Developing Foresight-Based IT Governance Strategies Through Scenario Analysis

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Abstract

The development of the Internet has revolutionized the methods in which governments provide public services by modifying traditional government duties and eliminating obsolete professional strategies and government structures. The increased citizen concern regarding the ability of an e-government to provide timely and effective services and other shifts are not only passively connected to the affairs of relevant units, but also require cross-organizational and collaborative innovative e-government mechanisms. This study examines and compares the development of an e-government in countries such as the U.S., Singapore, Canada, the U.K., Japan, and Taiwan using data obtained from the Brown University Taubman Center for Public Policy, the United Nations Department of Economic and Social Affairs, and the Waseda University Institute of e-Government. The changing of citizen residences is used as the test case for scenario analysis to examine the "current state" of IT governance implementation and to develop "active service" strategies, that is, the establishment of active offices. G2G participation mechanisms and G2B partnership mechanisms are established to improve current conditions.

Keywords: *IT governance, scenario analysis, e-government*

1. Introduction

Since 1992, the application of IT governance concepts and the development of e-governments, including IT outsourcing management, digitization of traditional government duties and procedures, and the 2008 United Nations initiative for interlinked governance [13], have indicated that governments should shift from providing information to providing interactive services. By unifying the services provided by front offices and establishing back office interorganizational connections, the government can provide diverse services and address citizens' dissatisfaction on simple electronic tasks. In the following sections, we describe the evolution of e-government and IT service trends.

1.1 e-Government to e-Governance

e-Government refers to the use of information and communication technology (ICT) to improve the provision of government information and services [10][18]. Broadly interpreted, e-government involves the use of various types of ICT to facilitate government administration. More specifically, e-government refers to the government's use of ICT to provide government services that simplify and improve the transactional relationships among the public sector, the electorate, corporations, and stakeholders. Recently developed IT governance concepts, as be corporate or government IT governance arrangements or structures, including IT infrastructure, usage, and project management methods [11]. The IT Government Institute (ITGI) contended that the inclusion of leadership ability and organizational structure and procedures is necessary to ensure that organizational IT can support and enhance the operational strategies and objectives of organizations.

In recent years, the rapid developments in society and information technology have resulted in the inability of e-government to effectively convey various affairs and phenomenon and its replacement by the broader concept of IT governance. This concept refers to government applications of information and communication technology to improve the quality of governance, including two-way interactive consultations, participation in public affairs, information transparency, and accountability. IT governance emphasizes issues, such as the information management strategy stages, alignment,

decision making, division of labor, and coordination mediation. The development of e-government into IT governance implies government transparency, rapid information transmission, higher administrative efficiency, and superior public service. However, from a heuristic perspective, the majority of IT governance initiatives implemented by various national governments primarily focused on elements of information technology while ignoring social perspectives [4]. The conceptual differences between e-government and IT governance are shown in Table 1.

Table 1. Conceptual differences between e-government and IT governance

Item	e-Government	IT Governance
Concept	Institutionalized public authority and administrative duties	Management of stakeholder programs or activities
Government Role	Supervision through collective decision making	The use of social resources to establish partnerships relationships
Basic Theory	Digitization of services provided by government organizations	Management of government digitization functions
Participants	Legislative bodies and government administration	Stakeholders (government, business, and citizen)
Organizational Model	Hierarchical administrative system	Network, partnership relationships, market, and non-market
ICT Methods	Facilitating management, service, democracy, and public governance functions	Facilitating governance procedures between various stakeholders
Focus	Improving government efficiency, performance, and fairness	Improving government transparency, the accountability of the public sector, and the participation of stakeholders
Mode of dissemination	Providing broad website links and access to known messages	Encouraging community participation and the cooperation of social perspectives
Implementation of Objectives	Government information and electronic service delivery	Public affairs management tools for Internet and electronic businesses

1.2 IT Service

In the domain of IT governance, the ISO/IEC20000 considers service management integration activities that convert interrelated single inputs into outputs using resources and management methods. The ITILv3 defines IT service as a method for achieving the results desired by clients simply and effectively without the burden of special costs and risks. Service management is defined as the provision of an entire organization's service abilities, with organizational ability expressed by the functions and processes of the entire life cycle. The CMMI (Capability Maturity Model Integration) model defines "processes" as activities, with "services" referring to the usable results of these processes instead of the processes themselves. A service is an intangible, nonstorable product that is delivered through the operation of service systems. "Service systems" refers to the integrated and mutually dependent resource combinations that fulfill service demands. Services are the usable nonmaterial and nonstorable results produced by the operation of service systems with or without automatic components. Consequently, IT dependability is effectively the sum total of each department's efforts to improve its own individual quality measures [6].

