFOCOMM PLANS: SINGAPORE’S E-GOVERNMENT JOURNEY FROM 1980 TO 2007

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Abstract
This article traces e-government journey of Singapore, a nation that has consistently been ranked as one of the leading e-government nations in a number of independent studies. In particular, this study focuses on examining the evolving strategic e-government plans of the Singapore government since 1980; when the first concerted effort to use ICT extensively to transform public service delivery began, to provide an overview of the strategic planning and management aspects of e-government. It is hoped that through this paper, e-government academics and practitioners can draw lessons from the invaluable experience of this successful e-government nation, and identify the appropriate strategies that will help steer their respective e-government initiatives towards the achievement of the desired outcomes.

Keywords: E-government strategy, e-government implementation, service transformation, case study
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INTRODUCTION

Advances in information and communications technology (ICT) has fundamentally altered the nature of public administration, to the extent that ICT now underpins the basic functioning of most public programs (Holden, 2003) and contributes to the most significant innovations in public service delivery today (Borins, 2001). In the present era of networking (Landsbergen & Wolken, 2001) and e-commerce, citizens of countries across the globe have grown accustomed to the efficient, ubiquitous and perpetual services provided by private sector e-businesses, and are now demanding the same level of service from public organizations (Ho, 2002; Evans & Yen, 2006; Lee & Kim, 2007). Consequently, developed countries around the world are leading the e-government movement as the traditional model of bureaucratic governance gives way to the e-government paradigm (Ho, 2002; Lee et al., 2005).

The term “e-government” refers to the application of various technologies to provide citizens and organizations with more convenient access to government information and services; and to provide delivery of public services to citizens, business partners, suppliers and those working in the public sector (Turban et al., 2002). The development of e-government is expected to bring about important benefits for public organizations, which include lower transaction costs (Carter & Belanger, 2005; Warkentin et al., 2002), increased responsiveness to citizens’ needs (Ho, 2002), and the facilitation of public involvement in support of deliberative democracy (Jaeger, 2005; Scott, 2006). The momentous potential of e-government for enhancing public service delivery has caused many governments across the globe to commit billions of dollars to its development. For example, in the United States
alone, e-government expenditure is estimated to be US$4.2 billion in 2004, and is estimated
to hit US$5.8 billion by 2009 (Pulliam, 2005). Yet, despite the massive amount of resources
invested in e-government, the failure rate of e-government projects remains high. To
illustrate, a report conducted by the United Nations estimated that 60% of e-government
initiatives fail (UNDESA, 2003) and the purported benefits of e-government continue to be
an elusive dream for many governments worldwide (Chan et al., 2007).

The experience of countries that have been particularly successful with their e-government
initiatives may shed light on how e-government failure can be avoided (Chan et al., 2007).
Consequently, this article endeavors to trace the e-government journey of Singapore, a nation
that has consistently been ranked as one of the leading e-government nations in a number of
independent studies (refer to Figure 1 for an example). In particular, this study will focus on
examining the evolving strategic e-government plans of the Singapore government since
1980; when the first concerted effort to use ICT extensively to transform public service
delivery began, to provide an overview of the strategic planning and management aspects of
e-government. It is hoped that through this paper, e-government academics and practitioners
can draw lessons from the invaluable experience of this successful e-government nation, and
identify the appropriate strategies that will help steer their respective e-government initiatives
towards the achievement of the desired outcomes.

The first section of this paper has established our motivation and the scope of the study. In
the second section, we will review the existing e-government literature and prior studies on e-
government in Singapore to create a theoretical foundation for our work and situate our study
in the body of existing knowledge. Following this, the third section traces Singapore’s 27
year e-government journey across four distinct phases, with an emphasis on the strategic e-
government plans that were enacted during each phase. Finally, the fourth section of the
paper provides a discussion of the pertinent findings that emerged before a summary of these findings in the concluding section of the paper.

LITERATURE REVIEW

The History of ICT Use in Public Organizations

Since the birth of democracy, the face of governance and public administration has been constantly evolving (Vigoda, 2002). The historical evolution and changing interaction between public administration and citizens in a democratic society can be conceptualized as an evolutionary continuum of five overlapping phases (Vigoda, 2002). The five phases range from coerciveness, delegation, responsiveness, collaboration to citizen coerciveness (refer to Table 1).
Phase 1: Coerciveness
Phase 2: Delegation
Phase 3: Responsiveness
Phase 4: Collaboration
Phase 5: Citizenry

Table 1: Evolutionary Continuum of Public Administration-Citizen Interaction

<table>
<thead>
<tr>
<th>Predominant Era</th>
<th>Phase</th>
<th>Role of Citizens</th>
<th>Role of Public Administration</th>
<th>Characteristics of Interaction</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up till late 18th century</td>
<td>Coerciveness</td>
<td>Subjects</td>
<td>Rulers</td>
<td>Leaders and Administrators had absolute control over the people. Citizens made minimal effort to have their voices heard. Limited services provided by public administrators (Vigoda, 2002).</td>
<td></td>
</tr>
<tr>
<td>End 18th Century – 1970s</td>
<td>Delegation</td>
<td>Voters</td>
<td>Trustees</td>
<td>Governance occurs through citizen representatives. Elections facilitate accountability and legitimacy (Scott 2006).</td>
<td></td>
</tr>
<tr>
<td>1980s – Present</td>
<td>Responsiveness</td>
<td>Clients/Customers</td>
<td>Managers</td>
<td>Relies on theory of the marketplace and a business-like culture in public organizations (Vigoda, 2002). Emphasizes customer service, decentralization, market mechanisms, cross-functional collaboration and accountability for results (Page, 2005).</td>
<td></td>
</tr>
<tr>
<td>Early 2000s – Present</td>
<td>Collaboration</td>
<td>Partners</td>
<td>Partners</td>
<td>Citizens are directly involved in policy debates, decisions and actions. Interaction mechanisms, policies and programs are in place for civic engagement (Cooper et al., 2006; Scott, 2006).</td>
<td></td>
</tr>
<tr>
<td>Hypothetical</td>
<td>Citizenry</td>
<td>Owners</td>
<td>Subjects</td>
<td>Vision of an ideal democracy where government and public administration are owned by the citizens (Vigoda, 2002).</td>
<td></td>
</tr>
</tbody>
</table>

Parallel to the evolution of public administration, ICT has advanced through four significantly different generations (refer to Figure 2) to date (Andersen & Dawes, 1991; Landsbergen & Wolken, 2001) since the first electromechanical computer was built in 1944 (Yeo et al., 2004). With the synchronous evolution of public administration and the advancement of ICT, the nature of ICT use in public organizations has correspondingly evolved, and three distinct stages of ICT use in public organizations can be identified (Holden, 2003).

The first stage of ICT use in public organizations is labeled “Management Information Systems” (Holden, 2003). When computing were first used in public organizations, it was...
limited to routine transaction processing and administrative reporting, focusing on the internal efficiency of backroom operations (Holden, 2003) with little impact on major policy decisions (Rochleau, 1992). The “Management Information Systems” stage (Holden, 2003) is characterized by a predominant focus on the management of technology. In the mainframe era (Andersen & Dawes, 1991), the jurisdiction of the Information Technology (IT) department of public organizations was restricted to the centralized data center. IT professionals were isolated from the broader functional and executive oversight and the usage of IT were primarily for automating backroom operations with the primary goal being that of improving the efficiency of clerical activities (Zuboff, 1988; Holden, 2003).

The arrival of the era of personal computers (Andersen & Dawes, 1991) ushered in the second stage of ICT use in public organizations. Termed “Information Resources Management” (IRM), the arrival of this stage coincided with the shift towards responsive interaction in public administration (refer to Figure 3). The essence of IRM is for federal governments to manage information and IT as a resource. With the decentralization of computing power possible as a result of the advent of microcomputers, management approaches shifted accordingly from the data center to include user organizations. Line organizations also began to realize that IT could be used for more than just automating backroom operations and as a result acquired their own IT when the centralized IT function could not meet their growing needs.
As investments in IT resources increase and as the IT resources became distributed across the organization, academics and practitioners began to see the need to integrate the disparate systems to form an organization-wide perspective of IT (Holden, 2003). This resulted in a change of IT ownership to managers from a broader range of organizational functions (Marchand, 1985; Holden, 2003). But although the integrated perspectives allowed public managers to move beyond internal efficiency of backroom operations to focus on internal efficiency of public services delivery, there were little discussion at the time on leveraging the promise of IT for electronic service delivery (Holden, 2003).

The emergence of the Internet and the World Wide Web in the mid 1990s ushered in the Networking era (Landsbergen & Wolken, 2001) which in turn enabled the third stage of public ICT management that persists to date (refer to Figure 3). The third stage, labeled “Managing Information Technology in an Information Age”, is characterized by the management of information technology in a state where ICT-based information services are quickly and universally accessible from the citizens’ homes.
this stage and the IRM stage is the emphasis on the technological infrastructure and the need for substantial user involvement in information management (Holden, 2003). The key mechanism for public service delivery in the networking era is e-government, and as a strong testimony to its growing prominence in the digital economy, in recent years, the world has witnessed the emergence of many high profile e-government initiatives across the globe (Lee et al., 2005).

The Emergence of E-Government

The rapid growth of private sector e-commerce has resulted in increasing pressure for public organizations to offer the same low cost efficiency, ubiquity and uninterrupted availability in public service delivery (Ho, 2002; Evans & Yen, 2006; Lee & Kim, 2007). Following the lead of private organizations, the public sector began to see the potential of the emerging networking technologies in improving their service provision capabilities (Chan et al., 2007). According to a report by the United Nations Department of Economic and Social Affairs (2003), 173 out of 191 members of the United Nations have created some form of online presence as of May 2003, indicating a high rate of e-government adoption within a short span of time since the commercialization of the Internet. In the United States, the leading country in terms of e-government development (UNDESA, 2003), e-government has been applied in diverse areas such as education, jury selection, social security administration, vehicle registration, law enforcement, military defense and space exploration (Evans & Yen, 2006).

Expected benefits from investments in e-government include lower transaction costs (Carter & Belanger, 2005; Warkentin et al., 2002), increased responsiveness to citizens’ needs (Ho, 2002) and the facilitation of public involvement in support of deliberative democracy (Jaeger, 2005; Scott, 2006). Yet despite the high rate of e-government adoption around the world and the application of e-government in many diverse areas, 60% of e-government initiatives fail
(United Nations Department of Economic and Social Affairs, 2003) and concerns regarding information privacy and security, process automation and censorship remain (Evans & Yen, 2006).

The State of E-Government Research

The pervasiveness of e-government, the extensive global investment in its development and the high failure rate of e-government projects brings attention to the criticality of e-government research. The phenomenon of e-government raises questions of information, technology, administration and politics that its main referent fields – information systems and public administration – are ill-equipped to answer (Heeks & Bailur, 2007). In addition, historical research on ICT use in public organizations has taught us that the existing body of knowledge on private sector e-commerce may not be applicable in the e-government context.

Bozeman and Bretschneider (1986) articulated three important inadequacies of applying private sector research in the context of public organizations. First, studies based on private organizations tend to ignore variables external to the organization, particularly the political environment that surrounds public organizations that heavily influences the behavior and practices of public organizations. Second, the inherent political nature of public organizations means that the established performance indicators in private sector research for measuring the impact of ICTs will be vastly different in the context of public organizations. Third, due to differences in the organizational environment, as compared to private organizations, public organizations require unique system design techniques that are different from those articulated in private sector research. In addition, public sector ICT implementation failures tend to have more devastating consequences resulting in higher costs and embarrassment to the government, and public organizations tend to face more red tape than private organizations (Kraemer & King, 1991). These important differences between ICT use in
private and public organizations’ highlight the need to establish a separate research area for e-government that is conceptually distinct from private sector e-commerce research (Heeks & Bailur, 2007).

Yet, research on e-government is still in its infancy (Siau & Long, 2005; Heeks & Bailur, 2007) despite its obvious importance. The majority of E-government research can be categorized into two main areas (Chan et al., 2007). The first area focuses on the demand-side issue of citizens’ acceptance (see Warkentin et al., 2002; Gilbert & Balestrini, 2004; Akman et al., 2005; Carter and Belanger, 2005; Reddick, 2005; Tung & Reick, 2005; Phang et al., 2006), while the second area emphasizes supply-side issues including organizational adoption (see Ho, 2002; Ho & Ni, 2004) and the subsequent development of e-government (see Layne & Lee, 2001; Hiller & Belanger, 2001; Ebrahim & Irani, 2005; Siau & Long, 2005).

**Demand Side Issues of E-Government Research**

The first area, citizens’ acceptance of e-government, refers to the initial adoption and subsequent use of e-governments by citizens. For some examples of work emerging in this research area, Warkentin et al. (2002) theorizes that trust in e-government, in tandem with perceived ease of use and perceived usefulness of the e-government website, exerts a strong influence on intention to use e-government services. Further, institutional structures, an individual’s disposition to trust, characteristics-based trust and prior experience are proposed as antecedents of trust in e-government.

