E-government Framework Based on Life Cycle of Digital Information Resources

Yan Gao¹,²

¹ School of Information Management, Wuhan University, Wuhan, China
² School of Economics and Management, Henan University of Science and Technology, Luoyang, China

Email: xingaozhiyuan05@yahoo.com.cn

Abstract—This paper proposes a framework for E-government based on information life cycle theory. By literature review, it reveals that it is urgent to establish an integrated E-government framework considering life cycle of digital information resources as an integrated process. Integrating information life cycle theory, the paper provides a framework for E-government, the implications of such a framework would be to inform designers and researchers of E-government about solving problems on domestic digital information development and management, and fulfilling digital information resources management.

Index Terms—e-government, digital information resources, life cycle, framework

I. INTRODUCTION

Worldwide, local and national government agencies are facing the challenging era of electronic government. A survey of government finance officers reveals that E-government is one of their top concerns (Bornstein, 2000).

While there seems to be substantial growth in the development of E-government initiatives (Bednarz, 2002; Friel, 2002), research on establishing a holistic framework for E-government should always be the priority of government and related agencies. This paper proposes an E-government framework based on information life cycle theory. By literature review, however, it reveals that research on E-government is lack of a holistic framework on theoretical and practical purpose. Therefore, the paper establishes a framework by integrating information life cycle theory. The framework can be utilized to process and analyze other complex issues. The framework can be used to facilitate decision-making unique to each stage and constituency of E-government.

II. LITERATURE REVIEW

Various frameworks of E-government implementation have been advanced in the literature. Three of interest are those proposed by Balutis (2001), Layne and Lee (2001) and the Gartner Group as presented in Baum and DiMaio (2001). These frameworks are detailed in Balutis (2001a) studied 1,300 government agencies and concluded that 57 percent disseminate information and 34 percent allow transactional activity while only 4 percent of the E-government initiatives are “transforming government.” The North Carolina Information Resources Management Commission (2001), in a report to that state’s General Assembly, looked more deeply into the implications of the Gartner Group framework for practice. Major challenges involved in web presence strategy (phase 1) are: content management, presentation hierarchy, and roles and responsibilities of backend support. Challenges faced as part of interaction strategy (phase 2) are availability of technical support staff and public records management in creating and maintaining databases. One observes the increasing complexity and required investment in technology as we move to phases 2 and 3 (transaction strategy) as the challenges become more complex. These challenges are related to privacy and security, backup and recovery, and internal integration. Even more complex is the advance to the transformation strategy (phase 4).

Other frameworks of E-government have appeared in the literature; however, they are generally descriptive in nature. From these frameworks, some basic propositions for the successful development of E-government have been posited. While this is valuable work at the infancy of E-government, we argue that for E-government to progress a more strategic framework is required. Further, the majority of E-government framework propose a sort of linear progression as E-government evolves, generally beginning with dissemination, then transactions, and finally to some form of integration. We believe that E-government services need not necessarily follow this path. In fact, some may achieve their strategic purpose at the dissemination stage and need not go any further. Since the majority of framework is based on existing E-government applications, which admittedly have been developed on a piecemeal basic, little thought has been given to the development of a coherent strategic portfolio of applications. A framework that begins to broach this topic is sorely needed at this point in the development of the literature.

Other frameworks have been undertaken from application perspective, and they are valuable at the beginning stage of E-government. While our research focuses on the digital information resources of E-government from life cycle perspective to see the forest for the trees, not like other frameworks, the framework not only builds theoretical foundation on E-government, and it also may give practitioners some guidance for further development.

III. E-GOVERNMENT FRAMEWORK BASED ON LIFE CYCLE OF DIGITAL INFORMATION RESOURCES (DIR)
A multi-dimensions framework for E-government based on life cycle of DIR is proposed in this paper (Figure 1).

A Stages of E-government

X axis stands for business process perspective on DIR. The stages are presented below, beginning with the least and moving to the most advanced stage of E-government implementation.

1) Information

Information dissemination is the simplest form of E-government where governments post information on web sites for constituents. Thousands of such sites exist. The biggest challenge with these sites, however, is to ensure that the information is available, accurate and timely (Gartner Group, 2000a, b, c). Examples include the US White House informational web page (www.whitehouse.gov/) or the European Union central page (www.europa.eu.int/).