With increasing support for applications of IT service technology, service providers can maintain higher service standards. This prompted the recent introduction of "service systems" based on IT service management by several international standards in an effort to standardize service processes. Standardized methods improve the quality of service processes and results by providing more structured and proactive working practices that reduce costs while maintaining greater flexibility and faster response speeds to ensure higher quality. Standards include COBIT4.1, CMMI-SVC v1.3, ISO/IEC20000, and ITILv3. This study defines services as "the results produced by service systems." Service systems include all demands required by services, such as work products, procedures, tools, facilities, consumption goods, and human resources.

1.3 Service-Oriented Evolution

IT governance was first considered an important component for IT strategies in 1992 [5] and become an analytical model of ICT [17] [16]. Lawrence and Venkatraman [9] proposed the first governing mechanism for IT outsourcing, which was then developed by Brown [2] into information systems governance frameworks. Sanbamurhy and Zmud [11] developed to IT governance frameworks. Jeremy [8] proposed an e-public service-integrated concept of "front office" and "back office", with the front office providing more humanized (warm) services, such as medical, caretaking, educational, counseling, and public safety services and services centered around civic life and commercial activities, through one-stop and friendly interfaces. This provides greater accountability, openness, transparency, convenience, and participation. The back office should abandon preexisting procedures and attitudes to achieve government process reengineering (GPR) through vertical cooperation/integration, horizontal cooperation/institutional integration, and public/private and third party cooperation to create an open and efficient government system.

The 2008 U.N. e-government report advocated the adoption of a connected governance model : collecting and sharing data and messages through information systems and allowing IT systems to facilitate the interoperation of task processes and data in delivery channels to integrate and share the capabilities and information of government organizations [13]. Connected governance refers to the horizontal integration between various government institutions, the vertical integration between central and regional governments, the connection of interoperable infrastructure facilities, the connection between government and citizens, and the connection between various stakeholders (government, private departments, academic institutions, NGO, and civil society).

2. Scenario Analysis

Scenario analysis uses sequence diagrams defined by the Unified Modeling Language (UML) of object-oriented software engineering concepts as the scenario-modeling tool.

2.1 e-Government Appraisal

The Brown University Taubman Center evaluated 1,667 government websites from 198 countries using 20 criteria: online publications, online database, audio clips, video clips etc. The countries that obtained the highest scores in 2008 were South Korea, Taiwan, the U.S., Singapore, Canada, Australia, Germany, Ireland, the Dominican Republican, Brazil, and Malaysia [3]. In 2010, the U.N. Department of Economic and Social Affairs (DESA) conducted a survey of e-government development in 192 of its member states and released an evaluation report based on 18 indicators comparing government websites, telecommunications infrastructure, and human capital [14]. These indicators include the Percent of staff in government institutions with a computer, disaggregated by gender etc. The results show that South Korea obtained the highest score (0.8785), followed by the U.S. (0.8510), Canada (0.8448), the U.K. (0.8147), and Holland (0.8097).

The Waseda University Institute of e-Government released the results of a global e-government survey on January 14, 2011. Singapore maintained the top position for the third consecutive year, followed by the U.S., Switzerland, Finland, Japan and Canada. This survey assessed seven primary indicators: Network Preparedness, Management Optimization, Required Interface-Functioning Applications, National Portal, Government CIO, e-Government Promotion, e-Participation [15], as shown in Table 2. For this study, we selected the countries that exhibited a superior performance in the three e-government evaluations: South Korea, the U.S., Singapore, Canada, the U.K., Japan, and Taiwan, for further scenario analysis of citizen residence relocation services.

