Evaluation Metrics for e-Government System and Services

Rahul Kaushal

Department of Computer Science & Engineering, Panipat Institute of Engineering and Technology, Samalkha, India

Abstract— *Many e-Government services till date have been created based on the existing services and own understandings, rather than based on citizen's need and interests. Very little data is available about local government officials and citizen's want and need. The proposed study will analyze the use of IT and e-Governance practices, develop & document the conceptual model of e-Govt, define components, component attributes, and the component relationships for each model. The model will be based on the citizen's viewpoint which is expected to be quite different from a model based on a government agency's viewpoint.*
Keywords— e-Government System, use of IT, privacy and security.

I. INTRODUCTION

We define Electronic Government (e-Govt) as 'The use of Information Technology (IT) to deliver government information and services and to involve citizens in the democratic process.' E-Government is not only about putting government services online: it involves a fundamental change in the way public services are delivered and managed.

E-Government have been applied to diverse services such as city planning, social services administration, physical or information infrastructure management, emergency management, public records and achieves, community or economic development, healthcare, education and property assessment etc.

The benefits of e-Govt usually includes improved quality of citizen services; internal efficiencies; law enforcement; education and information; promotion and outreach activities; safety and security; healthcare services and management; and involvement of citizens in the democratic process etc.

II. PROBLEM MOTIVATION

Little is known about whether citizens are getting the information and services provided by Govt. units, i.e. How much effective the E-Govt. is?

We do not yet have a good model for local governments and citizens that provides for them a context for understanding and implementing services and systems.

An appropriate model is needed to:
1) understand the needs of government officials and citizens;
2) encourage the adoption of existing solutions wherever possible;
3) address ethical and policy issues;
4) support scalability;
5) ensure the protection of privacy and security; and
6) provide for benchmarking and metrics.

We lack effective and agreed upon measures to evaluate the quality of e-Government. There are two types of measures: quantitative and qualitative. In quantitative measures, we count the number of website visits, decrease in response time to questions etc. The qualitative measures are related to policy and ethics such as level of satisfaction by citizens with the quality of service, whether privacy policies are included on websites etc.

Internationally, some efforts are being made to develop metrics; no systematic measure has been developed for widespread use. An evaluation requires a model of the object of evaluation and a system requires a model of applications it is intended to support.

1) Multiple models of e-Govt are required to represent and subsequently plan, fund, design, develop, implement, operate and evaluate adequately e-Government realistically; and
2) The synthesis of model components, component relationships, and component attributes from various models can be used to form adaptive, dynamic model for a particular context based on a set of contextual parameters that will explain a specific instance of an e-Govt development or implementation.

The approach that will be taken in this proposed project is to develop conceptual models of e-Govt. that transform these into logical models, and finally transform the logical model into physical (implementation) models using the components and attributes identified by community surveys so that the

attributes can be measured both quantitatively and qualitatively.

All models and metrics must be validated to ensure that they are realistic representations what they are supposed to represent. Model validation has two parts; (a) a comparison of model components, component attributes, and component relationships with data collected from the real world, and (b) a comparison of model components, component attributes and component relationship with expert judgments.

III.   RECENT STUDIES AND PRESENT SITUATION

International

Several studies addressing the evaluation of e-Govt were examined for measures to use in this proposed study. The most detailed and useful set of measures, nearly all of which are quantitative, are included in a study Gartner Consulting Group entitled "Best Practices in Country e-Govt Counties".

Several other studies such as two studies by Darrell M. West of the Centre for Public policy at Brown University (Sept- Oct 2003) and Studies conducted by Organization for Economic Co-operation and Development (OECD 2003) provide some useful measures, but all have serious limitations for examining local government activities and for developing both qualitative and quantitative measures. Among these limitations is the problem of building effective and workable online communities as a whole (Smith 2003) and also the currency and relevancy of the studies undertake, Studies become outdated quickly due to the rapid change of IT services. Many of the studies are limited to national data, and do not examine regional and local areas. However, many of these studies can be useful also in developing an understanding of e-Government, despite these limitations.

A report by the UN, Benchmarking E-Government: A Global Perspective (United Nations, 2002), offers some models, evaluation, and benchmarking criteria for e-Government on an international basis, using a citizen-centric approach and providing a "best practices section" based on web content, system architecture, and linking policy.

Even though several studies have developed conceptual models, evaluation criteria, and metrics, but no comprehensive studies focus on citizen-centric metrics or that include a widespread baseline comparison, cost savings, return on investment, metrics useful for multiple models, indexes of success for stages of e-Government systems (e.g. publish, interact, transact, transform), or qualitative measures across a wide spectrum of socio-political environments.

