Beginning a Municipal e-Government System

Jesse, F.
School of Software, Beijing Jiaotong University, Beijing, China
jesse@jesse.org

Beijing winter 2009.
Edited in 202102 for typing.

***Abstract*—Several guides for the planning and construction of a municipal electronic government system are presented. The discussed system is an electronic government platform mandated to provide information and services to citizens, and which presents these to citizens connected online or through mobile devices. We discuss parts of the system, including what constitutes a part of the system, user action potential and conceptualization of users, agency and agency services.**

***Keywords*—** e-Government, Action Potential for Agenda, Government Agency Presence, Provision of Services

I. Initial Planning for an EG System

Throughout the world, many cities are growing in population, and mobile-internet connected populations are increasing, which makes the importance of electronic government (hereafter referred to as EG) apparent. Historically, the earliest, the largest and the most used electronic systems are likely to serve as examples for the construction of similar systems in the short term (for example the British 1979 Prestel system was followed in 1982 by the French Minitel system [1]).

Initial planning for an EG system should include discussion of the parties closely affiliated with and involved in the construction and administration of the EG system. These closely affiliated parties may include: system designers, executive decision makers and officials, agency representatives, EG system administrators, and information officers. Information officers acquire, format and maintain information from each agency and add it to the EG system. Agency representatives are professional experts in the methods and procedures of an agency (which might be a government department) whom they represent.

After assembling closely affiliated parties, discussion can proceed to describe who the EG system will serve, and how. In our example, the municipal EG system serves citizens of a city. Citizens who interact with the system can be called users of the system. We can describe these users with a user model, which begins as a list of attributes that describe users, and continues at finer levels of detail to describe different groups of users, where the finest level of detail may describe a single user.

II. Describing Action Potential for Agenda

Large cities can support populations of many millions of people. For example, Beijing, China had a population of about 12 million people in 2007 [2], all of whom could have access through an EG system to government provided services. In such a city, removing the necessity to go to a physical office once every year to file a single document can be thought to immediately reduce the need for millions of trips to local government service offices. Economically and logistically, an electronic government platform can increase efficiency by reducing or eliminating transportation and time expenditures. Citizen's time and energy is conserved. Small changes in time spent on a task have a big effect when magnified through large populations

A. Action Potential for Agenda (APA)

We can attempt to quantitatively measure a person's capacity for completing a task, by generalizing that a person's metabolism remains constant across commonly used spans of time like hours days and weeks, and that the potential to complete a task is proportional to the fraction of total metabolism devoted to the completion of a task. We can then generalize the intuitively apparent, that the capacity to complete a task is proportional to the time spent on a task.

An agenda is a course of action which people spend time and energy in the pursuit of. If an agenda "x" is a course of action determined by an organization or person, people can spend time and energy working in pursuit of agenda x. Agenda x will be constrained by many factors including basic needs (sleeping, for example) and other agendas which compete with our introduced agenda x. In an abstract case we might say that if a person "M" will spend 3 hours in one waking day (12 hours) working in pursuit of actions that support agenda x, the action potential for agenda x would be 3/12 = 1/4.

An APA ratio can be used to make initial descriptions of agency as it is observed in the pursuit of an agenda, to describe who is closely affiliated with the agenda and who is not closely affiliated. These distinctions allow abstract classification of citizens into groups of administrators and groups of those who are provided services. Imagine two citizens, one "N" of whom is an employee in a government department, and another, "M", who is an end user of government services. Imagine citizen N will spend 9 hours in one waking day (a waking day of 12 hours)

working directly as an information officer in this government department, which we can call an agency. The APA ratio for the agency's agenda in the citizen's life would be 9 (hours) ÷ 12 (hours) = 3/4. Citizen N could be described as being closely affiliated to the agenda of the department, as the citizen's action potential for the department's agenda is high.

If citizen M will spend 3 hours in one waking day filling out an application and filing it in our EG system, the APA ratio for the agency's agenda in the citizen's life would be 3 (hours) ÷ 12 (hours) = 1/4. Citizen M could be described as not being closely affiliated to the agenda of the department, as the citizen's action potential for the department's agenda during the course of a 12 hour waking day is low.

