Cyclic Knowledge Management System in E-Governance: A Case Study of Evaluating Polls on Referendum-Independence of Quebec Using ANN

Manzur Ashraf
Faculty, BRAC University
66 Mohakhali, Dhaka 1212
manzur_bd@yahoo.com

Humayra Binte Ali
Dhaka University
Dhaka 1000
humayra_binte02@yahoo.com

Md. Mahfuz Ashraf
Faculty, BRAC University
66 Mohakhali, Dhaka 1212
mashraf@bracuniversity.net

ABSTRACT

E-Governance brings urban and rural together and breaks the barrier of distance to lead an efficient administration. Surprisingly, E-Governance have not made enough impact on the people as e-Commerce and e-Learning have done. From the software engineering point of view, E-Governance has a lot of characteristics, which are different from e-Commerce and e-Learning. It is enough for e-Commerce and e-Learning to be reactive whereas E-Governance needs to be proactive. While e-Commerce and e-Learning involve Information Management, E-Governance involves Knowledge Management (KM). Knowledge management is the management of information, skill, experience, innovation, and intelligence. Our model of E-Governance based on Knowledge Management System (KMS) is built on KM cycle of Knowledge capturing, Knowledge sharing, Knowledge enhancing, and Knowledge preserving. A few popular models of E-Governance use a concept of "knowledge centers" to share knowledge. Our model shares knowledge that supports the law of knowledge dynamics. The development model of E-Governance based on Information Management System (IMS) applies a cycle-based process such as spiral or iterative process. This paper studies a development model of KMS-based E-Governance, which is path-based. This model provides an environment where the system grows with the people. To simulate the proposed KMS model, we analyzed a scenario based on the poll on Referendum question of Quebec, CA regarding independence (unilateral action or negotiation) using Artificial Neural Network.

Categories and Subject Descriptors

H.0 [**Information Systems**]: General
K.4.4 [**Computers and Society**]: Electronic Commerce
K.6.1 [**Management of Computing and Information Systems**]: Project and People Management- *Strategic Information Systems Planning*

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General Terms

Management, Measurement, Design, Human Factors, Theory.

Keywords

E-Governance, User Interface Design, Accessibility, Law of Knowledge Dynamics, KM cycle, Information Management System, and Knowledge Management System.

1. INTRODUCTION

Electronic governance or E-Governance is the latest buzzword for governments trying to involve people in administration, address transparency in their bureaucracies, and make themselves more responsive to their citizens. The benefits of E-Governance are faster decision making, reduction of duplication of work, detection of corruption and illegal transactions, prevention of knowledge drain and crisis handling. E-Governance brings urban and rural together and breaks the barrier of distance to lead an efficient administration. Surprisingly, E-Governance have not made enough impact on the people as eCommerce and eLearning have done. There are several barriers on the roads of E-Governance. The audience of eCommerce and eLearning are normally a special interest group who volunteers to accept the Internet based web media. Unlike eCommerce and eLearning, E-Governance involves every citizen of a country who is largely unaware of the potential of Information Technology (IT) in daily life. From the software engineering point of view, E-Governance has a lot of characteristics, which are different from eCommerce and eLearning. It is enough for eCommerce and eLearning to be reactive whereas E-Governance needs to be proactive. While eCommerce and eLearning involve Information Management, E-Governance involves Knowledge Management (KM). Knowledge management is the management of information, skill, experience, innovation, and intelligence.

In this paper we propose an E-Governance model based on Knowledge Management System (KMS). This model is based on KM cycle providing knowledge capturing,

knowledge sharing, knowledge enhancing and knowledge preserving. Moreover, our model shares knowledge that supports the law of knowledge dynamics Later we illustrate a scenario of Quebec referendum polls for independence issues. An Artificial Neural network (ANN) based simulation applying the proposed KMS model is also described at the end of this paper to validate its applicability.

2. COMMON EXISTING MODELS OF E-GOVERNANCE

The objective of the conventional E-Governance is to help citizens in (i) paying utility bills (telephone, water, electricity, etc.), taxes and so on, (ii) handling registration formalities for land ownership, marriage, birth, and death (iii) processing application forms and renewals of driving licenses, work permits and passports (iv) lodging complaints. The E-Governance will cut the frontiers of time and space. It helps citizens to access information at anytime, at any place using net-enabled system. The object of the conventional E-Governance is a set of documents which may be rule books, guidelines, files, applications, circulars, government orders, memorandums, letters, archives and classified information.