2) Two-way communication

In this stage, government sites allow constituents to communicate with the government and make simple requests and changes. Several of these sites are based on e-mail exchanges, and there are thousand of those as well. Agencies allowing online requests provide sites with fill-in forms but the information is not returned immediately online. It is sent by regular mail or e-mail. An example of this is the US' Social Security Administration web site where constituents can apply for new medicare cards or request benefit statements (www.ssa.gov/).

3) Transaction

At this stage, governments have sites available for actual transactions with constituents. Individuals interact and conduct transactions with the government completely online, whereas these web-based self-services used to be performed by public servants. Actual online transacting is the most sophisticated level of E-government currently widely available. There are several hundreds of these sites. Examples include renewing licenses, paying fines, and applying for financial aid. Benefits of such sites can be very large. For example, the State of Arizona’s system to renew vehicle registration online has dramatically reduced waiting lines at department of motor vehicle offices (Thibodeau, 2000).

4) Integration

In this stage, all government services are integrated. This can be accomplished with a single portal that constituents can use to access services they need no matter which agencies or departments offer them. One of the biggest obstacles to more online transactions between the government and its constituents is the lack of integration of all online and back-office systems. Government agencies spend expensive and time-consuming resources to have face-to-face interactions with individuals. For example, in the Kentucky Governor’s office up to 90 percent of customer interactions are face-to-face (Thibodeau, 2000). Integrating online systems and back-end systems to support these customer requests could save time and money for the agencies involved, as well as improve customer service. Examples of national portals include the US’ FirstGov (http://firstgov.gov/), Australia’s State of Victoria’s MAXI system (www.maxi.com.au/), and Singapore’s eCitizen Centre (www.ecitizen.gov.sg/index_low.html).

5) Participation

These are government sites that provide voting online, registration online or posting comments online. Although this could be seen as a subset of the two-way communication stage, it is so significant as to warrant a separate category. It is helpful to view this as distinct because of the unique sensitivity of providing this online feature. There are few government sites that provide for this level of electronic sophistication.

One of the most prominent future uses of E-government with government may be for individuals to
vote over the internet. A California Internet Voting Task Force reported in 2000 that this must use a phased in approach with great care for authentication and security. Online voting will require technologies to support the privacy of individual voters while allowing re-counts and authentication of identity (Table1).

### Table 1. Stages of E-government

<table>
<thead>
<tr>
<th>Type of government</th>
<th>Stage 1</th>
<th>Stage 2</th>
<th>Stage 3</th>
<th>Stage 4</th>
<th>Stage 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government with Individual-Services</td>
<td>Information</td>
<td>Two-way Communication</td>
<td>Transaction</td>
<td>Integration</td>
<td>Political Participation</td>
</tr>
<tr>
<td>Government with Individual-Political Process</td>
<td>Description of Medical benefits</td>
<td>Request &amp; receive individual benefit information</td>
<td>Pay taxes online</td>
<td>All services and entitlements</td>
<td>Not Available (N/A)</td>
</tr>
<tr>
<td>Government with Business-Citizen</td>
<td>Dates of elections</td>
<td>Receive election forms</td>
<td>Receive election funds &amp; disbursement</td>
<td>Register to vote-, province &amp; local (file)</td>
<td>Voting online</td>
</tr>
<tr>
<td>Government with Business-Marketplace</td>
<td>Regulations online</td>
<td>SEC filings</td>
<td>Pay taxes online; Apply for and receive program funds Agricultural allocations</td>
<td>All regulatory information on one site</td>
<td>Filing comments online</td>
</tr>
<tr>
<td>Government with Employees</td>
<td>Posting RFPs (Request for Proposal)</td>
<td>Request clarifications or specs</td>
<td>Online vouchers payments</td>
<td>Marketplace for vendors</td>
<td>N/A</td>
</tr>
<tr>
<td>Government with Government</td>
<td>Agency filing requirements</td>
<td>Requests from Local governments</td>
<td>Electronic Paycheck</td>
<td>One-stop shop for info. on job, retirement, vacation, etc.</td>
<td>N/A</td>
</tr>
</tbody>
</table>

**B Multi-subjects of Development and Management**

Y axis stands for various E-government types. Our proposed categorization of E-government types includes:

- **Government with individuals – delivering services (GwIS).** The government establishes or maintains a direct relationship with citizens to deliver a service or benefit. An example is the US’ Social Security Administration in its delivery of benefits. This can involve two-way communications as individuals request information about benefits, and government may need information in order to process benefits.