In another study, Carter & Belanger’s work (2005) integrates the technology acceptance model (Davis et al., 1989), the diffusion of innovation theory (Rogers, 1995), the perceived characteristics of innovating (Moore & Benbasat, 1991) and web trust models (Lee & Turban, 2001) to form a model of the factors that influence citizen acceptance of e-government initiatives. Specifically, this study tested the influence of seven factors;
perceived usefulness, perceived ease of use, image, relative advantage, compatibility, trust of internet and trust of government on intention to use e-government services, and found that only compatibility, perceived ease of use, trust of internet and trust of government are important predictors of usage intention. The model was later adopted by another study (Schaupp & Carter, 2005) and used in the context of e-voting. Interestingly, this study found that compatibility, perceived usefulness, trust of internet and trust of government; a slightly different set of antecedents from the previous study, have significant influence on citizens’ acceptance of e-voting systems.

From a similar perspective, Gilbert and Balestrini (2004) integrated technology acceptance theories and service quality research in an exploratory study and suggested nine possible factors that may impact citizens’ acceptance of e-governments. The nine factors are avoid interaction, cost, time savings, experience, information quality, financial security, low stress, trust and visual appeal.

Finally, citizens’ acceptance of e-government was also studied in the context of a e-government targeted at elderly citizens that supports a government-run social security savings plan. Specifically, Phang et al. (2006) investigated the acceptance factors of this particular e-government and found that self-actualization, resource savings, computer anxiety and computing support influence senior citizens’ acceptance of the e-government through the technology acceptance model constructs of perceived usefulness and perceived ease of use. In addition, Internet safety perception was also found to have a significant direct influence on intention to use the e-government.

Technology acceptance is traditionally a vibrant and mature stream of information systems research (Hu et al, 1999; Venkatesh et al, 2003). However, the emerging stream of research on citizens’ acceptance has been generally met with two objections. The first objection is that
the issue of citizens’ acceptance may be irrelevant because a government has the authority to mandate the use of e-governments (Warkentin et al., 2002). The second objection is that e-government acceptance is so similar to e-commerce acceptance that existing e-commerce acceptance theories can simply be adapted for e-government with little need to “re-invent the wheel”.

Researchers in this area however have countered that although governments have the authority to mandate the use of e-governments, voluntary acceptance of e-government will lead to a more optimal utilization of e-governments as compared to mandated use (Warkentin et al., 2002). Moreover, certain fundamental differences exist between e-commerce and e-government that make it necessary to re-validate our existing knowledge of technology acceptance in the context of e-government.

First, legislation in some countries like the United States and Canada require that any information collected by e-governments be shared with other agencies, members of the press or the citizenry (Warkentin et al, 2002). Moreover, there are some countries like Singapore and Malaysia that do not have explicit privacy laws regarding information provided to government agencies (Electronic Privacy Information Center, 2003). Second, related to the first objection, the possibility of a legally-enforced relationship exists only in the e-government context (Warkentin et al., 2002) and it will be interesting to examine if existing predictors of technology acceptance will stay relevant given the greater legitimacy and authority associated with public organizations.

Third, governments are inherently political in nature and citizens may form opinions about the fairness of various political parties and individual politicians (Warkentin et al., 2002). For the acceptance of e-governments which involve monetary transactions and information exchange, citizens must inherently trust the system regardless of whoever is in power.
Finally, public organizations have the responsibility of acting in the best interest of the public (Jorgensen & Cable, 2002) while the majority of technology acceptance studies are in conducted in the context of private organizations that are typically profit driven. Therefore, the perception of how the organization will use the information exchanged during the transactions may be very different for public and private organizations leading to different usage intentions.

**Supply Side Issues of E-Government Research**

The second major area of existing e-government research focuses on the supply side issues of the phenomenon. One supply side issue pertains to the measurement of e-government performance. As an example of a study on e-government success metrics, Steyaert (2004) proposed adapting five indicators of e-commerce performance – awareness, contact efficiency, conversion, popularity and retention – to measure e-government success.

Another example of a supply side issue is the organizational adoption of e-government. To illustrate with some studies on this issue, Ho (2002) found that the size of the city, the support of senior officials, time and experience with e-government initiatives and household income were important factors that influenced the adoption of the e-government paradigm. In another study, Ho and Ni (2004) examined the impact of factors related to external constituency pressure, peer influence, resource and capacity factors, internal political support, and perceived characteristics on e-government adoption and found that only internal political support for e-government by the board of supervisors and concerns about work overload as a result of increased emails and online services had significant effects on organizational adoption of e-government. Interestingly, the study also found that population size and the belief that citizens have the right to online services, influenced the decision to expand the scope of e-government but are not significant in the initial adoption decision. This indicates
that the factors that influence e-government implementation and the factors that influence the subsequent development of e-government are vastly different (Ho & Ni, 2004).

Another supply side issue that has gained prominence in existing e-government literature is the process of e-government development. To illustrate, Tan and Pan (2003) used a case study of the Inland Revenue Authority of Singapore (IRAS) to inductively derived an evolutionary model of organization-stakeholder relationships and demonstrate how e-government transformed IRAS from a bureaucratic organization to an anticipative and responsive public agency. Adopting a technical perspective, Ebrahim and Irani (2005) examined the alignment between ICT and business process management in public organizations and described an integrated four-layer e-government architecture necessary for e-government development. From a broader perspective, studies in this area have also examined the barriers and benefits associated with e-government development (Evans & Yen, 2006; Lee & Kim, 2007), global trends in e-government development (Evans & Yen, 2006), and developed a generic e-government implementation framework (Chan et al., 2007).

An overwhelming majority of existing supply side e-government research has however, focused on distinguishing between the different types of e-government and defining various stages of e-government development. Some examples of e-government typologies used in existing e-government research include the widely-used typology of e-government (E-government Task Force, 2002) popularized by the United States Government, which categorizes e-governments into government-to-citizen (G2C), government-to-business (G2B), internal efficiency and effectiveness (IEE) and government-to-government (G2G). Extending this typology, Hiller and Belanger (2001) further classifies e-government into six categories: Government delivering services to individuals (G2IS), government to individuals as part of a political process (G2IP), government to employees (G2E), government to business as a
citizen (G2BC), government to business in the marketplace (G2BMKT) and government to government (G2G). An alternative typology is provided by Ho (2002) who distinguishes between e-government websites based on their orientation and defines three classes of e-government websites: administrative-oriented, information-oriented and user-oriented. In addition, the plethora of e-government stage models in existing e-government literature, created by both individual researchers and institutions, are summarized in the Table 2.

<table>
<thead>
<tr>
<th>Model</th>
<th>Stages</th>
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</table>
| Layne & Lee (2001) Four-stage Model |  - Catalogue: Delivers static or basic information  
  - Transaction: Enables simple online transactions  
  - Vertical Integration: Integrating government functions at different levels  
  - Horizontal Integration: Integrating different functions from different agencies |
  - Two Way Communication: Interaction between govt and users  
  - Service & Financial Transactions: G2C & G2B transactions  
  - Vertical & Horizontal Integration: Similar to Layne & Lee (2001)  
  - Political Participation: Promotion of political participation (e.g. online voting) |
| Siau & Long, 2005’s Five Stage Model |  - Web Presence: Provide basic information  
  - Interaction: Ability to contact agencies  
  - Transaction: Complete service & financial transactions  
  - Transformation: Provide integrated, personalized service  
  - E-Participation: Use of tools such as online voting, polls and surveys to promote political participation and citizen involvement |
| UNPAN’s (2003) Five-stage Model |  - Emerging Presence: Provide formal but limited static information  
  - Enhanced presence: Provide dynamic, specialized information  
  - Interactive Presence: Portal to connect users and Service Providers  
  - Transactional Presence: Ability to conduct complete and secure transactions  
  - Seamless or fully integrated presence: one-stop portal to access a variety of services |
| Deloitte’s (2001) Six-stage Model |  - Information Publishing: Provide increased access to information  
  - Official Two-way Transaction: Interaction between governments and users  
  - Multi-purpose Portals: Single portal to provide universal service across departments  
  - Portal Personalization: Customized portals  
  - Clustering of Common Services: Unified and seamless service across agencies  
  - Full Integration and Enterprise Transaction: Sophisticated, unified and personalized services for all customers |

Table 2: Various E-Government Stage Models

Notwithstanding the academic and practical contributions of these studies, there remains a need for more empirical and practice relevant research (Chan et al., 2007). Reflecting the immaturity of the research area (Siau & Long, 2005; Heeks & Bailur, 2007), it has been
noted that research on the more substantive issues of e-government implementation and development remains limited to date (Devadoss et al., 2003; Chan et al., 2007). In addition, in a scathing review of e-government studies published to date, Heeks and Bailur (2007) suggests that (1) the majority of e-government researchers are overly positive about the impact of ICT. Moreover, e-government research is (2) dominated by “feeble positivism” with little contributions from the interpretive or critical philosophical perspective, (3) do not build on the works of each other to create a cumulative tradition, (4) lacking in theoretical grounding, (5) overly focused on description rather than explanation, and (6) lacking in methodological rigor.

The importance of e-government research, the high failure rates of e-government across the globe and the gaps and limitations of the existing e-government literature underscores the need for a comprehensive study on e-government implementation and development. As the knowledge and experience of successful e-government nations may provide indications on how e-government success can be achieved (Chan et al., 2007), the purpose of this study is to trace the e-government journey of Singapore, a nation that has consistently been ranked as one of the leading e-government nations in a number of independent studies (refer to Figure 1). A review of the existing literature on e-government in Singapore is provided next to establish the context and provide a conceptual background for this study.

**Existing Studies on E-Government in Singapore**

Mirroring the development of e-government literature, the literature on e-government in Singapore (refer to Table 3) can be classified into three distinct categories: (1) Case studies of specific e-government projects, (2) studies on the adoption of e-government among individual citizens and organizations, and (3) macro-level analyses of the Singapore government’s strategic ICT plans. Yet, despite the theoretical and practical contributions of
these studies, two important gaps remain in the literature. First, while the case studies of specific e-government projects have provided rich insights to the implementation issues of specific e-government projects, the piecemeal contributions of each study do not provide an adequate picture of the overall strategic planning and coordination process that is crucial to the success of e-government initiatives nationwide. Second, while a handful of macro-level analyses of the overarching strategic ICT plans of the Singapore government exist, these studies have either focused on specific segments of the strategic plans (see, e.g., Ke & Wei, 2004), or on specific issues (see, e.g. Sriramesh & Rivera-Sanchez, 2006) and measures adopted (Chan et al., 2007) as a result of the strategic ICT plans, and do not provide a detailed picture on the nature of the strategic plans.

Collectively, these gaps in the literature indicate that the issue of strategic planning for e-government in the context of Singapore has not been adequately addressed. As e-government initiatives tend to originate from a formal and rigorous strategic planning process (Chan et al., 2007), this study will focus on the evolution of the Singapore government’s strategic master plans for ICT use and how these government-wide plans have fundamentally transformed the nature of public service delivery. In doing so, it is hoped that e-government academics and practitioners can benefit from the e-government knowledge, experience and practices of this successful e-government nation, and identify the appropriate strategies that will help steer their respective e-government initiatives towards the achievement of the desired outcomes. The strategic ICT plans of the Singapore government and the evolution of these over the e-government journey of the past 27 years are described next.
## Case Studies of Specific E-Government Projects

<table>
<thead>
<tr>
<th>Authors</th>
<th>Synopsis</th>
</tr>
</thead>
<tbody>
<tr>
<td>King &amp; Konsynski, 1990</td>
<td>Case study of TradeNet, a trade document administration system that revolutionized the way private trade-related firms interact with the administration and each other.</td>
</tr>
<tr>
<td>Applegate et al., 1993</td>
<td>Case study of how Singapore Network Services leveraged its experience in implementing TradeNet to develop and implement networks for other areas in the Singapore public sector.</td>
</tr>
<tr>
<td>Teo et al., 1997</td>
<td>Using a case study of TradeNet, this article demonstrates the use of EDI technology to effect productivity gains and create economic benefits for the sponsoring agency.</td>
</tr>
<tr>
<td>Devadoss et al., 2003</td>
<td>Based on a case study of an e-procurement system, this study uses a structurational model to examine the pertinent issues during the initial phase of e-government development.</td>
</tr>
<tr>
<td>Tan &amp; Pan, 2003</td>
<td>Utilizing a case study of an e-filing system, a evolutionary model of organization-stakeholder relationships was created to demonstrate how e-government transformed the tax agency from a bureaucratic organization to an anticipative and responsive public agency</td>
</tr>
<tr>
<td>Chan et al., 2005</td>
<td>Based on a case study of the Feedback Unit in Singapore, this study examines how offline and online channels can be combined synergistically in a multi-channel form of public service delivery.</td>
</tr>
<tr>
<td>Tan et al., 2005</td>
<td>Using a case study of a tax e-filing system, this study investigates the e-government phenomenon from a stakeholder management perspective and highlights the importance of identifying and aligning the interests of all stakeholders involved in e-government.</td>
</tr>
<tr>
<td>Pan et al., 2006</td>
<td>Based on a case study of the National IT Literacy Program of Singapore, this study examines the strategic Customer Relationship Management (CRM) practices of the Singaporean government and develops a framework for organizational relationship building</td>
</tr>
<tr>
<td>Teo et al., 2006</td>
<td>Using a case study of CRM implementation at the Housing Development Board of Singapore, a holistic framework of CRM implementation is proposed that integrates the business, technology and customer perspectives of the phenomenon.</td>
</tr>
</tbody>
</table>