Table 2. Recent e-government ranking

Brown University 2008		United Nations 2010		Waseda University 2011	
1	Korea	1	Korea	1	Singapore
2	Taiwan	2	USA	2	USA
3	USA	3	Canada	3	Sweden
4	Singapore	4	UK	4	Korea
5	Canada	5	Netherlands	5	Finland
6	Australia	6	Norway	6	Japan
7	Germany	7	Denmark	7	Canada
8	Ireland	8	Australia	8	Estonia
9	Dominica	9	Spain	9	Belgium
10	Brazil	10	France	10	UK, Denmark

2.2 Residence Relocation in Specific Countries

Generally, citizen residence relocation services require vertical integration between central and regional government, including ID address revision, voting registration, social welfare, labor insurance, vehicle or license taxation, and residential taxation. Also need horizontal operations such as the transfer of household registration from the original residence to the new residence, Other public utility companies operations, such as the postal services, Internet, telephone, and television provision.

2.2.1 Japan

Residence relocation services are located under the residence relocation tab in the electronic application/residence/home options of the general government portal (www.e-gov.go.jp). The provided services include those related to residency, vehicle use, medical insurance, long-term nursing insurance, pensions, employment insurance, social assistance (low income), and taxes.

Citizens apply for digital certification to log into the general e-government portal. To change household registration, citizens must complete a moving-out application for the local government area office of their previous residence and a moving-in application for the local government area office of their new residence. Furthermore, local government area offices also conduct address-changing procedures for national health insurance. Low-income and single-parent households can apply for an exemption from pension payments every six months through the Ministry of Internal Affairs and Communication Insurance Policy Division. The Human Resource Management Division of the Ministry of Internal Affairs and Communications manages the applications and payments of unemployment insurance, disability benefits, and child allowance, in addition to address change applications. Applications for an address change can also be submitted to the Welfare Division of the Ministry of Internal Affairs and Communications.

2.2.2 United States

Address changing services can be found easily under the service options of the national government portal (www.usa.gov), and include several integrated services, namely, postal services, national tax services, social welfare benefits, veterans affairs, immigration services, driver's license services, and voter registration. Postal services require a US$1 verification fee paid using a credit card for registration (postal applications are free charge), with the remainder of the services accessed using a social security number. Address changes conducted with the Internal Revenue Service (IRS) are also automatically applied to the address registered with the postal service and only require the completion of a single form (No. 8822) sent by post, with the remaining services conducted online. The U.S postal service also has a service management webpage and provides a one-year mail forwarding service to a new address, with citizens able to select the start and end dates of the forwarding service.

Services that can be completed through online applications include those of the U.S. Postal Service (USPS), Internal Revenue Service (IRS), U.S. Social Security Administration (USSSA), U.S. Department of Veterans Affairs (USDVA), U.S. Citizenship and Immigration Services (USCIS), driver's license, and voter registration. All 18 service items can be completed online with the exception of IRS taxation services, which require the completion of specific forms. The IRS, Social Security

Administration, Department of Veterans Affairs, and USCIS are federal government organizations, whereas driver's license and voter registration services are provided by state governments. The USPS is a public corporation.

2.2.3 Singapore

The Singapore e-citizen website portal (www.ecitizen.gov.sg) integrates thematically related services, namely, civic life, culture, safety, education, family, health, housing, and transportation. Citizens can apply for a Singaporean ID (SingPass) and enjoy numerous online services after registration. Residence relocation services are located under the Moving House option in the Housing category. The Singaporean Immigration and Checkpoints Authority (ICA) provides a one-stop change of address reporting service (OSCARS), which not only increases the convenience of address changing for citizens through a one-stop service, but also provides government institutions and legal bodies with formal notification of address changes conducted using citizen IDs. There are 23 participating organizations providing 26 services [7].