- **Government with employees (GwE).** This is the relationship between the government and its citizens as part of the democratic process. It is perhaps the most essential relationship between a government and any entity. Examples include voting online, and participating in requests for comments online during the regulatory process.

- **Government with business as a citizen (GwBC).** Although businesses will not vote, and thus the relationship between businesses and the government will not look exactly like the GwIP, there are still opportunities for business to relate to the government in a citizen-like capacity. Providing securities exchange commission filings online in the US, and paying taxes online in several countries worldwide would be examples of the relationship between government and businesses in this category.

- **Government with business in the marketplace (GwBMKT).** While businesses can receive many online services from government, a major portion of online transactions between governments and businesses involve procurement, or the hiring of contractors or acquisition of goods and services by the government. E-procurement “is one of the fastest growing areas of e-business because it can save time and money” (Symonds, 2000). Some savings reported include 70 percent more efficiency at Australia’s Department of Natural Resources and Environment’s purchasing department by deploying a paperless system (Symonds, 2000).

- **Government with government (GwG).** Government relationships between government agencies and their employees face the same requirements as that of the relationships between businesses and their employees. For example, an intranet can be used to provide information to employees, or online transactions with their employees can be performed if agencies have the proper technological architectures. This relationship should be distinguished from the same individual’s relationship under GwIP and GwIS.

Government with government (GwG). Government agencies must often collaborate and/or provide services to one another. There are substantial gains from conducting some of these transactions online, between federal, state and local agencies. An example of an inter-governmental level E-government application is the US National Science Foundation’s online funding request system called FastLane (www.nsf.gov). The potential for GwG to benefit agencies involved is tremendous – there are over 20,000 web sites for the US Federal Government alone (Thibodeau, 2000).
C Methodology of Framework for E-government

Z axis stands for life cycle theory of digital information resources which is methodology of framework for E-government.

In 1985, Marchand and Horton formally proposed the concept of “information life cycle management”, and information management was considered as logical connected several stages or steps, and each step depends on the former one, and the six parts are creating, collecting, organizing, developing, using, cleaning, which illustrated clearly the connectible between information and life cycle. Afterwards, Shenton, Cheatham, Cummins Jenkins responded Horton’s study by providing an organization view of information life cycle.

In 1994, Hernon argued that the process of public life cycle includes several stages such as creating, collecting, producing, processing, demonstrating, delivering, retrieving and using of information, storage, allocation and display through taxonomic study on earlier discussion of US government information management and life cycle model, and for the first time it analyzed information resources process under electronic context by applying generalized life cycle theory.

In 2000, US “A-130” bill defined “information life cycle” as “the stages of information, and several most important stages are producing or collecting, processing, demonstrating, using, storing and cleaning”. Library and Archives of Canada divided it into seven steps, and United States National Committee on Library and Information Science divided into 13 steps.

In 2005, “LIFE” program, launched by British Library and London Metropolitan University, aimed to research on life cycle theory of digital information resources and its application on cost control and investment management, and proposed and established a more complete and standardized life cycle model of digital information resources, including collecting, intaking, metadata, acquiring, storing and preserving.

Based on foresaid researches, the paper proposed business process perspective on digital information resources. The process includes seven stage or steps, they are archive, service, storage, process, collection, distribution and generation.

D Multi-Dimensions of E-government

E-government framework can be studies in four dimensions; they are information technologies, economics and management, policies and laws dimension and society and culture dimension. Information technologies dimension focuses on studying application of information technologies on E-government, such as information systems, data mining, information retrieval. Economics and management dimension focuses on studying improving E-government development economically and strategically. The related resources are information economics, game theory, digital Information resources. Policies and laws dimension are regulations E-government should follow which ensure the rational, scientific development of E-government by legal rights and responsibilities. Researches about government policies, information security are in this field. Society and culture dimension are factors should be considered when undertaking E-government researches. Such as minorities and disable people.

IV. CONCLUSION

This paper proposes a framework for E-government based on information life cycle. A literature review justifies the components of framework and reveals that the need for a new framework on E-government. Information life cycle as a methodology is applied to establish a framework for E-government to provide reference for practitioners and researchers to solve their problems. However, further research should be focused on empirical study to test and correct the framework.

REFERENCES