## E-Government Adoption Studies

<table>
<thead>
<tr>
<th>Authors</th>
<th>Synopsis</th>
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<tbody>
<tr>
<td>Li et al., 2004</td>
<td>Examines the influence of perceived ease of use, perceived usefulness, online privacy and security concerns on e-government adoption in Singapore.</td>
</tr>
<tr>
<td>Tung &amp; Rieck, 2005</td>
<td>A study of the factors that influence organizational adoption of e-government among private sector businesses in Singapore. Proposes that perceived benefits, external pressure, and social influence are important to the firms’ decision to adopt e-Government services</td>
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<td>Phang et al., 2006</td>
<td>A study of the factors that influence senior citizens’ adoption of e-government in Singapore. Findings of the study suggest that self-actualization, resource savings, computer anxiety and computing support are salient factors in senior citizens’ e-government adoption intention.</td>
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## Macro-Level Analyses of the Singapore Government’s Strategic ICT Plans

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Table 3: Selected Studies on E-Government in Singapore
SINGAPORE’S GOVERNMENT INFOCOMM PLANS

In Singapore, the use of ICT in public organizations is governed by the “Government Infocomm Plans” of the Singapore government. These strategic ICT plans are based on the broader “National Infocomm Plans” of Singapore (refer to Figure 4), and set the key thrusts and strategies that provide guidelines on the use of ICT to transform the public sector. There have been four Government Infocomm Plans to date: The Civil Service Computerization Program (1980-1999), the e-Government Action Plan I (2000-2003), the e-Government Action Plan II (2004-2006) and iGov2010 (2006-2010). Our historical account of Singapore’s e-government journey is organized according to the four Government Infocomm Plans and presented in the subsections that follow.

Figure 4: Singapore’s Government Infocomm Plans

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Civil Service Computerization Program (1980-1999)

Although the first real computer in Singapore was acquired in 1963 by the Central Provident Fund Board; a public agency that manages a social security savings scheme in Singapore, the first concerted effort to use ICT extensively to transform the public sector in Singapore may be traced back to 1980 when the Civil Service Computerization Program (CSCP) was launched in response to the National Computerization Plan (NCP) of the Singapore government. Prior to the CSCP, public service delivery was a labor intensive, manual process that was considerably inefficient due to the difficulty in managing the large volume of paperwork. Adhering to the directives of the NCP, ten systems study teams were formed with representatives from numerous ministries to examine how ICTs can be used in various areas of the public sector. The efforts and eventual recommendations of the ten systems study teams laid the foundation of the CSCP.

The intent of the CSCP was to transform the Singapore government into an effective exploiter of emerging ICTs. The CSCP focused primarily on using transaction processing, data modeling and data management technologies to improve the internal efficiency of the public agencies through the automation of repetitive work processes and paperwork reduction. Dr Tan Chin Nam¹, Director of the Systems and Computer Organization of the Ministry of Defense in 1979, elaborated on the aim of the CSCP.

“*It was recognized that we had to move away from labor-intensive to capital-intensive, mechanization and automation, and therefore higher wages… We cannot survive on cheap labor. Computerization was to help us reduce manpower.*”

¹ Dr Tan Chin Nam has retired from the Singapore Public Service. Prior to his retirement, he served as Chief Executive of the Singapore Tourism Board (STB) from 1994 to 1997, Permanent Secretary of the Ministry of Labour in 1997, Chairman of the National Library Board from 1995 to 2002 and Permanent Secretary of the Ministry of Information, Communications and the Arts (MICA) from 2002 to 2007.
With the framework of the CSCP in place, the Committee of National Computerization of the Singapore government that was tasked to implement the NCP realized that there was a need for a central agency to coordinate and oversee the implementation of the plan. This led to the establishment of the National Computer Board (NCB) in 1981, and the agency was tasked with bringing the directives laid out by the NCP and the CSCP to fruition. Mr Seah Kia Ger, one of the pioneers of the NCB described the challenges faced by the statutory board at the time.

“*You have to bear in mind that in 1981 the mindset of senior civil servants was not as open as today, although some were very positive towards and supportive of the unprecedented large-scale program to improve the operational efficiency of the public sector... (In addition), the structure of the civil service was not as conducive as 25 years later, to the implementation of a major technological initiative. Great efforts had to be put into getting things done fast in order to push Singapore as the first IT intelligent island state.*”

Despite the challenges, the NCB were provided with ample resources to carry out the mandate of the Singapore government. Dr Tan Chin Nam described how the Singapore government provided funding for implementing the CSCP.

*“We went to the Ministry of Finance’s permanent secretary; George Bogaars, to ask for money. There were some discussions and negotiations. He was kind enough to say ‘S$100 million (about US$70million); that’s all you need.’ I would say it was very generous.”*

In addition, a fundamental problem with the structure of the civil service at the time that inhibited the exploitation of new technologies was the lack computing knowledge. To overcome this problem, the NCB centralized all computing personnel in the various public
agencies and grouped them into a software engineering department and a computer engineering department under the NCB. The two centralized departments began to fulfill the needs of the entire civil service. Mr Phillip Yeo, Chairman of the NCB at the time commented on how the initial core of computing personnel in the public sector was created.

“What I did was get the 10 ministries their own computers which were physically in the ministries. The only thing they didn’t own were the people. I centralized the people – the recruitment, training, supervision, the monitoring of them... But every ministry had the same priority. I told every ministry, ‘Tell us which project you want first.’ And we focused on those projects. So we spread out our people, working physically in different ministries – 30 to 40 computer guys in each ministry. That was 300 over in all. After a year, I had a thousand, all up and running, all young people.”

The NCB also undertook extensive measures to create a pool of computing manpower to facilitate future ICT initiatives in the public sector. Training programs were established and foreign professionals were hired to alleviate the shortage of manpower. In addition, the educational system in the local universities and polytechnics was revised to offer new ICT-related courses. New technical institutes like the German-Singapore Institute and the Japan-Singapore Institute were established to train lower-level computer technicians, while the Institute of Systems Science (ISS) was set up to train top government and business leaders in the use of ICT.

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2 Philip Yeo served as the chairman of the Economic Development Board from January 1986 to January 2001. He is currently the Special Advisor for Economic Development in the Prime Minister's office and the chairman of Spring Singapore, the public agency responsible for enterprise development in Singapore.

3 27 years later: The Institute of Systems Science (ISS) has grown to be a teaching institute within the National University of Singapore, dedicated to the continued education and manpower development for ICT professionals. It offers graduate degree programs, professional diplomas, professional development courses, e-learning, and consulting services. It also conducts research and is the education arm to many national Infocomm initiatives including eGL (Singapore eGovernment Leadership Centre).
By 1985, the technological achievements of the Singaporean civil service under the CSCP were impressive. 59 application systems had been established in various agencies in the public sector, and the number of computer professionals in the civil service had risen to about 4,000. Further, the number of mainframe and minicomputer installations, which had stood at 350 in 1981, had risen to more than 2,000. More importantly, the CSCP demonstrated the government’s resolve to transform the civil service through the use of ICT and laid the foundation for the future use of emerging technologies in the public sector.

In 1985, Singapore was hit by a severe economic recession and the Singapore government quickly realized that there was an urgent need to re-examine the direction that the Singapore economy was heading. The Singapore Economic Review Committee was established to review the strengths and weaknesses of the economy, and one of the key recommendations of the committee was to exploit the emerging ICTs of the era to improve trade competitiveness, rejuvenate the key economic sectors, and create the foundation for economic growth. Dr Tan Chin Nam, who became the General Manager of the NCB during this period, described how the committee re-conceptualized the role of ICTs in the public sector.

“We are witnessing the emergence of a more comprehensive, total business capability and IT has a major contributing role in it. It is not just about national computerization. There must be a larger meaning in our tasks.”

The recommendations of the committee led to the launch of the second National Infocomm Plan called the National Information Technology Plan (NITP) in 1986. The NITP was anchored on a seven-pronged approach: developing IT professionals and experts, improving the information and communication infrastructure, promoting the ICT industry, coordinating and collaborating between various ICT-promoting organizations, establishing a culture that welcomes ICT, encouraging creativity and entrepreneurship, and increasing ICT application
in workplaces. Based on the guidelines laid by the NITP, the focus of the CSCP was shifted to making public sector information accessible to the outside world and providing one-stop services through cross-agency linkages. Mr Ko Kheng Hwa⁴, Divisional Director of IT Application and Human resource at the NCB at the time, described the new focus of the CSCP.

“No business organization exists in isolation: it has to conduct business transactions with external entities. As long as these external transactions are based on traditional paper documents, the benefits of IT to an organization cannot be fully achieved no matter how extensively its internal operations are computerized.”

As a result of the NITP, the CSCP began to look beyond automation using computing tools to the fusion of computer and communications technology. One of the most significant applications that emerged from the early initiative to merge computing and communications technology was TradeNet (refer to Appendix A). In the mid 1980s, international trade involved a staggering amount of paperwork which could result in a non value-added cost of up to 4 to 10 per cent of the value of goods shipped for private sector trade companies. To improve trade competitiveness in Singapore, the NCB and the Trade Development Board (TDB) of Singapore published a set of trade data interchange standards; which conformed to the international Electronic Data Interchange (EDI) standard, to standardize the process of electronic document exchange. By conforming to these standards, TradeNet enabled local companies to exchange trade documents electronically with their business partners abroad, and combine multiple trade documents into one single online form to achieve cost reduction.

⁴ Mr Ko Kheng Hwa is currently the Managing Director of the Singapore Economic Development Board (EDB)
and improved efficiency. Ms Rosina Howe-Teo, a member of the TradeNet team, described the scope of the TradeNet initiative.

“TradeNet was about integration, not just within departments but end-to-end. It was a massive project in that it involved 18-20 government agencies, each with its own requirements. We were moving into uncharted waters and there was a lot to adapt and adjust.”

Through the use of TradeNet, the trade-related sectors reaped the benefits of increased profitability and productivity as TradeNet slashed administrative costs and lowered the turnaround time for the documentation process from two days to 15 minutes. Cost savings were estimated at US$1 billion a year and by mid 1991, TradeNet was estimated to process 3.1 million import and export declarations annually. This led the US Society of Information Management to award its Partners in Leadership Award to TradeNet in recognition of its achievements and with the launch of TradeNet, Singapore became the first country in the world to implement EDI nationwide.

While efforts were being made to transform the trade-related sectors of the economy with TradeNet, other technological initiatives were simultaneously being developed by other public agencies in Singapore. For example, the Port of Singapore Authority (PSA) developed PortNet, which enabled shipping lines, freight forwarders, shippers, hauliers and local government agencies to communicate with the port and each other. Similar to the context of TradeNet, the operations of the shipping industry in Singapore at the time consisted of a voluminous amount of paperwork, and PortNet served to automate many structured, repetitive tasks in the shipping industry to reduce planning cycle time. The success of TradeNet and PortNet also led to the development of other EDI-based initiatives such as

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5 Ms Rosina Howe-Teo is currently serving as the Chief Innovation Officer of the Land Transport Authority of Singapore.
LawNet for the legal community, MediNet for the healthcare community, and BizNet for the business community. These EDI-based initiatives integrated the relevant public agencies with external private and professional organizations, which facilitated the exploitation of the ICT infrastructure developed in the earlier phase of the CSCP to create synergistic benefits for all the stakeholders involved.

The vision of ICT use in public organizations laid out by the NITP also required the consolidation of information across a number of public agencies. To this end, data hubs were established to serve as central repositories for various categories of data across multiple public agencies. For example, the Land Data Hub of the Ministry of Law was established to store information on Singapore’s shareable land, while the People Data hub of the Ministry of Home Affairs was established to store information on individual citizens that were used across various public agencies. These data hubs paved the way for inter-agency application systems such as the Integrated Land Use System and the One-Stop Change of Address Reporting System, which served to facilitate information sharing across public agencies, provide horizontally-integrated services to the general public, and reduce data redundancy.