Citizen N has a high APA ratio for government action, 3/4. Citizen N has a higher action potential for the agenda of the government department than citizen M, and so is more closely affiliated with the agenda and its component actions.

B. The Closely Affiliated

Those who have a high action potential for agenda (a high APA ratio) are closely affiliated to the agency and actions that comprise the agenda, whereas those with a low APA ratio can be described as not being closely affiliated with the agenda. People not affiliated closely with the action of government (people with low APA ratios for government action) spend more time and energy carrying performing actions which are not directly part of government projects. If considering only APA ratios, when the agenda is the successful conclusion of a service provided by a government agency, citizens with low APA ratios are least likely to be quickly served.

III. Government Agency Presence

Government Agency Presence (GAP) is the ratio of the population of those closely affiliated with government action to the total population governed. It generally happens in the case of government that the quantity of people closely affiliated with the government is smaller than those who are not closely affiliated. It can be represented graphically to indicate areas in networks of people or agencies to illuminate regions of high and low agency presence. Government agency presence can also be mapped geographically as the probability of action in government affiliated agendas by people in a place. For example, GAP will be very high in government buildings but lower in other places. We can describe GAP to be the fraction of the population who are c*losely affiliated* (CA) with government agendas.

GAP = CA / population.

EG and EG systems present several opportunities to plan government agency presence (GAP) so that a smaller presence can be more effective. One such opportunity is that EG systems can take advantage of machines to increase the speed of services, from popularization and description of services, to access, and delivery. Another opportunity is that EG systems can be accessed though a mobile device or EG can be made otherwise mobile, effectively increasing the quantity of locations at which services can be accessed.

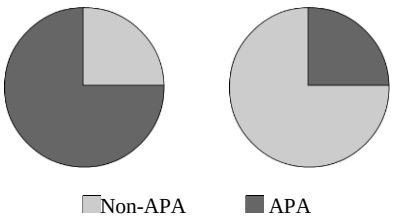

Fig.2. Left side, Citizen N - Closely Affiliated; right side Citizen M - Not Closely Affiliated

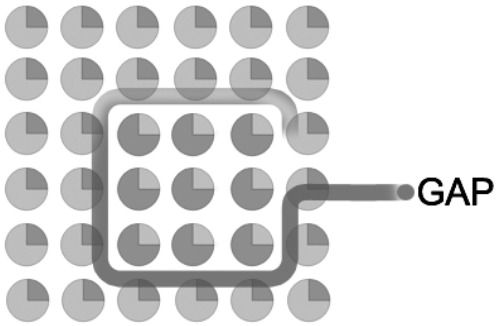

Fig.3. This graphic illustrates a density of people who have a high APA ratio for government agency, in a (surrounding) population which has a lower APA ratio for government agency. The central area, which is composed of citizens who have high APA for government agency, represents a concentration of government agency presence (GAP)

IV. Provision of Services

A service is an event in which an entity changes another entity. In our situation, the change that occurs in the observer entity, a citizen, is a designed and predicted change that has been brought about according to an agenda through government agency presence. In situations where the change which occurs is not the intended change, a service is not considered to exist. Often the desired change does not occur, which could be because the citizen's APA ratio is too low.

A. Service Provider

Government services are provided by the closely affiliated (CA), to those not closely affiliated. The closely affiliated are citizens with a high APA ratio for the agendas of government departments. These are citizens who are information officers, administrators, officials, and other government workers. The population of the CA is generally smaller than the larger non-CA population (which represents the entire population minus the CA population).

The CA to whole population relationship, from the perspective of the government agency presence (GAP), is a few-to-many relationship, with the GAP being generally smaller than the total population served.

Historically the policies of many governments allowed

location constraints (for example physical offices), and constraints on the hours of operation of services to be determined by guidelines which may be derived from the needs of the majority of the served population. If every citizen is the same, then the perfect provision of services to one citizen will

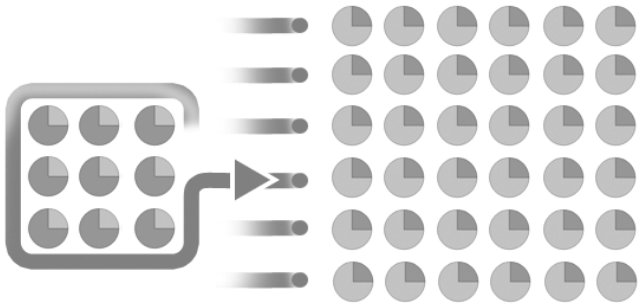

Fig.4. This graphic illustrates a smaller group of CA (having a high APA) on the left, providing services depicted by the arrow, to a larger population on the right who individually have lower APA ratios.

be a perfect provision of services to all citizens. It perhaps tends to be true that all citizens are not the same, and historically this problem has left portions of populations unable to obtain services, these including the physically disabled among other notable groups.