The OSCARS system provides citizens with a one-stop service and allows several collaborative bodies and units to change address records simultaneously. The system allows for fluctuations in the services provided by collaborating units and, thus, avoids an inability to maintain operations because of integration. The OSCARS system not only enables the Singapore Post, SingTel, Singapore Power, and Internet service companies (StarHub) to provide integrated services, but it also allows them to be contacted through the portal website [7]. Citizens can request mail forwarding services on the Singapore Post's website and validate the updated address using recent utility or telephone bills. Citizens who are unable to provide recent bills can apply online for pre-notification letters. Then, after the pre-notification letters arrive at the new residential address, apply for an address change at the Citizen Services Center. However, this service requires payment of SG$30.

2.2.4 Canada

The Service Canada website (www.servicecanada.gc.ca) provides relevant services under the Life Events/Moving tab to facilitate convenient citizen residence relocation and allows the submission of address change applications on the website. Connecting the Revenue Agency through My Account provides online address changing services related to taxation and supports post, fax, or telephone communications requesting service personnel conduct the required services. To increase the convenience of voting registration and reduce the incidence of multiple registrations in provincial and city elections, two-way data is shared with the Canada Revenue Agency and Canada Post Corporation to manage voter registration lists through the national register. The personal information that is maintained includes name, address, sex, and date of birth, reducing the registration costs for Canadian citizens and immigrants.

The Human Resources and Skills Development Canada (HRSDC) manages labor insurance, retirement pensions, and old age security and provides citizens a social insurance number (SIN) that enables them to directly change their personal information, such as addresses and telephone numbers, over the Internet. Citizens can also request service personnel change the information by calling the 1-800-206-7218 hotline after confirmation is complete. Changes to vehicle license plates and Ministry of Health's health insurance cards are forwarded through Service Canada to relevant departments for processing. The Royal Canadian Mounted Police (RCMP) manages firearm license changes online using Secure Sockets Layer (SSL) verification to update the Firearms License or Firearms Acquisition Certificate provided by the firearm management system.

2.2.5 United Kingdom

The U.K. government portal website (www.direct.gov.uk) contains a residence relocation section that lists options to enhance the convenience of searching for relevant services. The provided services include address changes, local government taxation changes, ID card changes, television license registration, an employment center, elderly and retirement pensions, vehicle and driver's license changes, family doctor, dentist, mail forwarding, utilities, voter registration, polling location selection, child benefits, inheritance tax, capital gains tax, and national insurance.

Relevant services are conducted through the direct.gov government portal. Besides the Driver and

Vehicle Licensing Agency (DVLA), the National Health Service (HS), Royal Mail, utility providers, voter registration, and HM Revenue and Customs (HMRC), detailed descriptions of the duties performed by each unit are not provided. Direct.gov allows citizens to access government information and services easily and uses simple language and common life events as themes for the website layout. Residence relocation services are updated through direct.gov, which integrates several government organizations and was planned with substantial consistency.

2.2.6 South Korea

South Korea provides a section on its citizen website (www.minwon.go.kr) that offers several services related to address changing and communicates information to relevant government departments by implementing the joint use of the administrative information center's information management process. The South Korean government provides a G2B partnership relationship through the KT-Moving program (www.ktmoving.com), allowing citizens to select the receiving organizations and date their information is released. Over 70 organizations are integrated in this service, including communications, banking, life insurance, fire insurance, currency exchange, transportation, securities, news, culture/recreation/education, and school alumni organizations.

South Korea established an administrative information center employing joint use information management procedures as the information platform for government organizations changing citizen addresses. Furthermore, the government also established KT-Moving as the notification platform for public institutions, developing G2G (Government to Government) participation and G2B (Government to Business) partnership relationships by allowing citizens to determine the KT-Moving notification scopes on the citizen portal website, thereby providing an efficient administration environment.

2.2.7 Taiwan

In 2008, the Taiwanese government proposed the "U-Taiwan Program", the primary objectives of which are to make Taiwan a "Ubiquitous Network Society", build a wireless environment to access multiple digital applications and services [12]. The Taiwanese e-government service single sign-on website (www.gov.tw) displays residence relocation options through forms or links to relevant departments. The relocation application forms, address change forms, and mail forwarding applications for specific counties and cities are available to the public to download and complete. The provided residence relocation services include waiving contributions to the national health insurance program, transfer services, and the land value tax for occupied residential land, with other online services offered primarily reservations and application forms available to download.