The key factors for measuring e-Government as being related to:

1) Governance structure, including the basis for decision making;
2) Privacy issues;
3) Content management (separate content from presentation);
4) Policies related to authentication, advertising, fees/payment etc;
5) Funding;
6) Information architecture;
7) Website applications and accessibility;
8) Maintenance of systems and services;
9) Marketing strategies;
10) Information literacy and fluency; and
11) Quality.

Various theories have been developed to evaluate the effectiveness of e-Government services. The greater attention has been on supply of government applications in terms of the percentage of basic public services available online. These types of framework focus exclusively on evaluating front-end-service applications neglecting back-end administrative reforms, change in nature of governance, and real benefits in terms of improvements in the social well-beings of citizens.

National

Today in India, many different types of e-Governance projects are being implemented in parallel as displayed on the websites. The aim of the projects is to introduce IT automation, improve transparency & accountability and enhance delivery of government services like payment of bills /taxes.

Recently, World Bank has announced $500 billion for e-Governance projects for Indian states.

A study conducted by United Nations Division for Public Economic and Public Administration (UNDPEPA) in collaboration with American Society for Public Administration (ASPA) to gain an appreciation of the progress of e-government in 2001 progress of the 190 UN member states. The study presents a straightforward benchmark to objectively assess a country's online sophistication. There are five stages of e-government development as a linear progression.

Emerging:
An official government online presence is established.
Enhanced:
Government sites increase; information becomes more dynamic.
Interactive:

Users can download forms, officials e-mail and interact though the web.

Transactional:

Users can actually pay for the services and other transactions online.

Seamless:

Full integration of e-services across administrative boundaries.

According to the study, India is rated in 3rd stage i.e. interactive category.

This study further develops an e-government Index to capture the progress made by individual countries. This index attempts to: 1) objectively quantify critical factors and 2) establish a reference point for a country's future progress. The E-Gov Index presents a more inclusive and less subjective measure of e-government environment and reflects a country's economic, social and democratic level of development. The industrialized nations with abundant resources, superior access to information and a more participatory relationship within the govts and citizens ranks well above the mean E-Gov Global Index of 1.62. India having minimal government capacity has index of 1.29. Our neighboring countries like China, Pakistan has 1.04 each while Nepal and Sri Lanka have index of 0.94 and 0.92 respectively.

Though India's rank is not high on these scores, but policy initiatives by Government of India (GOI) to promote and enhance the use of IT in governance as suggested by the IT task force setup by the Prime Minister in 1998 shows better future ahead. The E-readiness index has been developed on the basis of broad parameters like Network access, Network Policy and e-governance. A report titled 'India; E-Readiness Assessment Report 2003' for States/Union Territories' categorized the states as Leaders, Aspiring Leaders, Expectants, Average Achievers, under Achievers and Laggards. The Northern region states (subject states) i.e. New Delhi, Haryana, Punjab, Chandigarh, Himachal Pradesh and Rajasthan fit in categories as under:

Aspiring Leaders - Chandigarh, Delhi

Average Achievers - Punjab

Below Average - Haryana, Himachal Pradesh, Rajasthan

The GOI's composite index for evaluating e-Governance activities in different states (GOI, 2003), based on the Harvard e-Readiness criteria contains the following indicators:

- Special efforts made to promote e-Governance in particular sectors
- Online facilities available to the public
- Government network coverage
- Computerization of records

- Development of skills among government employees
- Reengineering of government processes

IV.   OBJECTIVES

The need of hour is to tailor the metrics for development & evaluation to technical, personnel, ethical, organizational, political, social, cultural & economic characteristics of government agency and community. The metrics should also incorporate the stage of development of the e-Govt system & services, as multiple delivery mechanisms are needed by the community. 'One-size-fits-all' model or single set of metrics not necessarily appropriate for all e-Government systems and services. Success metrics may vary depending on the project.

V.   RESEARCH METHODOLOGY

The study will propose parameters and quantitative & qualitative measures for attributes and relationships. The components, component attributes and component relationships will be defined and parameters and measures for the attributes and relationships for each model will be proposed thereafter. Among measures to be included are:

1) Innovation and use of IT to deliver government information and services;
2) Efficiency;
3) Return on investment;
4) Ease of use;
5) Focus on citizen's needs;
6) Ease of navigation across levels of government;
7) Protection of privacy policies;
8) Security and ease of auditing;
9) Inclusion of qualitative and quantitative measures;
10) Evidence of public and private partnerships; and
11) Effective evaluation mechanisms

The study will provide the perspectives from citizens and from government personals at all levels and provide other input and advice. The proposed study will also incorporate an Advisory Committee of experts, to assess the validity of the models and to propose additional models in these areas based on perspectives from citizens, govt. personnel at all levels, and provides other inputs and advices. The Advisory committee will assist in assessing the validity of the models in terms of definitions, components, attributes, relationships, and proposed metrics. The study will focus on Information, Payment and Receipts, Public Records and Achieves.