In addition, the NCB also undertook a number of projects that aimed to integrate the diverse information systems of the various public agencies to facilitate the sharing of information. For example, the Inter-Departmental Network was established in 1989 that linked 23 major computer centers from various organizations within the public sector. In the education sector, a project called School Link was also introduced to connect the Ministry of Education to 360 schools across Singapore, facilitating communications between the schools and the ministry and providing support for administrative tasks such as student profiling, management and exam scores analysis.
Although manpower reduction was expected when routine work processes in the public organizations were automated due to the CSCP, by the late 1980s, it was estimated that CSCP had instead saved 1,500 jobs and created 3,500 more due to the productivity gains from computerization. By 1991, it was estimated that for every dollar invested in the CSCP, the returns on investment was US$1.87. In addition, with the exception of the Ministry of Defense which ran its own computerization plan parallel to the CSCP; all the ministries and statutory boards in the public sector had implemented their own ICT initiatives in accordance to the framework laid out by the CSCP.

As Singapore entered the 1990s, the Singapore government; encouraged by their initial successes at exploiting ICT, began to perceive ICT as the means to enhance the quality of life for its citizens. Dr Tan Chin Nam, Chairman of the NCB at that point in time, elaborated on the government’s vision of the role of ICT in the early 1990s.

“Singaporeans will be able to access and share a vast store of information. It will almost be like a giant electronic library – except technology now allows us to ‘borrow’ information and still leave a copy in place for other borrowers... There will be no boundaries in the information age. Singaporeans will be able to see and talk to other people, even if they are separated by oceans, continents, time zones, geographical and political boundaries.”

To achieve this vision, the NCB and 11 sectoral groups consisting of about 200 people from the private and public sectors developed a new National ICT blueprint in 1992 that became IT2000, the third National Infocomm Plan of the Singapore government. An integral aspect of the IT2000 plan was the development of a National Information Infrastructure (NII) which comprised of three components: (1) Conduit; which refers to the physical communications pipelines, (2) Content; which refers to the information, and (3) Content; which refers to the
processing of the content through mechanisms such as billing, user authentication and permit
documents. The IT2000 committee identified five strategic thrusts to leverage the NII:
developing a global information hub, boosting the economic engine of Singapore, enhancing
the potential of individual citizens, linking communities locally and globally, and improving
the standard of living in Singapore.

Yet, the NII never came to fruition as the convergence of the deregulation of the
telecommunications industry in Singapore, and the invention of the Internet enabled low-cost,
high-speed public access to global information networks that went beyond what the NII could
offer. Although the economic potential of Internet technologies was apparent even during the
mid 1990s, the Singapore government was concerned about the social implications of the
Internet. However, the rapid adoption of the Internet by private organizations and individual
citizens in Singapore eventually convinced the Singapore government that the future of ICT
use in Singaporean public organizations laid in the emerging Internet technologies and not
the NII, and the decision was eventually made to establish a nationwide broadband network
rather than to persist with implementing the NII initiative. Mr Lim Swee Say⁶, Chairman of
the NCB in 1995, explained the rationale behind the decision to abandon the NII initiative.

“Content had become multi-media. Computers had to be multi-media. The network had
to change. We had to go broadband because the bottleneck was the network.”

Following the decision to utilize the emerging Internet technologies, public organizations in
Singapore adopted the Internet rapidly. In April 1995, the Department of Statistics of the
Singapore government established the “Government Resources on the Internet” (GRIN)
network. GRIN had two objectives: (1) Providing Internet access to government officials and

⁶ Mr Lim Swee Say is currently the Minister in the Prime Minister's Office of Singapore and the Secretary-General of the
National Trades Union Congress. His previous appointments include being and Minister of State for Trade and Industry,
Minister of State for Communications and Information Technology, and Minister for the Environment and Water Resources.
civil servants across all public organizations in Singapore, and (2) providing a platform to facilitate the creation of government websites. The GRIN initiative proved to be a phenomenal success. Prior to the establishment of GRIN, few public agencies had even heard of the Internet. However, within three months of its inception, all ministries, statutory boards and organizations within the public sector were connected to the Internet. By 1996, there were an estimated 50 government websites with more than 1,500 Internet users across all public organizations in Singapore. In early 1996, an intranet was also established for the government officials and civil servants in Singapore. The intranet housed the Singapore government directory, an instructional manual and a handbook that provided guidelines for the use of the intranet, the proceedings of the Singaporean Parliament, and various government newsletters.

The GRIN network represents the initial effort of the Singapore government at using ICT to engage individual citizens and internal government employees. Yet, although the GRIN initiative was a resounding success, the rapid development of the network posed some unique challenges. One key challenge was that it became increasingly difficult to hire IT professionals with the relevant Internet experience as the technologies were relatively new. To overcome this problem, the NCB initiated training programs that were similar to the programs it conducted in the earlier phase of the CSCP. The NCB first trained its own staff centrally, who then took on the roles of Internet champions and trained IT personnel from other public agencies. In all, the NCB conducted seminars for almost 1,000 officers from the IT departments of various ministries and statutory boards to raise the awareness level and familiarity with the Internet.

Although the Internet certainly took the world and the Singaporean public sector by storm, IT2000 was not merely about Internet technologies. Singapore had also established an
impressive record for service innovation through a number of high-profile initiatives that utilized other forms of technology. For example, other important nationwide technological projects carried out during this era include the development of the Electronic Road Pricing (ERP) system to manage traffic congestion, the use of radio frequency identification (RFID) chips by public libraries to eliminate queues, and the establishment of the Electronic Medical Records (EMR) system to allow doctors to retrieve patient’s medical records and share information across different departments and hospitals. At the close of the 20th century, Singapore had successfully paved the way for its citizen to live and work in a dynamic economy powered by ICTs. At the dawn of the new millennium, the Singapore government began looking at ways to integrate their existing information systems for greater efficiency, and to effectively extract and analyze citizen and other business data for competitive advantage.


The advent of the dotcom era and the ensuing dotcom crisis that occurred at the turn of the millennium provided the impetus for the formulation of the fourth National Infocomm Plan of the Singapore government. Dubbed “Infocomm 21”, the national ICT blueprint was created by the newly established Infocomm Development Authority of Singapore (IDA); a statutory board formed with the merger of the NCB and the Telecommunications Authority of Singapore, and aimed to “develop Singapore into a global infocomm capital with a thriving and prosperous e-economy and an infocomm-savvy e-society” (IDA, 2006a) To facilitate the attainment of this vision, four key strategies were formulated by the IDA: (1) Positioning Singapore as a premier ICT hub in the Asia Pacific, (2) empowering the private, public and people sector through the use of Internet technologies, (3) developing Singapore as an ICT talent capital and a hub for e-learning, and (4) creating a conducive pro-business and pro-consumer policy and regulatory environment.
In a parallel development, the Singapore public service embarked on a service excellence campaign called "Public Service for the 21st Century" (PS21) that aimed to inculcate an attitude of service excellence among civil servants, and cultivate a culture of continuous improvement to prepare the public sector for the future by “Anticipating, Welcoming and Executing Change” (PS21 Office, 2005). The convergence of Infocomm 21 and PS21 led to the development of the first e-citizen portal of the Singapore government in the late 1990s. Ms Wu Choy Peng, Chief Information Officer of IDA at the time, recounted the implementation of the pioneering e-citizen portal:

“… We visited a Canadian town offering local, state and federal government services under one roof... We built on the idea and persuaded Accenture to build a proof of concept to show the Permanent Secretaries. The green light was given and the first e-citizen portal delivering 10 different e-citizen services went live in the late 1990s.”

The e-citizen portal paved the way for the e-Government Action Plan (eGAP I), the second Government Infocomm Plan of the Singapore public sector. eGAP I was conceived in 2000 with the intention of transforming the Singapore government into one of the leading e-governments in the world: One that is able to exploit the full potential of web technologies to bring about unparalleled efficiency and effectiveness in public service delivery. The primary focus of eGAP I was on facilitating the transactions between the government and its three key stakeholders groups; citizens, businesses, and employees, through the use of ICTs. Accordingly, five strategic thrusts were identified as critical to attaining the objectives of eGAP I.

The first strategic thrust was to push the envelope of electronic service delivery. The citizens’ experience with private sector e-commerce and the pervasive, ubiquitous nature of Internet
technologies led to increasing expectations of the government to provide its public services online, anytime, anywhere. As a government is typically perceived to be bureaucratic and inaccessible, the Singapore government believed that by adopting a citizen-centric perspective and integrating their electronic services, they can move beyond the general perception and create value for its citizens. The e-Citizen portal is a good example to illustrate the resolve of the Singapore government. The portal was designed to serve as a single access point for all government information and services. To support the development of this portal, the Public Service Infrastructure (PSI) was established to enable government agencies to rapidly develop and deliver online services to the public. In addition, to cater to the segments of the population who were unable to use the electronic services, the government set up a network of e-Citizen Help Centers; providing aid to those who are unable to use newly-created e-services, to bridge the growing digital divide.

The second strategic thrust involved building new capabilities and developing new capacity. The Singapore government’s focus on achieving productivity gains under the CSCP was superseded by the drive to further leverage ICTs to create value for its citizens. As the quality of e-services is directly dependent on the public organization’s ability to appreciate the implications of emerging ICTs, government officials and civil servants had to be equipped with the necessary skills, tools, systems and infrastructure to make them effective workers in the digital economy. Consequently, an Infocomm Education Program was established to equip public servants with the requisite ICT capabilities to extend the capacity of the public organizations they belonged to. In addition, a Technology Experimentation Program was launched to provide resources for public organizations to encourage the innovative use of ICTs in their business processes and operations.
The third strategic thrust was to encourage innovation with ICTs. As citizens became increasingly sophisticated through their growing experience with Internet technology, their expectations in terms of the quality of electronic service delivery correspondingly increased. As such, experimenting with groundbreaking technologies such as emerging wireless transmission protocols and interactive broadband multimedia was imperative to the public organizations if they are to provide a similar, if not superior, online service experience. An example of a significant technological innovation in the public sector is GeBiz, the Singapore government’s one-stop e-procurement portal. Gebiz was established to allow public officers to perform a wide range of procurement activities such as publishing tender notices, awarding government contracts and allowing suppliers to respond to procurement opportunities. By 2002, it was estimated that the total value of procurements through GeBiz was about US$181 million.

The forth strategic thrust was to develop anticipatory and sensing capabilities to become a proactive and responsive government. In order to keep pace the rapidly evolving trends in public administration worldwide, the Singapore government realized that its government officials and civil servants must be technology savvy and proactive in utilizing them to develop the relevant public policy responses. Increasingly, public organizations had to emulate the private sector in adopting a “sense and response” approach to anticipating new trends in public administration. Especially in the digital era where the role of customer service is becoming increasingly important, the government had to exploit the full potential of existing and emerging ICTs to churn out service innovations that add value for its citizens at “Internet speed”.

Finally, the fifth and strategic thrust was to develop thought leadership on e-Government. To cultivate a better understanding and appreciation of the benefit of ICTs, the public servants
had to be equipped with the necessary knowledge and skills to use ICT tools and systems effectively. More importantly, there was a need to sensitize public officers to the impact of ICTs on the economic and social landscape so that the potential benefits that ICTs can bring will always be at the back of their mind when they are making critical policy decisions.

To drive the strategic thrusts, six programs that would empower and serve the changing needs of the public, private and people sectors were established. First, the Knowledge-Based Workplace program would empower active and collaborative learning and knowledge sharing as part of the culture of continuous learning that the Singapore government hoped to nurture in the public service. Second, the Electronic Services Delivery program would provide a one-stop interface for the government to interact with the general public through the integration of government services of individual public organizations. Third, the Technology Experimentation program would encourage pioneering technological initiatives to better understand their capabilities and their potential for enhancing public service delivery. Fourth, the Operational Efficiency Improvement program would facilitate a thorough re-examination of existing business functions and processes to identify possible areas for improvement. Next, the Adaptive and Robust Infocomm Infrastructure program would develop the ICT infrastructure necessary to facilitate some of the earlier programs and enable the creation of a knowledge-based workplace, delivery of integrated electronic services and improved operational efficiency. Finally, the Infocomm Education program would extend beyond teaching traditional IT literacy skills and focus on developing the capacity of each public organization to take advantage of advances in ICTs.

By 2003, Singapore had gained international recognition for its success in e-Government as it was consistently rated one of the top e-Governments in the world in a number of independent studies (see, e.g., IDA, 2006b). In addition, the era of eGAP I witnessed the launch of several
important e-Governments such as the electronic tax filing system of the Inland Revenue Authority of Singapore (refer to Appendix B) and the “my cpf” portal of the CPF board, which greatly enhanced the effectiveness and efficiency of public service delivery and resulted in massive cost savings for the public organizations involved.