This model of E-Governance has two independent components: (i) Administration and (ii) Citizen & Government. The administration component has two major subdivisions, which are inter-department and intra department. In the same way the component of "Citizen & Government" has two major subdivisions such as citizen to government and government to citizen. See Figure 1.

2.1 Administration

E-Governance entails an Intranet for secure, authenticated inter/intra departmental electronic data interchange. Decision-making and activities of a government of intra department are hierarchy-based. There are two kinds of hierarchies in intra department: official hierarchy and regional hierarchy. See Figure 2. Inter-Department activities are such as Sharing of information, Mutual cooperation, and Monitoring and assistance.

2.2 Citizen and Government

The financial aspects of Citizen-to-Government are taxes, utility bills, penalties, and toll money etc. The non-financial aspects of Citizen-to-Government are voice of the people, memorandum, requests, and general elections etc.

The financial aspects of Government-to-Citizen are loans, relief funds, dole money, B2C transactions, B2B transactions (eCommerce). E-Governance provides comprehensive B2B / B2C capabilities that connect small-scale industries, traders, farmers and their customers in a cost effective and timely manner. The non-financial aspects of Government-to-Citizen are education and training (eLearning), opinion polls, survey, intelligence and reports. E-Governance can harness the internet and cable networks to spread quality education and training across the country.

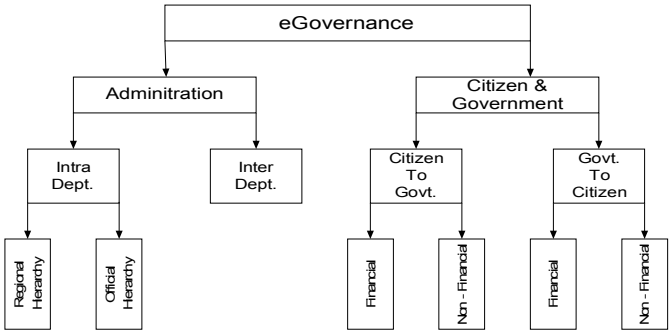

Figure 1

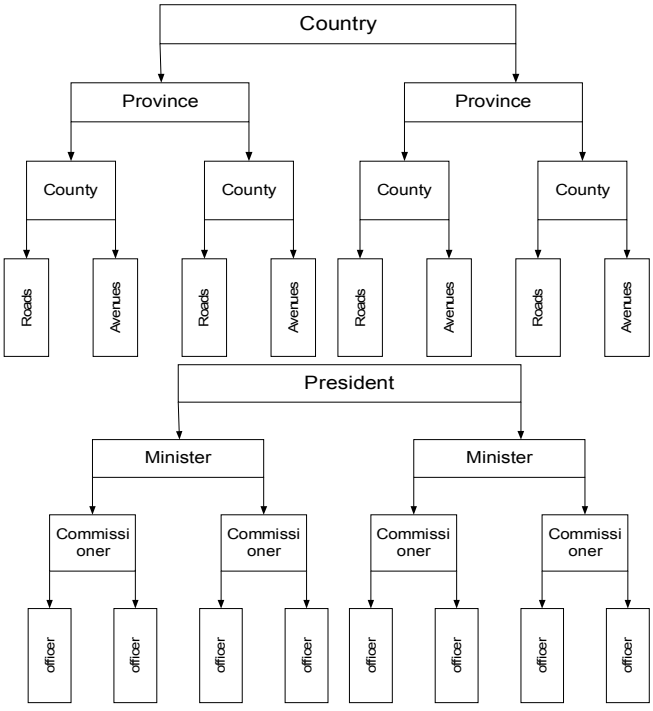

Figure 2

3. OVERVIEW OF THE PAPER

From the perspectives of software engineering, E-Governance is a combined process of *integration and interaction*. Billions and billions of bytes of information find their way into this system by users. It requires sound technology and infrastructure to effectively access and use this ever-growing information and knowledge database. E-Governance needs to maintain a powerful integrated hardware and software network. This is the *integration part*

of E-Governance. A country is made up of government and people. People are made up of communities. A good E-Governance model provides a platform where various communities and special interest groups (SIG) represent themselves. It provides an easy way for individuals to find the groups and communities of interest to them. It links people and organizations with each other. It builds an environment with specialized expertise that can help answer questions, and guide them to find solutions. This *is* the *interaction part of E-Governance* [1].