After the conceptual model definition, the survey instrument will be developed to collect data based on each conceptual model's components, attributes and proposed set of measures. The survey will incorporate a representative sample of

citizens from diverse set of community & Govt. entities and will gather parameter values for attributes and metrics proposed. The survey results will be used to develop new models & metrics, enhance existing models & metrics and eliminate models & metrics that do not fit in any context. The northern region will be a sample for future surveys because of its diversity in population, cultures, and socio-economic factors.

For government entities, the survey will include what function and services states have currently implemented and what are planning for new services, how security and privacy issues have affected their systems, how citizens can be involved, and what metrics they have gathered about current e-Government system. The process will be used to make their system a reality,

For the citizens, the survey will determine the citizens need of e-Government for themselves and their communities, what their objections are, how e-literate they are etc. The survey instruments and interviews will capture general data on citizens needs; an inventory of services and related data (e.g. governance policies, funding, organization, technology, architecture, marketing, services offerings, ethics, public policy etc.) and in depth data on the areas of investigation.

Data Collection

First, the study will acquire the socio-economic and cultural data for all communities in these states; select a sample of citizens from a set of strata including demographic data to interview across a diverse section of socio-economic classes. We will identify 10 communities with no-Govt services, best-Government services and communities with poorest Govt services. We will develop an interview instrument and schedule interviews within focus groups, with the appropriate citizens and govt officials in each selected community to get an in-depth understanding of history, development, implementation, and current operations, patterns for success, mediocrity, failure or lack of an of govt and e-Govt system.

Data Analysis

The study will use the criteria we develop as a guide to codify all the data acquired from the survey and interviews to perform statistical analysis and to identify model parameters and metrics. This will be done by assigning a rating or weight to each of the factors acquired or discovered via survey and interview process. This same method would be used for e-Government system architecture components, relationships, and processes.

VI.　MODEL AND METRIC CONSTRUCTION AND VALIDATION

Based on the data analysis we will generate a set of rules that will dynamically build a synthesized e-Govt model for states and will use the synthesized model to build a set of metrics. We will then use the data and analysis to validate the mode(s) and the metrics. The validation process will involve comparing the synthesized model and set of metrics produced by the set of rules, actual data collected, using expert judgments from the principles and the Advisory committee to compare the models and metrics produced by set of rules with published and expert's evaluations. When the synthesized model and metrics are in conflict, the rules for model building and metrics will be revised. After the model and metrics building process has been validated, we will attempt to build an index metric similar to an economic index that can be used by a community to show; their current status in terms of an existing e-Government system; their capability of improving a currently existing system; and their capability of developing and implementing a system when one does not currently exist. Results of the proposed study will be presented at professional conferences and submitted for publication in several print and electronic journals.

REFERENCES

[1] Freed, Larry.(2003) American Customer Satisfaction Index: E-Government Satisfaction Index. http://www.idt.unisg.ch/org/idt/ceegov.nsf/0/9252408f34 2f09b8c1256df2003bb87f/$FILE/eGovBench.pdf.

[2] Gartner Consulting Group (2003) Best Practices in Country E-Government Countries. http://www.cira.state.tx.us/docs/docs/bestpractices.pdf.

[3] Heeks, R. (2001a) Understanding E-Governance for Development, iGovernment working paper series, Paper No 11, Institute of Development Policy and Management, Univesity of Manchaster.

[4] GOI (2003) E-Readiness Assessment of States in India. Report prepared by the National Council of Applied Economic Research, New Delhi.

[5] Kirkman, G., Sachs, J., Schwab, K. and Cornelius, P. (Eds) (2002) the Global Information Technology Report 2001-2002: Readiness for the Networked World, Centre for International Development at Harvard University and World Economic Forum, Oxford University Press.

[6] Organisation for Economic Co-operation and Development. (2003) The e-government imperative: main findings. http://oecd.org/dataoecd/60/60/2502539.pdf.

[7] Promoting Electronic Government United Kingdom http://www.peg.org.uk.

[8] Smith, J. (2003) Benchmarks for Building Extranets and Online Communities. Benton Foundation. http://benton.org/publibrary/capacity/extranet_benchmarks.doc.

[9] United Nations Division for Public Economic and Public Administration. (2002) Benchmarking E-Government: A Global Perspective. http://unpan1.un.org/intradoc/groups/public/documents/un/unpan003984.pdf.

[10] Unnithan, C. (2002) e_governance in India – Initiatives and drivers: A preliminary investigation. Paper presented at the 2nd European Conference on e-Government held in Oxford, October 2002.

[11] West Darrell (2003) Achieving E-government for All: Highlights from a National Survey: Working document. http://www.benton.org/publibrary/egov/access2003.htm.

[12] West Darrell (2003) Global E-government. http://www.insidepolitics.org/egovt03city.pdf.