The success of e-Government in Singapore is attributed to the e-Government development framework laid out by eGAP I, which in turn, was dependent on several critical success factors. One of the key factors was the amount of resources committed to making the programs of eGAP I work. The Singapore government committed US$1 billion between 2000 and 2003 to the implementation of eGAP I. In addition, through the efforts of the IDA, the Singapore government demonstrated a strong commitment to transform the public sector through the use of ICT, which provided inspiration and leadership to all ministries and statutory boards in the public sector. A second factor that was instrumental to Singapore’s success was the presence of an ICT champion that was influential in the hierarchy of the Singaporean Civil Service. Ms Wu Choy Peng, described the role that Mr Lim Siong Guan; Permanent Secretary of the Finance Ministry and Head of the Civil Service at the time, played in driving the eGAP I initiative.

“He (Mr Lim Siong Guan) drove the project because he saw IT as an enabler of change. I think in Mr Lim’s mind, we were not fast enough.”


The success of eGAP I paved the way for the launch of Singapore’s third Government Infocomm plan, e-Government Action Plan II (eGAP II), in 2003. Mr Lee Hsien Loong, Deputy Prime Minister and Minister of Finance of Singapore during the time, elaborated on the economic and social forces that created the need for eGAP II in a speech during its launching ceremony (PS21 Office, 2003):
“The environment is becoming more uncertain and competitive. We have to be more dynamic, entrepreneurial and self-reliant... Singaporeans increasingly want their views on policies to be heard and the Government needs to be more consultative and open. To develop new policies and enact new laws, we must seek the views and expertise of private sector experts and various stakeholders.”

The US$900 million ICT blueprint incorporated strategies that aimed to transform the Singapore public service into a networked government that provides integrated, accessible and value-adding e-services that meet the needs of an ever-changing environment. Mr Lee further elaborated on the objectives of eGAP II (PS21 Office, 2003):

“Ultimately, eGAP II is not about IT, but about changing the approach to Government. eGAP II will deliver more one-stop, integrated services to meet the needs of our public and businesses.... eGAP II will develop the tools and help us connect citizens with each other and the Government, and involve them in issues that they have expertise in, or issues that affect them”

Adhering to the vision of the Singapore government, eGAP II was formulated with three targeted outcomes: (1) Delighted Customers, (2) Connected Citizens, and a (3) Networked Government (refer to Figure 5). Accordingly, three sets of strategies were formulated to achieve the desired outcomes.
First, to achieve the outcome of delighting customers, the Singapore government sought to increase public awareness of its e-services and provide convenient access to its e-services. To this end, the government embarked on an ambitious project that aimed to integrate the vast array of information and services meant for different customer segments; citizens, residents, businesses and non-residents, into a single portal. The result was the re-launch of the Singapore Government Online portal (www.gov.sg) in October 2004. Integrating three existing portals for the government (SINGOV), citizens (eCitizens), and the business community (EnterpriseOne), the new portal would serve as a single point of access to all government information and e-services for the various customer segments of the Singapore government.

To provide convenient access to the e-services in the portal, the Singapore government undertook extensive measures targeted three customer segments specifically. For the segment of the population that were “digitally excluded”, the government provided free access to the portal at public libraries and community centers for citizens without Internet access. An eCitizen Helper Service was also established nationwide to provide aid to the segment of the
population that faced difficulties in transacting with the government electronically. In addition, by April 2005, self-service kiosks were installed at all public agencies in Singapore with the aim of allowing customers to help themselves to the information and transact electronically without having to queue and wait for physical services. Each public agency was also tasked to ensure that there were ample staff at hand to guide and educate customers at the self-service kiosks, so that they are able to use the e-services on their own in the future. For the business community, initiatives were established to help businesses overcome the barriers to e-service adoption. As an illustration, the government introduced the Business CARE program in November 2004 to provide training for enterprises in using the e-services available in the portal, and lower the cost of adoption by selling computers bundled with internet access at affordable rates.

Finally, for the technology-savvy, customers were allowed to personalize their service experience through MyeCitizen, which permits customers to subscribe to desired SMS or e-mail alerts. Examples of such alerts include reminders to return library books before their due date, and reminders to renew their annual road tax or pay for parking fines. MyeCitizen also allows users to personalize their homepage by populating it with the most frequently accessed e-services of the Singapore government. In addition to MyeCitizen, public organizations are highly encouraged to deploy feasible services on the mobile platform due to the government’s belief that the mobile platform offers more extensive reach, convenience and immediacy for the technology-savvy customer segment.

The second strategy used by the government to delight its customers is to improve the e-service experience. To provide and transform e-services to meet the different and evolving needs of its customers, focus group discussions, public surveys and advisory panels were initiated by the Singapore government to obtain feedback on the needs of the citizens. In
addition, a set of Web Interface Standards (WIS) were established in August 2004 to define a framework for designing government websites. The aim of the WIS was to facilitate ease of navigation and provide a consistent customer experience by standardizing key features, naming conventions and the basic layout of websites by 2007. Through the WIS, the government’s need for standardization and the individual public organization’s need for a unique identity are balanced; providing a consistent, easy-to-use interface for citizens while allowing individual public organizations flexibility in customizing their suite of e-services.

Another measure used to improve the e-service experience and instill customer confidence is the implementation of the national trust mark scheme, TrustSg. E-governments that excelled in the areas of data privacy, information disclosure, service fulfillment and best web practices adoption were accredited and awarded with the TrustSg seal on their websites. The initiative provided the impetus for public organizations to continually examine and improve on their online practices and by October 2004, 78% of all eligible Government agencies had been accredited by the TrustSg scheme.

In an attempt to make their e-services as inclusive as possible, the Singapore government also identified an essential tier of e-services for enhancement in accordance to the World Wide Web Consortium Accessibility Guidelines (WCAG). The WCAG is an international standard adopted by governments worldwide, including the Australia, Canada, and the United Kingdom, for the development of websites friendly to people with disabilities.

More importantly, a fundamental paradigm shift occurred in the mindset of Singapore government. The government realized that the key to improving the e-service experience is to deliver integrated services from a customer-centric perspective rather than an agency-centric perspective. Consequently, there was a strong drive to deliver more e-services that were horizontally-integrated across different public agencies to provide a seamless service
experience for the private and people sectors. The enhanced service delivery paradigm (refer to Figure 6) was termed “Public-Private-People Integration”, and the new paradigm challenged public organizations to drop their agency-centered mentality and focus on the customers’ needs, to generate opportunities for radical improvements in public service delivery.

Second, to attain the objective of having connected citizens, the Singapore government actively pursued a strategy of citizen engagement through active consultation and virtual communities. The view of the government was that citizens can play a more active role in the development of the nation. Mr Lee Hsien Loong, who became Prime Minister of Singapore in August 2004, elaborated during his inaugural National Day Rally speech:

“We should have an open society which is welcoming of talent, which welcomes diverse views, is yet cohesive and has a sense of common purpose. And we should be a community where every citizen counts, where everyone can develop his human potential to the full and everyone participates in building and repairing and upgrading this shared home which is Singapore.”
The vision of the new Prime Minister stirred the public sector into action as public organizations began to seek new ways of community building and encouraging active citizen involvement in the policy making process. Consequently, public organizations in Singapore began to explore the ways in which ICT may be used to (1) explain public policies and their underlying rationale, (2) provide new channels for public feedback on policy formulation and review, and (3) encourage active citizen participation in community building activities.

A centralized portal was established to provide electronic matching and information for citizens who wished to volunteer for community services. ICTs were also extensively used to form new virtual communities and support existing physical communities. In addition, the Singapore Public Service's launched its Consultation Portal (www.feedback.gov.sg) in April 2003 to provide a new channel for citizens to voice their opinions on national issues and public policy proposals, contributing towards a more consultative approach to policy making. The portal provides a single access point or citizens who wish to review and provide feedback on all the new policy proposals of the Singapore government. Since its inception, the portal has been revamped to support e-polling and provide references to related policies to enable citizens to better understand public issues. Citizens are also permitted to engage in debate with fellow citizens on a myriad of policy issues in a discussion forum, or comment on ministry-specific policy consultation papers through the e-Consultation Paper channel.

Finally, to achieve the goal of having a networked government, the Singapore government endeavored to foster greater collaboration between different public organizations. ICT was perceived as a key enabling factor to achieving inter-agency collaboration and the government began looking at ways in which ICT can help public organizations transcend their organizational boundaries, share information, and leverage on a collective pool of knowledge to deliver consistent, integrated and responsive services to their customers.
A Service-Wide Technical Architecture (SWTA); a technical framework comprising of principles, standards, and guidelines on the use of technology components, was established to facilitate inter-operability and information sharing across agencies. The SWTA paved the way for public organizations to provide seamless, integrated e-services to their customers and its purpose was to reduce integration complexity, promote greater economies of scale and increase re-use of components among the ICT systems of different public organizations. The SWTA was conceived as part of a broader Singapore Government Enterprise Architecture (SGEA), a blueprint that aims to achieve complete business process and information interoperability in the public sector by 2007.

In addition, with the heightened threat to information security as a result of inter-agency information sharing, an integrated, proactive and preventive approach was adopted to ensure the Government’s preparedness for any ICT-related contingency. Government-wide security policies and guidelines; benchmarked against the best security practices of the private sector, were also established to safeguard the confidentiality and privacy of the shared information.

iGOV2010 (2006-2010)

At the end of 2006, the results of eGAP II (PS21 Office, 2006) were vastly encouraging. In 2005, 85% of the e-government users were found to be satisfied with the overall quality of the e-services, while 9 out of 10 citizens who had the need to transact with the government opted to conduct their transactions electronically. The typical profile of an e-government user is a white-collar worker between 20 and 39 years old. In contrast, citizens who used conventional, non-electronic means to transact with the government tended to be aged 50 and above, likely to hold blue-collared jobs, were employed, housewives or retired. An e-government user who professed satisfaction with the quality of e-services explained:
“I take advantage of e-services because they save me a lot of time and they are easy to use”

Encouraged by the success of eGAP II, as the three-year Government Infocomm Plan lapsed, the Singapore government launched a new US$1.38 billion five-year masterplan that they termed “iGov2010”, which aimed to transform the Singapore government into “an Integrated Government (iGov) that delights customers and connects citizens through Infocomm” (IDA, 2006c). Mr Raymond Lim⁸, Minister for Prime Minister's Office and Second Minister for Finance and Foreign Affair, drew comparisons between iGov2010 and eGAP II at the annual e-government forum in which the masterplan was unveiled:

“Under iGov2010 we will invest S$2 billion to transform backend processing to achieve front-end efficiency and effectiveness. The principle to think "Customer" and "start with the user in mind" in everything we do remains the same in iGov2010. Rather, what is new is the strengthened focus and emphasis on transcending organizational structures, changing rules and procedures, to reorganize and integrate the government around customers' and citizens' needs and intentions”

iGov2010 was developed in consultation with the public sector, private organizations and the general public. As the fourth Government Infocomm Plan of the Singapore Public Sector, iGov2010 envisions an integrated government with all public organizations working as one, exploiting the opportunities of synergy and integration to exceed the expectations of the citizens it serves. The masterplan consists of four strategic thrusts (refer to Figure 7): (1) Increasing reach and richness of e-services, (2) increasing citizens' mindshare in e-engagement, (3) enhancing capacity and synergy in government, and (4) enhancing national competitive advantage.

⁸ Mr Raymond Lim is currently the Minister for Transport and the Second Minister for Foreign Affairs in Singapore
The first strategic thrust of iGov2010 seeks to increase the reach and richness of e-services with the objective of reaching even more citizens through the use of ICT. To extend the reach of its e-services, Initiatives such as CitizenConnect and BizHelper were established. CitizenConnect is the continuation of a program that was initiated during eGAP II that targets citizens without access to the Internet. CitizenConnect Centers were established at the neighbourhood community clubs that provided free access to the government’s e-services, while dedicated service officers are on hand to educate users and assist in completing the transactions. BizHelper, on the other hand, was a similar service targeted at business owners that charged a nominal fee for their services at privately-run BizHelper Centers.

In addition, the trend of pushing e-services onto the mobile platform continues as the Singapore government sought to take advantage of the 100.8% mobile phone penetration rate in the country. As an illustration, the CPF board launched the mPAL service that allows employers with less than 10 employees to submit their CPF contribution details using a mobile phone in three easy steps. The use of the mobile platform is thought to be particularly attractive to busy, technology-savvy working professionals who are constantly on the move.
There are also plans in the pipeline to establish a single SMS number for all government mobile services, utilizing a standardized SMS format to simplify the process of transaction.

To improve the richness of its existing suite of e-services, the Singapore government sought to create more extensive feedback channels to gain further insights into their customers’ needs and preferences. In addition, the government broadened their integration efforts to include private organizations, with the objective of minimizing the number of interactions that a citizen has to undergo in completing a single transaction.