The existing model of E-Governance (discussed in Section 2) does not fully represent people and their needs. This article discusses and analyzes various parameters involving integration and interaction of E-Governance. A model of E-Governance based on Knowledge Management System is investigated. This model will help engineers who architect E-Governance applications. There are several technical barriers to make people accept this new media. One important factor of the success behind E-Governance is the efficiency of user interface design. This article intends to investigate various parameters of user interface design of E-Governance which are mainly relevant to common man who are largely unaware of the potential of IT in daily life.

It was the age of Data, then the age of Information. Now it is the age of Knowledge. We study the differences of the three eras from the perspective of software engineering. We also discuss the implementation barriers of KMS-based E-Governance. Knowledge sharing is a key aspect of KM cycle. A few models use the concept of "knowledge centers" to share knowledge [2]. We introduce a concept of law of knowledge dynamics to share knowledge among the users of the system.

We study the differences between the IMS and KMS of E-Governance. The software engineering process of Information Management System of E-Governance is cycle-based. We discuss a path-based development model, which is more appropriate for Knowledge Management System of E-Governance.

4. OUR MODEL OF E-GOVERNANCE

A country is made up of government and people. People are made up of communities. A good E-Governance model provides a platform where various communities and special interest groups represent themselves. It provides an easy way for individuals to find the groups and communities of interest to them. It links people and organizations with each other. It builds an environment with specialized expertise that can help answer questions, and guide them to find solutions. This is called *community management system* of E-Governance. See Figure 3.

E-Governance is a transition process from conventional to people-oriented proactive electronic system. This is a big change in the mindset of people. Putting it in a positive way, it is not a change but a transition. It may not be achievable unless it slowly evolves among the people. All communities of people should be attracted towards the system. To accept this transition process, the communities need to be trained and educated. The electronic media should be user friendly and accessible by different communities including the disabled and the under-privileged. This is called *transition management system* of E-Governance.

When E-Governance provides a platform for discussion and debate of all communities, the suggestions, requests and the outcome of the discussions and debates should be properly recorded. It should be easily retrievable. The system should support and protect privacy, information rights and other cyber-laws, such as copyright, intellectual property of the contributors, ownership of recommendations, confidentiality of poll, discussion or debate. The key role here is to ensure that all the strategic content generated by the various communities can be retrieved easily and logically by the users of the network. The minimum and basic features of E-Governance are to store and retrieve the information, records and documents of a government. Advanced features are to extract statistical reports to predict future, to help decision-making and to provide intelligent forecast for planning. This is called *knowledge management system* of E-Governance. Several millions bytes of information find their way into this system by users. It requires sound technology and infrastructure to effectively access and to use this growing information and knowledge database. E-Governance needs to maintain a powerful integrated hardware and software network. This is called *infrastructure management system* of E-Governance.

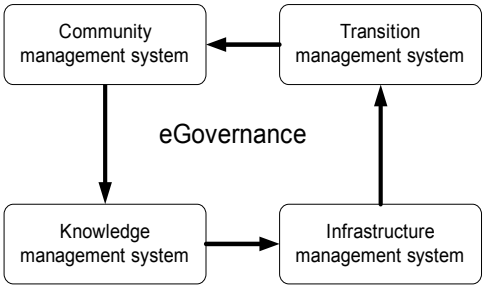

Figure 3

4.1 Community Management System

A country is made up of heterogeneous communities. Community includes various special interest groups, like-minded factions, forums, institutions, social and cultural organizations, business establishments, departments, and administrative hierarchies. There are an ever-increasing number of development organizations that want to have

online groups or communities. This brings cultural change both within the government itself and in the overall society.

E-Governance is a partnership of people and administrators. In a conventional administration, the administrators are proactive and the people are reactive. A successful E-Governance induces both government and people to be proactive and interactive. The success depends on how people are made involve and commit in the process of planning, decision-making, and administration. In a good model, administrators and lawmakers are also considered as one of the communities of the system. The stakeholders of E-Governance are the communities. Our model of E-Governance provides a platform where government and people come together to play proactive roles to discuss burning issues, to suggest new methodology, to analyze new technology, to commit to new system or to accept necessary social reorganization. E-Governance is a vehicle to create knowledge society, which would lead to improvement of common man.

The community management is influenced by proactive management of the communication process of vertical and horizontal structure of communities. The starting point of the community management is fostering groups and communities in national and international development. The community management is a partnership, which caters to both individuals and organizations by offering tools and services that bring people together.