B. Diverse Populations

Managing diverse populations is a primary challenge for modern governments. The similarity between citizens will be a determining factor in how the deployment of inflexible or unchanging services can be successful. For a CA group operating a government agency presence GAP, the diversity present in the population may be more than the GAP can manage in its delivery of services. This may become apparent in the operation of EG systems as users of the system fail to successfully complete the service actions they have begun. Among other possibilities for the failure (including general low user APA) is the lack of flexibility in an EG user model so that the model does not reflect the realities of the user. An example could be where services are deployed for EG users through a text interface, but a portion of the population is illiterate.

EG systems amplify government agency presence so that more citizens can be served. Challenging problems that diverse populations present can be addressed in some cases by relying on the machine nature of EG systems. EG augments historical forms of government though accessibility at diverse locations, changeable human interface types, and continuous hours of operation. Important primarily however is the flexibility of the user model employed by EG systems. The ideally flexible user model can adapt to any user, can serve all citizens.

C. Citizens Viewpoint, Agency Viewpoint

What citizens see as they approach government service providers is the relationship of many CA individuals (who are a large GAP presence) to one single non-CA person (themselves). This perspective can be quite the opposite of what CA officials, administrators and other employees see: the non-CA individual is a member of a group larger than the CA group and larger than the GAP. Where a principal problem that the GAP has, adapting to and providing for a larger number of non-CA individuals, the non-CA individual citizen has the twin of this problem: adapting to an agenda for which it has a low (relative) action potential.

Citizens and EG system users see a relationship of a large government agency presence (which the users can interpret as complex and difficult to manage) to a single person: themselves. Conversely, CA members of the GAP see a small group attempting to provide for a (usually orders of magnitude) larger and more diverse population.

In the development of an EG system, initial surveys of component agencies may reveal that agencies have information distribution systems or publishing systems, the operation of which is considered to be a service. For example, a web page which lists available appointment times. For planning, budgeting and allocation of resources these types of systems must be considered services. Analysis of the success of services must consider who is changed by the service (often the target audience is citizens), by this standard publishing systems are providing services to whoever is changed by the operation of the system. If the system does not successfully create a change in the viewer of the published information, the service could be considered a failed service or a service which serves only the operator. For EG systems developed by this standard, a webpage is not a service until it becomes an event, until the page is viewed and causes a change in whoever views it. If the observer only views it, and is not changed, then the webpage can't directly be considered a service (or it is a failed service). If the webpage can't be downloaded, or is in a language that the observer of the page can not understand, the designed change in the observing entity can not occur, and no service event occurs.

The (government) agency conception of service is often a sequence or network of service events, which exist in a relationship with other services and elements. The level of complexity and user expectations of services are often high, and agencies often employ a simplified model of services for convenient use, which does not include all the steps in the process that a user may require or be required to follow. Users of services may have incomplete information or instructions on how to use services, especially users who may be considered to not be closely affiliated to government agencies. For example, the process of obtaining a driver's license is simple and clear to someone who is closely affiliated to the agency who issues drivers licenses, but the process may be unclear to those who are not closely affiliated to that agency.

D. Analyzing Agency Provided Services

There are several questions that can help us analyze complex agency provided services. Answering these questions is difficult unless services are first broken down into the small discrete steps.

a.] When and how does the service event begin, continue, and end?

b.] What changes? What large changes can be further broken down into smaller changes?

c.] Who are the entities involved? Who supplies, updates, and

approves incoming and outgoing data? Who provides the user interface?