The second strategic thrust of iGov2010 seeks to increase the citizens’ mindshare in e-engagement. Under eGAP II, ICT had allowed Singaporeans all over the globe to access public information, participate in public policy consultations, and provide feedback to the government to stay connected and engaged with Singapore. The second strategic thrust of iGov2010 efforts seeks to go beyond eGAP II by actively engaging citizens in the policy-making process. To this end, the Singapore Government Online portal was revamped with an improved interface; designed to facilitate easy navigability and clear information presentation, in belief that an effective and aesthetically appealing interface will increase the “stickiness” of the portal, attract citizens to participate actively in online interactions and provide feedback to the government. To illustrate, animated graphics and video snippets were used to convey information in an interesting and lively manner, while content search functionality was added to most of the existing websites of public organizations to support information search and retrieval. Separate consultation areas were also established for three specific customer segments; private organizations, youths and overseas Singaporeans, in the Singapore government’s Consultation Portal to facilitate dialogue on national issues and policy proposals from a diverse range of perspectives.
In addition to actively engaging citizens in policy-making process, web technologies were also leveraged to foster bonds and build communities within different segments of the population. For example, the Singapore government established the Youth Portal (www.Youth.sg) in February 2006. The Youth Portal is a one-stop portal for Singaporean youths to participate in community services. By offering young Singaporeans easy access to information on the community initiatives that their peers are engaged in, and information on how to start their own community activities, the Singaporean government hopes to build stronger ties between members of this population segment while creating social gains for the nation as a whole.

The third strategic thrust of iGov2010 seeks to enhance the capacity and synergy in the Singapore government. The new mantra of the public sector is “do more with less”, which requires a greater extent of collaboration and integration across business processes, knowledge and information systems. The SGEA initiated under eGAP II was seen as one of the key means of bringing about integration and the corresponding efficiency gains. Under iGov2010, the scope of SGEA was expanded as extensive data and application standards were established to facilitate greater integration and coordination across agencies. An illustration of the workings of the SGEA is the establishment of the Center of Shared Services (Vital.org), which integrates common Finance and Human Resource functions of the public organizations in Singapore to bring about economies of scale for the public sector.

ICTs were also leveraged to transform the job scope of public servants, and create solutions for the routine challenges that they typically encounter. As an illustration, mobile technologies were exploited to allow public officers to work from home, while collaborative desktop tools were used to support work across various departments and agencies. In 2006, the Singapore government also embarked on an ambitious project that sought to establish a
Standard ICT Operating Environment (SOE). Targeted for completion by 2010 at a cost of US$918 million, the SOE involves the standardization of computing and network components across the public sector, making it easier for public agencies to develop new applications on all desktops across the public sector, and establish a stronger, more consistent corporate identity.

Finally, the fourth strategic thrust of iGov2010 seeks to leverage the integrated government to create competitive advantage for Singapore on three different levels. On the industry level, the Singapore government sought to collaborate with the private ICT industry in the creation, development and export of e-government solutions to accelerate the growth of the private ICT sector. ICT products and services will be marketed as “Created-by-Singapore” to nations that wish to tap on Singapore’s considerable e-government expertise.

On the national level, ICT was used to bolster its macroeconomic infrastructure to attract foreign investments to Singapore. This entailed transforming various sectors in the economy through a strong collaborative effort between relevant public organizations and major players in the various industries. To illustrate, an example of one such initiative is TradeXchange, an integrated trade and logistics platform established to support the exchange of commercial and regulatory information for organizations along the entire trade and logistics value chain. It integrates public services; such as the application for trade permits and customs declarations, with private sector offerings; such as the promotion of financial services and insurance, to simplify the trade permit declaration, reduce the number of interactions necessary to complete a transaction, and, on the whole, provide the trade and logistics community with a total customer service experience. Finally, at the international level, the Singapore government sought to partner regional countries in the implementation of ICT initiatives to accelerate the rate of development. The objective is to strengthen Singapore’s national
Mr Raymond Lim elaborates:

“iGov2010 is well-positioned to strengthen Singapore's national competitive advantage, as well as its reputation as a centre of excellence and a global showcase for ideas, innovation and knowledge. Through partnerships and collaborations in the international arena, we will be a world-class city where people live, work and play through infocomm, technologically-advanced and well-connected to the rest of the world”

While iGov2010 has not arrived at fruition, The Singapore government has established ambitious targets for its fourth Government Infocomm Plan. By 2010, the government aims to have (1) 80% of users who are very satisfied with the overall quality of e-services, (2) 90% of users who would recommend others to transact with the government through electronic means, and (3) 80% of users who are very satisfied with the level of clarity and usefulness of information published online concerning government policies, programs and initiatives.

DISCUSSION

To structure our discussion on Singapore’s e-government journey, we identified six theoretical constructs that were particularly pertinent to the events, activities and decisions that transpired. The six constructs are: (1) Philosophy of governance, (2) Level of ICTs, (3) Contributing factors, (4) Effectiveness of strategic ICT plans, (5) E-government maturity and nature of ICT use, and (6) Nature of public service delivery. Next, we organize our discussion of the six constructs into 4 theoretical propositions which we will elaborate accordingly in the sections that follow.
The Fit between the Underlying Philosophy of Governance and the Level of ICTs

Based on Singapore’s e-government journey of 27 years, it was evident that the strategic objectives of the Singapore government during each of the four Government Infocomm Plans were heavily influenced by the evolution of the underlying philosophy of governance. During the first phase, the emphasis of the CSCP was on enhancing internal efficiency; transforming public agencies from labor-intensive to capital-intensive organizations through the automation of routine work processes and paper work reduction. To illustrate, the TradeNet (refer to Appendix A), and PortNet initiatives that were representative of ICT use during this era all had a common aim: The reduction of manpower and paperwork, as well as the automation of work processes. These strategic objectives appear to be guided by conventional notions of Weberian Bureaucracy that was prevalent in Singapore during that time (see, e.g., Ho, 2002), which advocated the importance of standardizing and routinizing organizational processes for the purpose of efficiency.

During the second phase, the key strategic thrusts of eGAP I were focused on developing assets and competencies to revolutionalize the nature of public service delivery. As the examples of the e-filing system of IRAS (refer to Appendix B) and the “My CPF” portal of the CPF board illustrate, electronic transactions enabled by the maturing Internet technology were used to provide services to the three main stakeholder groups of the Singapore government: Citizens, Businesses and Employees. The use of electronic transactions not only provided the public organizations with considerable cost savings, but at the same time, the constant availability and the ubiquitous nature of the underlying Internet technology made it increasingly convenient for the stakeholder groups to transact with the government, improving the responsiveness of the government agencies to the customers that they serve.
In the third phase, the key strategic thrusts of eGAP II had the convergent objective of achieving horizontal integration between different public organizations to provide seamless, one-stop services for its customers. The re-launch of the Singapore Government Online Portal; which integrates three separate portals for the government, the citizens and private firms, and the launch of initiatives from various public organizations; such as the NS portal that integrates the portals for National Servicemen from the Ministry of Defense and the Ministry of Home Affairs, clearly illustrates the drive towards integrated, end-to-end services. The creation of a “networked government” provided greater convenience to the customers of the public organizations as they could access relevant e-services from a single access point, while the integration of the various portals of different public organizations helped to standardize the interface that is put forth to the customers, improving the ease and consistency of transactions with the government and consequently, the responsiveness of the government to the needs of their citizens on the whole.

The aim of enhancing responsiveness, the perception of citizens as customers rather than subjects (Vigoda, 2002), and the paradigm shift towards customer centricity during eGAP I and eGAP II reflects the adoption of a new philosophy of governance akin to the New Public Management paradigm (see, e.g. Page, 2005) that was revolutionalizing the mode of governance in many developed countries worldwide. The new paradigm; which advocates the importance of better customer services, decentralization, market mechanisms, cross-functional collaboration and accountability, resulted in the formulation of strategic thrusts that seek to improve the responsiveness of the government towards the needs of its citizens via the use of electronic transactions in eGAP I, and the horizontal integration of the e-services of various public agencies in eGAP II.
Finally, in the last phase, the emphasis of the strategic thrusts of iGov2010 appear to have moved beyond improving responsiveness to enhancing collaboration between the government and its main stakeholder groups. The aim is to achieve greater integration between the public, private and people sectors, and to this end, community building tools that provide channels for feedback and citizen engagement are increasingly being used in e-governments such as the Consultation Portal and the Youth Portal to promote active participation in the process of policy making and dialogue on National issues. While Singapore has traditionally been criticized for lacking in political pluralism, such initiatives appear to indicate that a gradual progression towards a dynamic mode of governance (Neo and Chen, 2007) in Singapore has materialized (Sriramesh & Rivera-Sanchez, 2006), and this has resulted in a drive to increase citizen involvement in policy debates, decisions and actions, and the establishment of various interaction mechanisms for civic engagement (Cooper et al., 2006; Scott, 2006). The evolution of the key strategic objectives and the underlying philosophy of governance across the four Government Infocomm Plans are summarized in Table 3.

In addition to the influence of the underlying philosophy of governance, the strategic ICT plans of the Singapore government was also constrained by the availability and limits of the ICTs existing at the time. For example, prior to the invention of the Internet early in the era of the CSCP, there was no way of using ICTs as a medium to deliver public services to a broad base of the population. Consequently, as the examples of TradeNet and PortNet illustrate, the focus of the ICT plans were on improving internal efficiency by automating routine transactions between private organizations and public agencies, and paperwork reduction using the existing EDI technology. Similarly, as Internet technologies emerged and matured, they provided the government with a medium to (1) interact with the citizens later during the era of the CSCP, (2) transact with the three main stakeholder groups during the eGAP I phase, and (3) integrate the services of various public agencies during eGAP II. Further, the
emergence and the rapid adoption of Web 2.0 technologies more recently has enabled the government to formulate plans to leverage ICT for increasing participation if the process of governance in the iGov2010 phase.

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<table>
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<tr>
<th>Key Strategic Objectives</th>
<th>Internal Efficiency: Improve internal efficiency through work process automation and paperwork reduction</th>
<th>Responsiveness through Electronic Transactions: Use ICT to facilitate transactions between the government and 3 main stakeholder groups</th>
<th>Responsiveness through Horizontal Integration: Transform public service in a networked government that delivers accessible, integrated and value-adding services</th>
<th>Collaboration through 3P Integration: Become an Integrated Government (iGov) that delights customers and connects citizens through the use of ICT.</th>
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Table 3: The Underlying Philosophy of Governance and the Strategic ICT Plans

Yet, although it is apparent that the philosophy of governance and the level of ICTs are both important determinants of the form and nature of the strategic ICT plans of a government, we contend that each of these factors in isolation does not ensure the effectiveness of the plans. For example, if a government is mired in the mindset of Weberian bureaucracy, the mere existence of Web 2.0 technologies is unlikely to provide sufficient drive on the part of the government to adopt initiatives the fosters civic engagement. Or vice versa, a government that readily embraces dynamic governance will find it difficult to reach out individually to a substantial proportion of the populace without the existence of the Internet and Web 2.0 technologies. As the effectiveness of the strategic ICT plans is contingent on the fit between the underlying philosophy of governance and the state of ICTs, we propose that:
Proposition 1: The effectiveness of the strategic plans for ICT use in public organizations depends on the fit between the level of existing ICTs and the underlying philosophy of governance

Contributing Factors

Empirical evidence from Singapore’s e-government journey also reveals a number of factors that were crucial to the effectiveness of e-government strategic planning. The first and most important of these factors is the presence of a central agency with the mandate and the authority to manage the strategic ICT plans of the government. As illustrated by the critical role of the NCB during the CSCP and the IDA since the era of eGAP I, a central agency, imbued with sufficient authority, is critical to (1) conceptualizing and refining the government-wide strategic ICT plans, (2) communicating the strategic ICT vision of the government, (3) enforcing compliance with the strategic ICT plans among the agencies in the public sector, and (4) coordinating and organizing existing assets and competencies into effective resource configurations that contributes to the effectiveness of e-government strategic planning.

A second key factor that determines the effectiveness of the strategic ICT plans of a government is the level of funds available for the enactment of the plans. From the case data, it is evident that each of Singapore’s Government Infocomm Plans was well-funded, and the funds were necessary for (1) acquiring the necessary ICT infrastructure, (2) training ICT professionals and public servants in the use of ICTs, (3) encouraging technology experimentation to encourage pioneering technological initiatives in various organizations across the public sector, and (4) providing the means of bridging the digital divide for the segment of the population that were excluded with the implementation of new technological initiatives.
A third integral factor relates to the comprehensibility and concreteness of the strategic ICT plans. Based on the experience gained from implementing the CSCP, each of Singapore’s subsequent Government Infocomm Plans were structured with an overarching ICT vision that communicates the overall objectives of the ICT plans, a number of key strategic thrusts designed to achieve the vision, and specific programs under each strategic thrust that provide concrete guidelines for the various public organizations to follow. This tiered structure makes it easier for the organizations across to public sector to understand the overall intent of the government, the role they play in achieving the overall goals and the means for achieving these goals, which in turn, increases the commitment and level of compliance of the organizations to the plans.