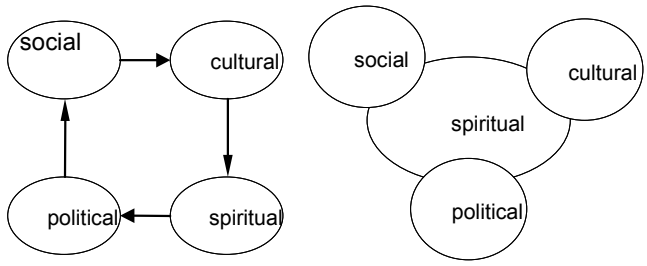

Figure 4

A broad classification of communities is social, cultural, political and spiritual. However, there are two kinds of interaction among themselves. There are countries where the four domains are rather independent and autonomous. On the other hand, there are countries where the social, cultural and political domains are circled around spiritual domain. These are hierarchically classified into smaller communities.

A good model of E-Governance supports all social activities of a community with the capacity to do in an environment, which is simple, non-commercial, respectful of privacy, and targeted at all sections of citizens:

1. It is principally to grow communities, and in particular the community of facilitators and SIG leaders within it; as these roles are crucial in establishing a successful community. The system provides tool so that a community can register themselves to create a home and can maintain self-controlled areas. This will be a meeting place for people sharing an interest in a restricted and private environment.
2. It links people and organizations with each other and with specialized expertise that can help answer questions, and guide them to solutions.
3. It creates a platform that provides an easy way for individuals to find the groups and communities of interest to them.
4. It includes coordination of the activities of the various areas of the site and events of communities.

4.2 Transition Management System

Transition management [1] is all about how the stakeholders of E-Governance, which are the various communities, make transition from traditional approaches to new means of electronic process. Transition management [3] is a subject matter that is currently sweeping public and private sector organizations. It is not new but has been evolving as a discipline over the past decade. Transition management is addressing the changes being faced by modern public administrators, both internally and externally. In the past three decades, governments have had to contend and deal with, many societal transitions that have significantly altered the way public administrators function in their jobs. Globalization, free trade, the increased movements of people and goods, changing social attitudes and new technologies especially information and communication technologies, have all contributed to the challenges now facing rulers and people alike. Thomas Riley [3] calls it change management.

A proactive approach of Transition management is to define and resolve personnel and cultural issues that may inhibit successful evolution. This is also called proactive management of E-Governance. This may become positive forces in helping E-Governance to evolve.

Transition management will become central to many of the above issues. However, how public sector officials adapt to these new environments, which require transparency, accountability and openness will become crucial to the success of E-Governance. This is part of a major transition that is compulsory to reflect the current social and cultural shifts occurring in society. Transition management is one such tool to achieve this goal. However, the success of how we will handle our future lies in the involvement of people who will be willing to accept and work in our new environment.

A success of E-Governance very much depends on the success of the front-end design. The common man in a

country continues to be largely unaware of the potential of IT in daily life. Thus E-Governance needs to take proactive measures to attract the citizens and make them accept the new media. One important factor of the success behind E-Governance is the efficiency of user interface design. We need to discuss various parameters of user interface design of E-Governance, which are mainly relevant to common man including disables and illiterates. Many users may be operating in contexts very different from our own [4]:

- They may not be able to see, hear, move, or may not be able to process some types of information easily or at all.
- They may have difficulty reading or comprehending text.
- They may not have or be able to use a keyboard or mouse.
- They may have a text-only screen, a small screen, or a slow Internet connection (poor audio and video sysetm).
- They may not speak or understand fluently the language in which the document is written.
- They may be in a situation where their eyes, ears, or hands are busy or interfered with (e.g., driving to work, working in a loud environment, etc.).
- They may have an early version of a browser, a different browser entirely, a voice browser, or a different operating system.

The community management system deals multiple activities of communities. It is the role of user interface design to classify these activities effectively. Stephan R. Covey [5] differentiates the activities based on two factors: urgency and importance. He categorizes the activities of communities into 4 quadrants. See Figure 5. It is one way to organize the collection of screen contents in order to focus on the issues of urgency and importance of activities of communities.

A good model of E-Governance puts simplicity at the front-end and complexity at the back-end:

1. It supports knowledge sharing networks on issues like training, evaluation, community access centers, and education.
2. It provides user-friendly electronic media. It is easily accessible by different communities including disabled and under-privileged. User Interface Design will be a high priority so that all communities of people will be attracted towards the system.

4.3 Knowledge Management System

Historically it goes like this: the age of data, then the age of information and now the age of knowledge [6,7,8,9]. Data is a representation of facts. Information is an interpretation of data. Knowledge is an application of Information.