The Taipei City residence relocation services provided online include the services offered by the Taipei City Zhongzheng District Office, household registration offices, Revenue Service Office, Ministry of Transportation and Communications (MOTC) Directorate General of Highways, and water companies. Among these, applications for new water pipes require on-site completion, whereas all other services can be completed online. Document mailing requires 4 to 10 days. After each department receives an application, each operation is completed independently without cooperation from other departments, providing a short lifeline for each operation. The MOTC Directorate General of Highways applies address changes to the management of vehicle license tax, additional applications to change the driver's license and vehicle license address are unnecessary. In other words, the service is integrated and completed simultaneously. The applications for occupied residential land value tax and license tax delivery address changes submitted to the Taipei City Revenue Service Office are processed at the same office, but require multiple applications.

2.3 Differences in Residence Relocation Services

As fragmented e-government services move toward centralization and integrated collaboration, the degree of integration in each country is demonstrated by the vertical and horizontal operations required to provide residence relocation services. Differences in the residence relocation services provided by each country are shown in Table 3.

Table 3. National differences in residence relocation services

Item	Taiwan	South Korea	Japan	US	Singapore	Canada	UK
National single portal website	C	C	C	C	C	C	C
Single sign-in	C	C	C	C	C	P	C
Thematic needs	C	C	C	C	C	C	C
Dedicated organizations	P	C	C	C	C	C	C
Operational support		P			C		P
Electronic voting	X			C	C	C	C
Retirement pension	P	C	P	C	C	C	C
Labor insurance	P	C	C		C	C	
National insurance	C	C	C	C	C	C	C
Welfare for the disabled, bereaved survivors, and low-income households	P	C	P	C	C	C	
Child benefit payments	P	C	P		C	C	C
Health insurance	P	C	P	C	C	C	
Family physician and dentist							C
Change of mailing address	P	C	P	C	C	C	C
Redirection of mail	P	C	P	C	C	P	C
Telephone, Internet, and television provision	P	C	P		C		C
Utilities	C	C	P		C		C
Mortgages and discounts	P	C	P		C	C	C
Inheritance tax	P	C	P	C	C	C	C
Personal income tax and corporate tax	P	C		C	C	C	C
Driver and vehicle registration	C	C	P	C	C	C	C
Employment services	C	C	C	C	C	C	C
ID cards		C	P		C		C
Passport		C	P	C	C	C	
Former residence household registration transfer out	P	C	P	X	X	X	X
New residence household registration transfer in	P	C	P	X	X	X	X
Application for household registration	C	X		X	X	X	X
Application for address certification	C	X		X	X	X	X
Crime regulation							
Firearm management	X				C		C
Veterans				C	C	C	C

Legend: C = Complete digitization; P= partial digitization (appointment filing); X= non service

3. IT Active Service Strategies

The differing residence relocation services provided by countries with established e-government services and development trends focusing on e-government services show that each country emphasized transitioning backend platforms from an independent model into a consistently integrated and connected system. Additionally, development in each country is trending toward linked governance and unified e-government [8] [13]. For example, Singapore's OSCARS program, South Korea's KT-Moving partnership program, Canada's two-way data sharing agreement, and the U.K.'s direct.gov project all demonstrate cross-organizational and collaborative e-government that not only requires passively connected organizational duties, but also more complete G2G participation and G2B partnership mechanisms.

3.1 Active Service Concepts

Typically, governments that do not provide "active service" only begin these operations after receiving service requests from citizens. However, certain organizations already exhibit cross-organizational active service concepts, such as prohibiting draftees from leaving the country, prohibiting citizens with overdue taxes from leaving the country, administrative fines payment by supermarkets and convenience stores, and enforced wage deductions by banks. Active service concepts are proactive actions that are customized to citizens' basic data. In other words, citizen demands are predicted and organizational and crucial operations are integrated to create peripheral services in response to citizens' requests. As shown in Fig. 1, when citizens activate the primary service (through household ID), the government automatically transmits citizen information to organizations participating in "active service" and public utilities to complete the tasks requested.