One of the early problems in planning for the design of an EG system may be the transition from people and information officer and service agent based agencies and services, to system and machine based agency provided services. Agencies charged with administering this transition can take advantage of other agency's publications in this area [3]. Deciding what an element is, and how elements are related, can be initial problems. These problems might be solved by integrating the policies of responsible agencies into sequences of service events which are managed by information officers who are working in the responsible agency. For example, service events can be begun and end within the domain of a single responsible agency, for complex services, an agency with a larger scope or responsibility may be required to act as the responsible agency. Information from users can begin service events when the user requests a service. Working from this viewpoint, we then isolated elements which can be used to build EG service events.

V. Organizational Structure Models

A basic unit that an observer can sense, and which does not easily break down into smaller components, can be called an element.

A. Simple Models

In an EG user interface, database, and system, elements are instances of models, which are computerized versions of people's ideas about the organization of information. Most elements are based on a model for the organization of components into a structure. The models can be very simple, or complicated. Complicated models are generally composed of a variety of simple models.

Simple models include the list, one of the basic models from which many other specific types of lists are descended: names, articles, dates, addresses. Another basic type of model is a network, a collection of nodes which have connections. Examples of networks might be grids, hierarchies, maps, objects, containers. Objects and containers are often considered as their own unique type of model.

Elements may be constructed in various stages by different processes for presentation to an observer. Lists from the database may be added together by the system, given a name and a few pictures by the user interface, and presented as an element the user of the system. The component parts are all elements themselves when observed by the system, or by the content creator.

Decide on containers for elements, be aware however that once a user sees or otherwise comprehends a certain grouping, they might not be able to learn new groupings without some effort. Groups of elements often need to be changeable, because the user may not agree with or understand the designer's grouping. For example, if items can be put in a list, let this be possible in the system's interface presentation, for other users who are not familiar with lists, allow them other interface configurations.

B. Relationships Between Elements

When we build machines and software, we generally build so that even a single number or character is an element. For information officers who have worked in a particular area for years, very large collections of information are typically viewed and concieved of as elements. Information officers over time develop a professional viewpoint which allows them to work with often-seen information more efficiently. This viewpoint, which may allow the efficient input of authoritative information and efficient official management might not be the same as, or even useful for users of an EG system. For example, the concept of "opening time of an office" (for example the opening time of a branch office of the taxation department) can be viewed as one piece of information, or as many pieces of related information. For this reason, there are often separate information management and information presentation (or end user) interfaces. The information officer's management interface informs and can dictate allowable actions. Information and services available to users of the EG system are restricted not only by official government policy, but by the information officers' viewpoint, their information management interface, the design of the EG system's database (for example, location data may or may not be able to be associated with an event), and finally by the user interfaces available to the end user.

C. Elements with Changing Relationships

Sort the information and services that will become part of the EG system. Take the composite information apart, find each element and label it. Decide what is unique. For each unique element, identify its borders, identify why it is not like other elements. Decide how some elements are similar to others. Implement according to (official) policy while allowing flexibility where needs and viewpoints of the user or agencies could possibly change. When changes in policy occur or when users' needs change, the EG system must adapt or be changed. In a simple example, the legal framework for tourism in Beijing's Summer Palace is a long term generally unchanging policy, however the public transportation infrastructure in the area has changed, and the viewpoints of tourists have changed. From the year 2005 to the year 2010 tourists have changed from walking and using public transportation to reach the Palace, to driving and parking near the Palace. The information needs of tourists in this context have changed to require not only public transportation information but also traffic and parking directions. During the same time the public transportation infrastructure in the area has changed to include subway service and different bus routes and schedules. To adapt, the EG system must provide reorganized information, which can be accomplished by changing the relationships between elements that compose the system, as opposed to adding and deleting elements from the system.

D. Creating Elements

Content (presentation elements, information) should be cut into pieces for several reasons.

a.] Because the system needs to present content in several

ways (for example if the system needs a smaller version, or put something on several pages).

b.] Its fast, the system can save memory space and time, transmissions can be compressed.

c.] Model-based presentation (templating) can be taken advantage of. For example if many web pages have the same layout, we need change only the layout, not many web pages.

d.] Searches can be conducted quickly, relationships between elements can be stored, relationships can make searching faster, for example, linking a picture to a place, so that when a person searches for a symbol, they will be presented with pictures as well as essays.

Review existing reference models, they might be helpful or useful in your system. Several governments have made their efforts open and available for other agencies to copy or learn from, for example the US government eGovernment "e-strategy" policies and standards [4], and other reference models and design models [5][6].