Urgent-Important Matrix

Submission of assignments, preparing for the exams	Sharpen the saw type of activities which are crucial for a student growth. Example: Developing reading habits, language learning, physical exercises etc
Receiving Phone calls, answering the door bells etc.	Time Wasters like watching excessive TV, surfing internet without an aim. Activities which are beyond the circle of concern.

Urgent-Important Matrix of a student

Figure 5

4.3.1 Age of Data and Age of Information

Until the 1970s, it was considered as the age of data when people were happy with the data management system (DMS). Then it was the age of information when people were excited with the revolution of information technology. Let us look at the differences between data and information from software engineering point of view.

Architecture: DMS is single tier where as IMS is n-tier architecture.

System: DMS is homogenous where as IMS is heterogeneous.

Design Model: DMS is about how to maintain data where as IMS is about how to interpret data.

Development Model: DMS focuses at the back-end where as IMS focuses at the front end.

4.3.2 Age of Information and Age of Knowledge

What is the difference between Information and Knowledge? “Which portfolio is doing well in equity share

market of Wall Street?" The answer to this question is information. "I have 1 million dollars. How do I invest this money in Wall Street?" The answer to this question is knowledge. Knowledge is an interesting combination of information, skill, experience, trust, and intelligence. Capturing knowledge is a challenging task of computer engineers. Knowledge Management System is an interesting research topic for computer scientists in the coming years.

Let us look at the differences between information and knowledge from the perspectives of E-Governance. Suppose there is a system, which simulates World Trade Organization (WTO). Recently USA Senate passed a Bill that restricted IT contractors from sub-contracting Government projects to firms in other countries. Countries like India planned to complain to WTO that it was against the spirit of free trade. WTO is an organization like UN to mediate trade disputes between two groups. Mediation or adjudication involves rulebooks, experience and understanding of sensitive environmental issues. An IMS-based E-Governance does not handle these kinds of subtle issues. However, one of the responsibilities of a KMS-based E-Governance is to play a role of a mediator.

This paper discusses the software engineering aspects of KMS-based E-Governance. We pointed out in the beginning that there are several models of IMS-based E-Governance. We highlight that the principles and philosophies of IMS are not applicable to models of KMS-based E-Governance.

Project: IMS focuses on the *development* of the project where as KMS of E-Governance focuses on the *maintenance* of the project.

Requirements: IMS is well defined and well structured (can be expressed in the SQL statements) where as KMS of E-Governance cannot be organized and classified.

Driver: IMS is business-driven controlled by one team with defined business objectives where as KMS of E-Governance is people-driven.

System: IMS is a homogeneous project with heterogeneous systems where as KMS of E-Governance involves heterogeneous projects over hydrogenous systems.

User Interface Design: The GUI layout of the communications and reports of IMS targets stakeholders who are well defined at the requirements phase itself where as the user interface design of KMS of E-Governance targets undefined and unknown users.

Architectural Design: IMS is based on *integration* where as KMS of E-Governance is based on *assembling*. An IMS based project is modularized into smaller projects with well-defined interfaces and thus it is a process of integration. A KMS based E-Governance project is a combination of multiple projects and it is a process of assembling.

Process: An IMS project is a *cycle*-based process. It is software development cycle of various phases from requirements engineering to transition. A KMS of E-Governance is a *path*-based process. We discuss this path-based process in detail shortly.

4.4 A path-based process

There are models to represent knowledge [10]. A good model of knowledge management system is a blend of evolution and innovation. The KM [11,12,13] cycle has 4 phases:

- Knowledge capturing (creation)
- Knowledge sharing
- Knowledge enhancing
- Knowledge preserving

How do we differentiate between IMS-based E-Governance and KMS-based E-Governance from the perspectives of software process? Let us consider an IMS of E-Governance of Quebec, Canada. In 1990, if you ask an IMS regarding Quebec sovereignty referendum "Does Quebec want to separate from Canada?", it would reply "NO". But it would give the same answer in 2000 and continue to reply in the same way in 2010. In the real scenario, the mindset of the people of Quebec has been changing. There has been a consistent drift from "NO" to "YES". We need a system that changes according to the change of the mindset of the people. We need a system that reflects the changing attitude of the people. We need a system that grows with the people. In other words, we need a system that would reply "NO" in 1990, that would reply "Between YES and NO" in 2000 and that will respond in a different way in 2010 according to the mindset of the people of Quebec in 2010. Only knowledge-based E-Governance provides this.