A final factor critical to the success of the strategic ICT plans is the development of complementary assets and competencies necessary for the enactment of the plans. These complementary assets and competencies may take the form of (1) ICT human resources necessary for the effective utilization of ICTs; which the Singapore government developed resources through the centralization of ICT manpower training and the revamp of ICT training in educational institutes, (2) ICT standards that establish consistency of ICT use among organizations across the public sector; such as the GRIN network, the WIS initiative and the SWTA framework, or (3) ICT infrastructure in the form of hardware, software and networking and telecommunications components.

Collectively, we term these factors “Contributing Factors” and posit that each of these factors is an important determinant of the effectiveness of the strategic ICT plans of a government. Accordingly, we propose that:

*Proposition 2: The presence of a central agency, the adequacy of funding, the comprehensibility and concreteness of the strategic ICT plans, and the development of*
complementary assets and competencies are all crucial to the effectiveness of the strategic plans for ICT use in public organizations.

E-Government Maturity and the Nature of ICT Use in Public Organizations

Based on the empirical findings from Singapore’s e-government journey, it is also apparent that the strategic ICT plans of the Singapore government had a profound effect on the general level of e-government maturity and the nature of ICT use in the public organizations in Singapore. In particular, as Singapore’s Government Infocomm Plans became increasingly targeted and effective at meeting the needs of the citizens, there was a corresponding increase in e-government maturity and advances in the complexity of ICT use across the entire public sector, along the lines of the typical e-government stage models in the existing literature (see, e.g., Siau & Long, 2005).

To illustrate, guided by the overarching objective of internal efficiency during the era of the CSCP, ICTs were used in numerous agencies in the Singapore public sector as “Management Information Systems” (Holden, 2003) to facilitate routine transaction processing and automated process reporting. This is illustrated by the examples of the EDI-based TradeNet and PortNet, and it was not until the emergence of web technologies that ICT was first used to for front-end interactions with the citizens. The web technologies enabled public agencies to provide static information and email links on their websites that corresponds to the Web Presence and the Interaction phases of the e-government maturity model (Siau & Long, 2005).

As the strategic objective of the ICT plan evolved towards increasing effectiveness during the period of eGAP I, web-based e-services that enabled self-service transactions; such as the e-filing system of the IRAS and the My CPF portal of the CPF board, were established in e-governments across the public sector to facilitate the aim of enhancing the responsiveness of
the government through electronic transactions. This corresponds to the Transaction phase of
the e-government maturity model (Siau & Long, 2005). Similarly, the subsequent drive
towards integrating the services of different public agencies across the public sector;
epitomized by the revamp of the Singapore Government Online Portal and the launch of
smaller integrated portals such as the NS portal, originated from the increasingly effective
strategic objectives of eGAP II, and corresponds to the Transformation phase of the e-
government maturity model (Siau & Long, 2005). Finally, the emergent use of community
building tools; such as online polls, blogs and discussion forums, in numerous portals across
the Singapore public sector facilitate the higher objective of enhancing collaboration through
3P integration and corresponds to the E-Participation phase of the e-government maturity
model (Siau & Long, 2005).

The tight coupling between e-government maturity and the effectiveness of Singapore’s
Government Infocomm Plans demonstrates that e-government maturity is not emergent but a
consequence of a deliberate, comprehensive strategic ICT plan. Based on the observed
relationship between the growing effectiveness of these strategic ICT plans and the increasing
e-government maturity across the entire public sector in Singapore, we propose accordingly
that:

Proposition 3: The general level of e-government maturity and the nature of ICT use
are dependent on the effectiveness of the strategic ICT plan.

The relationship between the strategic objectives of each ICT master plan, the resultant use of
ICT in the public sector and the stages of e-government maturity attained in each phase are
summarized in Table 4.
Towards Public Sector Service Innovation

From Singapore’s e-government journey, it is also apparent that the depth and breadth of ICT use in public organizations has resulted in a fundamental transformation in the nature of public service delivery. During the period of the CSCP, when the focus of ICT use was on automating repetitive work processes and paperwork reduction, ICT was not actively used to for front-end interactions with citizens. As such, citizens were generally treated as outsiders, and although interactions in the form of email links were available late during this period, communications between citizens and the government agencies remained largely dictatorial. In addition, the source of value creation tended to stem from operational improvements from internal organizational sources (Tan & Pan, 2003).
In the era of eGAP I, the focus of ICT use shifted to enhancing the responsiveness of the public agencies through enabling self-service electronic transactions. With more channels for interactions with citizens available, and the establishment of web-based e-services in numerous e-governments across the public sector, citizens adopted the role of clients and capacity for negotiation increased in communications between the government and the citizens. In addition, value creation has been extended to both internal and external stakeholders although the value creation remained centered on operational efficiency (Tan & Pan, 2003).

With the advent of eGAP II, the nature of ICT use became that of enhancing the responsiveness of the public agencies through the integration of e-services from different public organizations. As e-governments in Singapore moved towards the Transformation phase (Siau & Long, 2005) of maturity, public organizations became more customer-centric, breaking organizational silos to provide integrated, end-to-end services to the public. Consequently, the role of citizens became that of valued customers in that public organizations became proactive in soliciting customer requirements and feedback for the purpose of improving service delivery. Communications were integrative with the establishment of more responsive communication links, and value creation became strategic in nature as business processes were re-engineered with the help of ICTs towards the attainment of not just operational efficiency, but customer satisfaction as well.

Finally, under the iGov2010 plan, as the focus of ICT use shifted towards promoting collaboration and civic engagement through 3P integration, the pervasive, widespread use of community building tools such as discussion forums, blogs and online surveys indicate that citizens are playing an increasingly strategic role in public service delivery. With more electronic channels for suggestions and feedback, citizens have become strategic partners of
the public organizations and as Singapore continue to progress towards total 3P integration, it is expected that individual citizens and private sector businesses will eventually form strategic value networks that enhances public service delivery further. Communications between citizens and government are no longer bi-directional, but through the rich channels for interactions, a complex web of interactions now exists between multiple stakeholders of public services. Value creation does not simply originate from either the agency or the citizens alone, but can result from the interactions and joint discussions of multiple stakeholders. The evolution of the public service delivery through public sector service innovation under each Government Infocomm Plan is summarized in Table 5.

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<tr>
<td>Evolution of Public Service Delivery (Tan &amp; Pan, 2003)</td>
<td>Role of citizens</td>
<td>Mode of Communication</td>
<td>Mode of Value Creation</td>
<td>Clients</td>
</tr>
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</table>

Table 5: Public Sector Service Transformation

As it is evident that increasing e-government maturity and the growing depth and breadth of ICT use in public organizations are associated with the evolution of public service delivery, we propose accordingly that:

*Proposition 4: The nature of ICT use in public organizations influences the process of new service design to enable public sector service innovation*
CONCLUSION

Summary

The criticality of e-government research, the high rates of failure among e-governments worldwide and the gaps in the existing e-government literature provide the motivation for a detailed examination of e-government implementation and development. As e-government success tend to originate from a formal and rigorous strategic planning process (Chan et al., 2007), this study has focused on the strategic ICT plans of Singapore; one of the leading e-government nations in the world (Accenture, 2007), in an attempt to extract important lessons, experiences and best practices that can potentially be of benefit to e-government academics and practitioners.

Tracing the evolution of the strategic plans for ICT use in public organizations over the past 27 years, a framework (refer to Figure 8) that depicts the antecedents and consequences of e-government strategic planning is inductively derived. Specifically, the effectiveness of the strategic plans for ICT use in public organizations is determined by the fit between the underlying philosophy of governance and the level of ICTs, as well as the existence of contributing factors; such as the presence of a coordinating central agency, the availability of adequate funding, the comprehensibility and concreteness of the strategic ICT plans and the development of complementary resources and capabilities. As the plans become increasingly effective at meeting the needs of citizens, e-government maturity and the depth and breadth of ICT use in public organizations correspondingly increase, which in turn, leads to service innovation in the public sector.

Theoretical and Practical Implications

This article has important implications for both research and practice. For researchers, this article is significant in that it addresses the strategic planning aspects of e-government
development and provides an empirically supported framework that identifies the antecedents and consequences of e-government strategic planning. Yet, as generally acknowledged in the field of e-government, research in this area is still in the nascent stage (see, e.g. Heeks & Bailur, 2007). Future research can certainly contribute by statistically validating the propositions of this study or use the developed framework as the foundation for building a more comprehensive, general model of e-government strategic planning.

For practitioners, the framework developed in this study provides important indications on e-government strategic planning. In particular, the developed framework sheds light on (1) the importance of the fit between the underlying philosophy of governance and the level of ICTs, (2) the factors that facilitate the effectiveness of the strategic ICT plans, and (3) how e-government maturity and the nature of ICT use alters the level of citizen involvement with defining how public service are delivered, leading to public sector service innovation. In tracing the critical factors and the intermediate steps leading to public sector service innovation, it is hoped that this framework will prove useful to practitioners in reevaluating
their investments in e-government, so that effective and sustained innovation can be attained in the face of ever-growing public expectations.

REFERENCES


APPENDIX A - TRADENET

1. Background

The Singapore Trade Development Board (TDB), now known as International Enterprise Singapore, was founded in 1983 for trade facilitation and promotion purposes. As a trade facilitator, TDB provided basic information on export practices, helped traders overcome technical barriers, and processed trade declaration documents for imports and exports. As a trade promoter, TDB actively promoted the export of goods and services, expansion into new markets, and the development of Singapore as a base for international businesses.9 Faced with a shortage of labour in the 1980s, the turnaround time for processing of trade declaration documents, which spanned from two to four days, was deemed as unsatisfactory. The 1985 recession was a catalyst for the development of TradeNet, when the Economic Review Committee proposed to leverage IT to improve trade competitiveness. Singapore was further propelled to realize this notion when Hong Kong revealed that it was working toward the creation of TradeLink, a trade-oriented electronic data interchange (EDI) system in 1986.10

2. Paper-Based Trade Administration

The verification of trade declaration documents is a critical component of the trade administration process. This ensures that traders comply with legal requirements such as health and safety issues, and the payment of custom duties. In 1986, TDB processed an average of 10,000 trade declaration documents daily. As the volume of international trade increased, the costs of cumbersome trade procedures became increasingly visible. The paper-based trade administration process thus put both public agencies and traders in a tight spot.

From the perspective of the public agencies, the boredom and monotony of performing repetitive tasks impaired staff productivity and morale, despite constant recruitment and training by TDB to meet voluminous paper management demands. This impeded the staff's ability to carry out value-added activities as they were perpetually overwhelmed by paperwork. In addition, the lack of coordination between TDB and the regulatory bodies due to their unconnected computer systems led to substantial overlap of information. Traders were often required to submit the same data in different formats to various public agencies in order to get approval for permit application. The complicated document flow scheme in the 1980s is illustrated in Diagram 1. All in all, the paper-based administration process hindered TDB's ability to provide efficient services to the trading community.

For traders, frequent visits to different agencies in geographically dispersed locations were not only time-consuming, but also incurred significant transportation costs which could otherwise be avoided if the trade procedures were streamlined. Furthermore, the lack of coordination between public agencies attributed to the delayed clearance of documents and approval. This slowed down the movement of goods, and thus raising customer dissatisfaction, tying up labour to maintain slack resources, and incurring additional warehousing costs to traders. As a whole, the paper-based administration process reduced the competitiveness of traders and Singapore as a premier international trading hub.

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9 www.iesingapore.gov.sg
3. TradeNet-Based Trade Administration

The problems associated with the paper-based trade administration process prompted TDB to set up TradeNet together with the National Computerization Board. TradeNet is an EDI system that links public agencies and the trade-related sectors to allow exchange of business documents in a structured format electronically. The ultimate purpose of this EDI system is to consolidate multiple trade documents into a single document. The simplified document flow scheme is illustrated in Diagram 2. A 1985 study by the Swedish Trade Procedures Council showed that the costs of trade procedures corresponded to between 4 and 7 percent of the value of goods traded. Based on this study, it was estimated that if TDB could reduce procedural costs by 1 percent, it would save S$1 billion annually for the trading community.
Commitment from public agencies and traders was the key to the effective implementation of TradeNet. In light of this, CEOs of government agencies and leaders of trade associations came together to form an executive committee to solicit support from all trade-related parties. Although public agencies had the technical expertise, they lacked marketing skills to convince traders of the benefits of TradeNet. TDB thus reckoned that it was viable to set up a market-sensitive and performance-driven private organisation to implement and market TradeNet. This triggered the development of Singapore Network Services Private Limited (SNS) by TDB together with Singapore Telecoms, Port of Singapore Authority, and Civil Aviation Authority of Singapore. With its official launch by SNS in 1989, TradeNet became the first nation-wide EDI in the world. TradeNet received international recognition when it won the Partners in Leadership awards from the US Society of Information Management in the same year.