Figure 1. Double-loop active service

3.2 Migration Strategic Scenario

The case studies of residence relocation services provided by various countries indicate that an ideal electronic relocation service should enable citizens to complete all the services related to residence relocation online by completing a single application, also known as a one-stop method. Governments should establish mechanisms that allow referenced operations in G2G participation relationships, enabling public utility G2B collaborative operations. The content should include changes in government organization authority and the duties of public utility companies. Additionally, both government collaborative operation proposals and corporate partner proposals regarding government organizations should be integrated through verification mechanisms, enabling each organization to alter the services they provide. One way to quickly build the business of corporate partners by three steps: componentization modeling, business service modeling, software services description to build a service-oriented business model [1]. Ideal relocation service situations should begin with household ID management and include the services shown in Fig. 2.

● Government organization participation platform: Relevant changes in civil administration / economics / finance / real estate / residences / health / medicine / social welfare / insurance / elections / human capital / laws / licenses

● Public utility collaboration platform: Relevant changes in communication / banking / insurance / currency / vehicles / air travel / securities / news media / magazines, culture, and art / leisure / education / and alumni associations
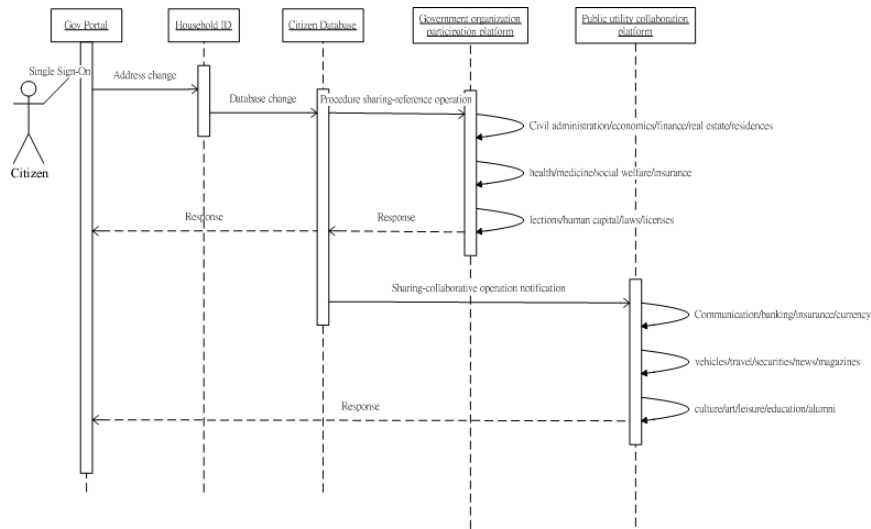
Figure 2. Ideal relocation service sequence

3.3 Active Office

With IT as the basis, the construction of "active service" through cross-organizational services and chain collaboration allows governments to provide citizens with customized immediate information or integrated services. These concepts can be used to establish organizations that have G2G participation mechanisms and G2B partnership mechanisms through "Active Offices". Service-oriented integrated services and collaborative operations are definitely reflected in daily convenience, cross-domain governance, collaborative operations, integrated services, leadership, and politics. The content comprising active offices is listed below, shown in Table 4.

Table 4. Characteristics of active service

Stage	characteristics/procedures	Content
Front office	Data + procedures = front office Online and warm service	1. Established based on citizens' lives and business 2. Humanized (warm) services (medical / nursing / educational / guidance / public safety) 3. Conferment of accountability / openness / transparency / convenience / participation
Back office	Processes + links = back office Process reengineering and efficient government	1. Internal procedure reconstruction, rapid response to citizen demands 2. Vertical cooperation / integration, horizontal cooperation / institutional integration 3. Remolding of old procedures / skills / attitudes
Active office	Cross-organization + cooperation = active office (Cooperation = G2G participation mechanism + G2B partnership mechanism) Service orientation, service portfolio, service government	1. Government and business external mechanisms (G2B partnership mechanisms) with references provided by key operation units 2. Units participating in government-to-government cooperation mutually referencing internal operations (G2G participation mechanisms) 3. Organizational relationships/ Reconstruction of procedure/ Cross-domain leadership

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