The popular process models of software development life cycle are waterfall, spiral and iterative. In the cycle-based process of IMS of E-Governance, the development phase and the maintenance phase are in different stages. The maintenance phase begins after the completion of the development phase. The period of development phase is very small compared to the maintenance phase of a software development life cycle. This cycle-based process is not appropriate for KMS of E-Governance. The development phase and the maintenance phase of KMS of E-Governance should go hand in hand. Both phases should proceed endlessly on parallel paths. Figure 6 represents the path-based process of KMS of E-Governance. In this path-based process, the development phase and the maintenance phase are two parallel activities. The development phase is

a sequence of software development life cycles, which involve development projects.

There are two metrics available to classify knowledge competency. The MIT I/T Competency Model associates weight 0 to 4 according to a classification of "none", "developing", "proficiency", "strong", and "expert". Another metric model [9,14] assigns similar weight according to a classification of "novice", "advanced beginner", "competent", "proficient" and "specialist".

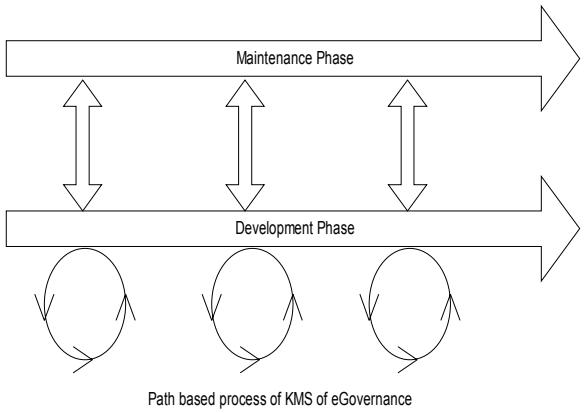

Figure 6

4.5 Law of Knowledge Dynamics

Knowledge sharing is a crucial phase of KMS-based E-Governance. A few models of E-Governance [2] propose a concept of "Knowledge Centers". In this model, a few centers are identified as specialists and experts of certain skill sets. These centers disseminate knowledge and expertise on a particular domain to other users of the system. Only the assigned "Knowledge Centers" are the authorized knowledge provider. This model has advantages and disadvantages. One argument to support this model is this. Knowledge providers are like medical consultants. Only authorized consultants should disseminate knowledge. The other school of thought is that every one has a certain degree of knowledge and experience to be shared. The system should be open to everyone to impart his knowledge to others. Our model is based on the second school of thought which we call *law of knowledge dynamics*.

According to law of thermodynamics, heat is a form of energy, which flows from a body at higher temperature to another body at lower temperature, when the two are in contact. Knowledge is also a form of energy. A good knowledge-based system should provide an environment where knowledge flows smoothly from a source with knowledge to a destination that needs knowledge.

4.6 Other features of KMS-based E-Governance

Information management is becoming a crucial subject matter of E-Governance. The reason for this is that E-Governance involves a huge volume of data that requires skills on how to effectively access and use this growing information and knowledge to the world. Development problems are increasingly complex and require interdisciplinary solutions. Development organizations need to be smart, agile, and responsive; they need to be better at what they do in order to learn more from their experiences, and adapt to an ever-changing reality. The key role here is to ensure that all the strategic content generated by the various client organizations can be retrieved easily and logically by the users of the network.

The issue of privacy [3] is included because of its importance in ensuring the success of eGovernment implementation. Privacy and good access to government information, through web sites and other technological mechanisms, are important. Privacy rights, in particular, help to build trust and confidence in eGovernment programs. Also, privacy is seen as a basic, intrinsic human right being woven into the fabric of life in many countries. Privacy is also emerging as an important policy instrument in international trade to enable governments to protect their nations' sovereignty and have control about how the use of personal information of their citizens is used. The concept of information rights are being linked with the success of E-Governance [17]. Thus, privacy, information rights laws and other cyber-laws, such as copyright, intellectual property and freedom of expression laws are becoming central to eGovernment practices and an important part of the knowledge management [11].

A good model of E-Governance will have the following features:

1. Information management [15, 17]: This also includes *knowledge preserving*. The system stores and retrieves the data, documents, and records of government. It also generates reports for the administrators and the people with the appropriate access privileges and confidentiality. The system is smart enough to extract statistical and intelligent forecast reports for future planning.
2. Events Management [18,19,20]: This also includes *knowledge capturing*. The system provides a platform for discussion, debate, snap poll, referendum for the communities. The goals are to provide flexible collaborative environments with targeted services for the different parts of the community, to support interactions between organizations and research networks where new social issue or need or change is floated, defined and

analyzed. The outcome of these events are stored and forwarded to appropriate destination.