TradeNet brought unprecedented changes to the trading community. It eliminated the need to submit multiple copies of trade declaration documents physically to various public agencies. Traders are now only required to submit a single copy of trade declaration document through TradeNet, without any supporting documents. Once the document is validated, a notification with a permit number will be emailed to the applicant. Fees charged for document processing, custom duties and network usage will then automatically be deducted from traders' bank accounts twice a week. More notably, the trade administration process once took two to four days, but it had been reduced to as little as 15 minutes following implementation of TradeNet.

4. The Impacts of TradeNet on TDB
(a) TradeNet's Impact on Organizational Structure

As a consequence of the implementation of TradeNet, the organizational structure of TDB had been altered in terms of unit size, unit grouping, job specification, reporting mechanism, control mechanism, and communication mechanism. Before the inception of TradeNet, there
was only one trade administration unit in TDB, which consisted of over 100 staff performing homogeneous and repetitive task manually under close supervision. Trade declaration documents and supporting documents were examined carefully before approval was granted and communication between TDB and the trading community was mostly done via phone and mail.

After the inception of TradeNet, the trade administration unit was split into four units with a streamlined staff performing differentiated and specialized tasks without supervision. All documents were scanned to detect fraud after approval was granted. Electronic messages facilitated the communication between TradeNet participants. The widespread adoption of TradeNet led to the closure of manual processing counters, relieved the document processing staff from mundane tasks and allowed them to perform value-added activities. In short, TradeNet reduced labor costs and boosted staff productivity.

(b) TradeNet's Impact on Business Processes

The willingness to change the existing mindset to embrace IT was the determining factor of TradeNet's success. TradeNet had transformed public agencies from controlling bodies into trade facilitators. This was evidenced by the elimination of the need for supporting documents upon permit application through TradeNet. TDB believed that drastic improvement could only be achieved if the paperwork was reduced as much as possible. This explained the reason for passing the burden of responsibility on to traders to prove their integrity. Nevertheless, to prevent abuse, outputs from TradeNet would be investigated and traders would be indicted for malpractices.

TradeNet did not only restructure the business processes of TDB, but it also improved the interaction between traders and other public agencies. With the integration of TradeNet into other public agencies' systems, it changed the routine of all the relevant agencies involved. TradeNet's one-stop, round-the-clock operation allows traders to apply for permit electronically anywhere. All related agencies will then retrieve and process the trade declaration documents in a timely manner.

(c) TradeNet's Impact on Business Network

Following the implementation of TradeNet, TDB played crucial roles in facilitating trade procedures and promoting the adoption of EDI applications. As a trade facilitator, TDB was mindful of the need to enhance the competitiveness of the trading community through a better trade administration process and wider range of services. As an EDI advocate, TDB worked hand-in-hand with SNS to explore other potential areas for EDI applications to benefit the trading community.

Apart from that, TradeNet had also helped foster stronger bonds between TDB and all the trade-related stakeholders. Prior to the implementation of TradeNet, standard linkages existed between TDB and all trade-related parties. There were no concerted efforts to improve the handling of trade transactions for mutual benefit. For effective implementation of TradeNet, all the parties involved were coerced to refine business processes by overhauling obsolete procedures and installing new communication equipment. The extensive investments were thus a driving force for the relevant parties to transform the previous business network to a customized one where all involved parties were mindful of the need for inter-organizational collaboration.
(d) TradeNet's Impact on Business Scope

As a controlling body, TDB used to have no interest in investment of any kind. However, a paradigm shift occurred as a result of the implementation of TradeNet, which spurred TDB to try its hand at investment outside the organizational boundaries. Most of its subsidiaries and associated organizations were focused on EDI-related businesses. This initiative was ascribed to the profitability of SNS through aggressive marketing of TradeNet and other EDI applications.

(e) TradeNet's Impact on Efficiency and Effectiveness

Increasing productivity in TDB and enhancing the competitiveness of the trading community were the triggers for the development of TradeNet. Therefore, the two factors to assessing the impact of TradeNet were efficiency (i.e. the ability of TDB to implement the EDI system) and effectiveness (i.e. the achievement of the intended objectives). Studies showed that there was a significant increase in trade volume handled and processing revenue earned since the implementation of TradeNet. Thus, there was no doubt that TDB had successfully boosted productivity through TradeNet. Moreover, TradeNet participants reported that they were satisfied with the TradeNet features and usage price. Hence, it was apparent that TradeNet had realized its goal by making the entire trading community more competitive internationally.

5. Conclusion

TradeNet has greatly facilitated trade transactions in Singapore. It reduced the turnaround time for processing of trade declaration documents, reduced procedural costs, improved interorganizational communication, increased productivity in public agencies, and enhanced the competitiveness of Singapore as a global trading hub. More importantly, it has transformed public agencies from controlling bodies into trade facilitators, which allowed them to provide wider range of services to benefit the trading community. In addition, TradeNet has also made fundamental changes on the organizational structure, business processes, business network, business scope, efficiency and effectiveness of TDB. In sum, the case of TradeNet is a critical part of the Singapore's government pioneering efforts in leveraging IT to enhance business competitiveness.
APPENDIX B – INLAND REVENUE AUTHORITY OF SINGAPORE (IRAS)

1. Background

Taxes are primarily collected to fund government expenditures, as well as achieve economic and social goals. The Inland Revenue Authority of Singapore (IRAS), formerly known as Inland Revenue of Singapore (IRD), is a public agency mandated by the government to administer all aspects of taxation. The antecedent of IRAS can be traced back to 1947 when the Income Tax Ordinance was enacted. Since its independence, the pace and stability of Singapore’s economy grew strongly. Faced with an escalating number of taxpayers, IRD found it increasingly hard to cope with the swelling backlog of tax cases. Meanwhile, another issue faced by IRD was the acute shortage of staff, which was about three times higher than other public agencies. IRD was thus restructured to IRAS to address these problems in 1992.11 Being rated one of the lowest among public organizations in terms of public satisfaction, IRAS was determined to revamp the administratively and bureaucratically complex tax administration process. One of the earliest attempts made by IRAS was the introduction of the phone filing service in 1995, which proved to be a catalyst to the development of the ground-breaking e-filing system in 1998.

2. The e-Filing System

With the launch of the new US$1.3 million e-filing system, both local and overseas taxpayers can file their income tax returns through the Internet. A significant change is the elimination of the need to submit receipts upon filing of returns. This is because the government does not want to simply overlay the e-filing system on the traditional tax filing process as they believed that drastic improvement can only be achieved if the paperwork is reduced as much as possible. Nevertheless, the changes were not applicable to high-income taxpayers who were required to post complete details of their income to IRAS for statistical purposes. Due to the simplicity of the new e-filing system, the user base was only 10 percent of the taxpaying population in the first year of implementation. However, as usage rates increased to 30 percent by 2000, the government decided to extend the system to self-employed individuals that comprised a significant proportion of the population of taxpayers.12 The following sections describes the evolution of the e-filing system.

3. The Evolution of the e-Filing System

Phase I: Digitizing Taxpayer Information

Prior to the creation of the e-filing system, it was estimated that nearly 50 percent of tax returns had yet to be assessed at the end of 1991. To put it simply, the backlog comprised of half of the collected tax returns, and this number grew exponentially each year. The imaging system was thus created in 1992 to deal with this problem. All physical returns were scanned to create digitized images for archiving purposes, thereby dispensing with the need to store paper files. Although the system was not fully automated and human labor was still required to complete the assessment of tax returns, it relieved tax officers from paper-shuffling. More importantly, with all the digital folders stored in a centralized database, tax officers were capable of locating taxpayers' information on the network to serve their enquiries instantly.

11 www.iras.gov.sg
sum, the imaging system reduced administrative costs, boosted productivity and increased public satisfaction.

**Phase II: Automating organizational business processes**

The implementation of the imaging system paved the way for the Inland Revenue Integrated System (IRIS) in 1995. Propelled by the desire to fully automate the tax filing process, IRIS was introduced to provide an integrated one-stop service to taxpayers. According to IRAS, taxpayers can be grouped into two categories. Normal taxpayers; who constitute 80 percent of the taxpaying population and enjoy the liberty to file returns without further validation by tax officers, and high-income taxpayers; who make up of 20 percent of the taxpaying population and require special attention from IRAS.

Making a decision to substantially reduce the level of human resources allocated to normal tax returns, the Workflow Management System, a subsystem within IRIS, was established to transmit unique tax returns to the specific tax officer with the relevant skills. In other words, the implementation of the Workflow Management System saves tax officers from sifting through 80 percent of tax returns annually.

**Phase III: Developing the phone-filing system**

The imaging system was not a panacea for solving all the problems associated with the labor-intensive legacy processes. Data entry by tax officers was still essential for the completion of tax assessment. Therefore, the next phase of re-engineering focused on the automation of the data input function. To this end, the phone filing system was revamped to involve taxpayers directly in the process of data entry to free officers from the mundane, repetitive task of data entry. A series of simple instructions was provided to familiarize taxpayers with in the tax-filing process. However, despite the simplicity of the phone-filing system, it was not well accepted among taxpayers for two reasons. Firstly, it was restricted to only the portion of taxpayers with a single source of income due to security concerns. Secondly, a non-visual tax filing system was a nebulous idea and it raised resistance from most taxpayers.

**Phase IV: Designing the e-filing system**

Undeterred by the lack of popular acceptance for the phone filing system, IRAS continued persisted with its efforts at enhancing the tax filing experience. Riding on the prevalence of the Internet, the Internet e-filing system was introduced in 1998 for those with employment income, which was subsequently extended to all taxpayers in later years. For effective implementation, IRAS incorporated a customer-centric perspective by adopting feedback and suggestions from tax officers and taxpayers. In addition, a one-time use of Electronic-Filing Personal Identification (EF PIN) was introduced for authentication purposes. The PIN was mailed to the taxpayer as the start of each tax cycle, and then terminated when the taxpayer has filed his returns. This saves taxpayers the hassle of trying to remember a number that would be of no use at the end of every tax cycle, and makes the e-filing system more appealing to taxpayers.

**Phase V: Maintaining and improving the e-filing system**

Precautions were taken to prevent contingencies and enhance the efficacy of the e-filing process. Firstly, an operational E-filing Helpline was opened from 8am to 10pm, 7 days a
week during every tax cycle to answer taxpayers' enquiries. Secondly, system maintenance was carried out regularly to ensure the stability of the system. Thirdly, at the end of each tax cycle, a post-mortem was conducted to cross-examine the problems that may occur during the tax filing period. Numerous customers' queries were analyzed and proposed solutions were then incorporated into the e-filing system for the next fiscal year. IRAS also formed an independent Taxpayer Feedback Panel to assess and improve IRAS services. In all, the government's determination and persistency in enhancing the e-filing experience was rewarded with a growing base of e-filers from year to year.

**Phase VI: Extending e-filing services**

Another concerted effort made by IRAS to improve its e-filing services was the auto-inclusion scheme. IRAS managed to secure commitments from various government agencies and business organizations to directly transfer the income portfolio of their employees to IRAS electronically. Taxpayers are now only required to submit a series of zero returns through the e-filing system. As of 2003, this scheme was supported a number of major Singaporean companies, which accounts for 46 percent of all employees in the country. With the verification of tax information done by employers, IRAS is assured of the accuracy of tax returns submitted.

**3. Conclusion**

The evolution of the e-filing system has transformed IRAS from a bureaucratic agency to a customer-centric organization. A number of lessons can be drawn from the case of IRAS. Firstly, the willingness to disregard conventional notions of treating customers as outsiders is imperative to raising customer satisfaction. A deciding factor behind the success of the e-filing system was the strategic management of customer relations. Instead of excluding taxpayers from the e-filing initiative, IRAS treats them as important stakeholders of the organization and tries to address their needs to improve the tax administration process.

Secondly, the case underscores the ability of IT to mend the tarnished image of public agencies by improving internal operation efficiency. The rapid development of IT has resulted in increasing customer demands for an integrated one-stop service. The e-transformation for faster and efficient public service delivery is thus perhaps an inevitable consequence. Thirdly, the case demonstrates that integrative communication helps to align perceptions and concerns of public agencies with those of its stakeholders, and thus reduces apprehension towards innovations. Through constant solicitation of feedback and suggestions from all relevant stakeholders, IRAS was able to secure public confidence in the revamped tax filing system.