VI. Standardization

Government's policies on standards are often open to the public and available as examples to learn from [7]. Standards related to EG systems have been discussed in public forums online, which formal results and recommended standards made public[8].

Data standards for electronic systems have been well developed and documented. What may be more useful for EG systems and the agencies that are connected through EG systems are standards which describe metadata. One such general standard is the Dublin Core standard for creating meta data[9].

A. Meta-Data

Meta-data can be thought of as information about data, or information about information. When meta-data is interpreted, by a person or a machine, it is meta-information. If one should like to send several pieces of information though only one channel, meta-data is needed to contain and separate the messages so they can be properly interpreted when they arrive. If we want to connect information to other information to generate context, the context data must be stored somewhere, generally in meta-data. Writing meta information takes a main body of primary information, a comparatively large amount of contextually linked information, removes some context and adds other contexts, and notates the original information by the meta-data.

The use of meta-data in technical communications may have began with the first electronic transmissions, with the telegraph. With the first transmissions of data for the press (newspapers and other news distributions systems) it became convenient or necessary to know more about the information being transmitted than was available in the publishable transmission itself. For example, the main transmission could be a newspaper article, and the with the text of the newspaper article were transmitted instructions for how to present the newspaper article, for example, inserting a word in the transmission which indicates that the next word transmitted is part of the title, and then transmitting the title. This would be an early case of transmitting information about a user interface allowing with the information content (transmitting the information of the article, and also how it should be presented to a user or reader).

Transmission Control Protocol (TCP), the fundamental communication protocol for email and the web is an implementation of structured meta-data encapsulating data. TCP describes the length of data to be sent, the destination address for the data, and other important information about how to send a piece of data through the internet. Without this metadata, according the current structure of the internet, nothing sent would arrive. Examples exist in completed EG systems which have made their meta-data standards open[10]

VII. User Experience

User experience can be analyzed as a sequence of transaction events occurring as elements are presented by the system to the user. The presentation of the elements, and the user's reaction to the presentation change the user model. The user experience can be a combination of the sequence of transaction events that have historically effected the user model, and the analyzed statistical information that can be derived from the sequence of transactions.

A. User Expectations

Seeking uncertainty reduction or in goal seeking behavior, the user has expectations. The user interacts with an EG system to experience what is available through the system. The user agrees to be affected by the system and to make at least some decisions based on what the system presents to the user. These decisions can be as simple as pressing "continue", or agreeing to complex social, behavioral, or financial contracts.

The user has to understand the system to use it. This means that the user must have a model or be able to quickly create a model of the system and the information that exists in the system. The user's model of the system may consist of relationships between elements that are presented to the user by the system. The user doesn't entirely know the answer that the system will provide, although the user may be reasonably sure of the answer. The user may be entering the system to confirm something that the user already believes, and perhaps that the system already contains. If the system presents a model that is incompatible with the ideas that the user already has, the presentation will probably be unsuccessful.

B. User Transaction

When the user is presented by the system with an element, and then the user reacts to the presentation in a way that the system can sense, a transaction between the system and the user can be said to have occurred. The system obtains and converts data into formats that can be acceptable to a user. When the user accepts what the system provides, the user accepts formatted data which becomes knowledge for the user. The knowledge resides in the mind of the user until the user forgets it. The process of data moving from the system into the mind of the user

can be called a transaction that occurs as data moves across the barrier between person and system, changing the user model in the system and instigating a change in the user's mind which can become knowledge for the user.

C. Presentation, and Transaction History

As the user is presented with elements by the system, these elements are experienced by the user (if the user allows herself to experience the presentation). The experience changes the user model: presented elements are added to the user model's history.

D. Event Chains

Event chain methodology can be used to model uncertainty in schedules and chains of events, and in decision making processes. In decision making sequences, areas of uncertainty can be identified so that methods for decreasing uncertainty can be employed. As a methodology to model sequences of user actions it can be used to highlight areas of uncertainty, where risk can be equated with service failure. The methodology is often composed of:

a.] Probabilistic moment of risk
b.] Event chains
c.] Critical events of event chains
d.] Project tracking with events
e.] Event chain visualization

E. Preferences

Preferences can be calculated if the user rates an experience. For example the user is presented with information on weather, the user rates the information as beneficial, and returns every day to get more information on the weather. The user's user model is changed each time, with new information appended to history information. As the user rates the weather information that is presented, the user model stores this rating information, and can retrieve it later when the system needs to decide if it should present weather information.