3. Privacy Management [3]: The system is designed in such a way that the privacy of discussion, debate, snap poll, referendum is strictly maintained. Necessary copyright and intellectual property is taken care.
4. Capabilities Management [18, 19, 20]: This also includes *knowledge sharing*. The system uses Knowledge Sharing approaches to assist development organizations in sharing their capabilities, experiences and knowledge with the goal of increasing the effectiveness of development work overall. The aim is also to support and nurture collaboration within individual organizations as well as the development community as a whole. It will also promote a range of services to offer to its members and other interested parties such as training, consulting and facilitation.
5. Creativities Management [18, 19, 20]: This also includes *knowledge enhancing*. The system provides a platform where multiple perspectives have an opportunity to interact, where different disciplines cross one another, where good is challenged by bad, rich is challenged by poor, and revolutionary ideas are challenged by conservative ideas. The system encourages social activists, researchers, business people and knowledge workers from all sectors to join there to create some real innovative breakthroughs in technology, new organizational forms and methods, new leadership skills, new collaborations beyond age boundaries, beyond discipline boundaries, and beyond sector boundaries.

4.7 Infrastructure Management System

Infrastructure Management [15] is well studied under Enterprise Resource Planning. The infrastructure management [16] covers the following domains:

1. Security management: Security holds the key to successful E-Governance by safeguarding each electronic data interchange. The security functions that need to be addressed are:
   - *Confidentiality* to keep information private.
   - *Integrity* to prove that information has not been tampered.
   - *Authentication* to prove the identity of an individual or application.
   - *Non-repudiation* to ensure that information cannot be disowned.
   - *Access Control* to allow access only to authorized users.
2. Software management: Software is one of the most critical elements of the system. It involves huge efforts in the development life cycle. The focus of software management: system is the organization, control, and protection of software assets within the communities of E-Governance.
3. Network management: E-Governance integrates multiple domains running on different computers, and uses distributed database technology and provides a high performance platform regardless of the size or configuration of each network. It supports management of multiple distributed domains. Here domain represents a community from the perspectives of E-Governance. It should be a secure, scalable, distributed software suite for managing mission-critical network of E-Governance.
4. Resource Management: This includes procurement, inventory management, software distribution and hardware release management, license management, configuration management, capacity planning, and optimization of the infrastructure.

Since enough expertise is available on the infrastructure management system, the research scope of this paper does not intersect the infrastructure management system.

5. CASE STUDY

As a case study of E-Governance prototype based on knowledge diffusion/dynamics, we pick a political case study. The study is based on the poll on Referendum question of Quebec, CA regarding independence (unilateral action or negotiation). Center for Research and Information on Canada (CRIC) conducted the poll between February 12 and 19, 1998 [21]. The sample size was 1000 and margin of error was 3%. We investigate those resultant data to calibrate the approximate quantitative weights of certain factors (like 'social aspects, cultural values, etc) influencing the population-behavior. We select Neural Network to formulate the decisive system as 'adaptive' and 'efficient'.

5.1 Experimentation of the case study

A network of two layers where the first layer is sigmoid and second layer is linear can be trained to approximate any function arbitrarily well. In our case study the input parameters are 'social aspects',' cultural values',' political effects' & 'spiritual effects'. We adjust different historic values of those input parameters for resolution of 'independence decision' as training set. The output or 'decision' is 'Yes' or 'no', denoted by '1' or '0'.For the experimentation we use Neural network toolbox 3.0 of Matlab 6.5 .

Parameters for NN:

Network Type = Feedforword Backprop
Input Ranges = [0 1; 0 1]
Train Function= TRAINLM
Adaption Learning Function = LEARNGDM

Performance Function = MSE

Numbers of Layer = 2

In Layer 1, the number of neurons= 4, & Transfer Function is logsig type. In Layer 2, the number of neurons= 1, & Transfer Function is linear type . We set 1000 for epochs, since we would like to have longer duration for the train. 0.000000000000001 for goal, since we would like to see if the NN is capable to produce high precise result. 50 for max_fail.

After conducting feed forward back propagation ANN training, we get the learning rate of figure 7.
Weight to Layer 1 from Inputs:
IW{1,1}=
[6.689 -7.4908 -2.2068 7.7611;
11.2744 -0.73953 7.6911 -7.757;
13.1336 5.6581 -7.2299 -5.1749;
10.7512 7.9907 -3.0779 -5.4392]
Weight to Layer 2 from Layer 1:
IW {2,1}=
[-1.9865 1.1006 -1.4781 0.66399]

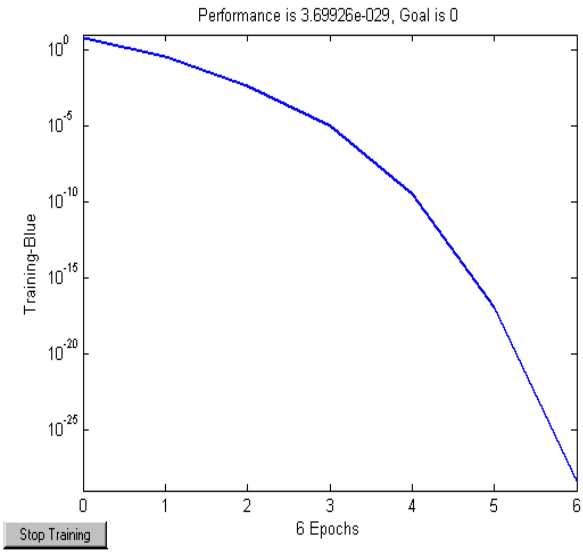

Figure 7

In figure 2, we show the corresponding neural network.
Bias to Layer 1, b{1}
[-4.1531;
-3.078;
-1.7215;
-0.2574]
Bias to Layer 2, b{2}
= [0.78695]

If test input set=[0.2,0.2,0.2,0.7];
In first layer:

First neuron's output (before proceeding through sigmoid function)
= (6.689 -7.4908 -2.2068+ 7.7611) X 0.2 -1.9865= -1.036
After passing through the sigmoid function, f1= logsig(-1.036)= 0.2619

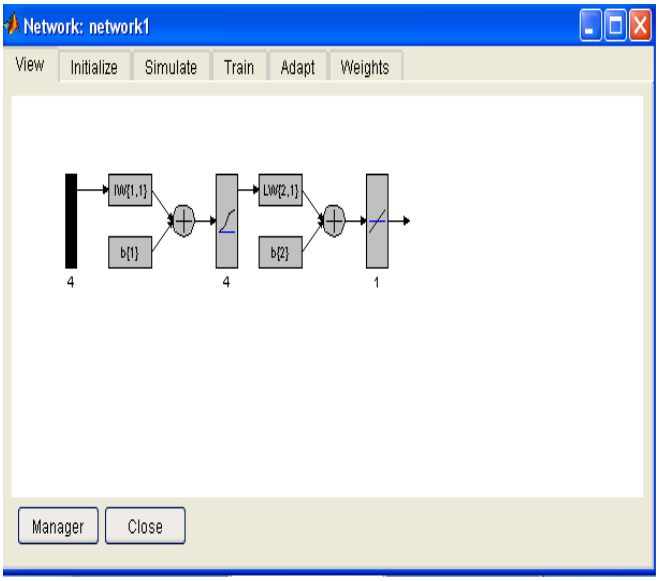

Figure 8

Second neuron's output (before proceeding through sigmoid function)
= (11.2744 -0.73953+ 7.6911 -7.757) X 0.2 +1.1066= 3.2004
After passing through the sigmoid function, f2= logsig(3.2004)= 0.9608
Similarly, f3= 0.4500
f 4=0.9996

In second layer using the same principle, we get final outcome= -5.8640 .Now considering the range ">=0.5" as 'YES' and <0.5 as 'NO' value, the simulation forecasts decision regarding predictive referendum polls in future. For different sets of input values the ANN system adapts accordingly. Future work will consider 'Adaptive Neuro-fuzzy Inference System (ANFIS)' to predict the approximation more closely towards correct values. Moreover, consideration of new 'variables' and relevant re-architecture of the overall network (adaptive network issues) is also future concern.

6. CONCLUSION

The conventional IMS-based E-Governance uses a concept of "knowledge centers" to share knowledge. Our model of E-Governance based on knowledge management system is built on KM cycle of Knowledge capturing, Knowledge sharing, Knowledge enhancing, and Knowledge preserving.

This model shares knowledge that supports the law of knowledge dynamics.

The development model of IMS-based E-Governance applies a cycle-based process. E-Governance is a combination of interaction and innovation. This paper studies a development model of KMS-based E-Governance that is path-based process. This model provides an environment where the system grows with the people.

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