F. User Groups

The existing body of EG systems often distinguishes between different types of users (described following). The reason for this may be that the end goal of some users may be generally predicted based on what type of user the user identifies herself to be. For example, it might be helpful if we identify ourselves as a business type of user if we want the system to present us with elements that are intended for business users.

Example user groups
1] Citizens
2] Non-citizens or visitors
3] Businesses
4] Employees
5] Government agencies

In 2009, the USA.gov and Gov.sg websites both distinguished user types 1, 2, and 3 (users can self-identify with these groups by selecting from options displayed on a webpage).

The process of associating useful elements to be presented to users or groups of users can be designed by system designers or administrators or officials. Another option for associating elements together with types of users is to allow users to select what elements they wish to be presented with by themselves. Other possible selection methods could be the display of elements that have been recommended by other users or generated automatically through rules in the system. A simple example of the automatic method may be that when a user identifies herself as a business user, and then accesses information on business registration, the next user who identifies herself as a business user is automatically presented with options to access business registration information.

Areas of the system may be thought to be only useful for users who identify themselves as part of a group of users that the part of the system was designed to serve. An example of this may be users who identify themselves as drivers of motor vehicles, who are then presented with driving information by the system.

If attempting to serve the user, the system should not attempt to change the behavior or goals of the user unless directed by official policy. In the example of the drivers group, those users who wish to access information on driving, but do not identify themselves as drivers, should still be able to access this information, unless directed otherwise by official policy.

VIII. EG System Parts

Connecting different parts of an EG system requires translation of information or intention. The collection of ideas that are respectively, content creator's expectations, database designs, and user expectations, are each unique and each collection does not completely translate into the others. There is a difference between content creator's expectations and user expectations, and this difference will affect the usefulness of the system from the perspective of users. Transition probability between elements is lower than within elements, within an element transition probability is absolute (the transition is perfect as there is no transition), whereas between elements it is fractional (the transition must be distinguishable). To identify areas of uncertainty, where the translation between the interpretation of information in one part of the system to the interpretation of information in another part of the system occurs, we can identify example entities which play important roles in a complete EG system. Each of these entities is different from the other entities, and this difference presents a transition area where uncertainty is high, or where information or intention can be mistranslated:

a.] Content creator (a user)
b.] Any user (with a goal)
c.] Database
d.] System
e.] User interface
f.] Administrator
g.] Policy

These entities are typical of current EG systems (for example USA.gov, GOV.sg). The distinction of the database and the other entities following in this list might best be considered only

representative of current technology implementations.

IX. Content Management

In the creation of EG system services, a content creator (probably an information officer) assumes the viewpoint of a user, and creates what she thinks is the user's goal. The content creator makes content and segments content into database fields in the system. A user who requires a service begins and makes efforts to complete the goal service event. The system presents elements in a user interface. The user is guided to select some elements by the user interface. The user selects elements for presentation by the system and the user is presented with content made by the content creator. The user then evaluates whether the presentation satisfies her goal.

When a content creator makes something, she designs the content (for example, information on water prices for next year) for the user, hoping to satisfy the user's goal. The content creator is often not the user, and so will not know exactly what the user's goal is. When the user completes collecting and designing her content, she must enter the content into the system. Currently (according to commonly used web-based system interfaces) the EG system will then present her with a form for entering data or other content. The form may not be designed to accept the type of content that the creator has prepared. The system puts content into a database. The database only accepts certain types of content. Content which does not fit (into the system or through the interface) will not be understood by the system, and will not be used well (for example, results might not show up in a search, or a picture or text appears incorrectly). After the creator has entered the content into the form, the system must try to store the content in a structure that will allow its presentation as the creator designed. But the content needs to be cut into pieces which get put into the database. The process of cutting content into pieces is designed into the system, and may be done by the user, and sometimes by the system.

X. EG System Rationale

Employment of an EG system can speed up government services. EG often makes government services available anytime anywhere, and is the realization of many of the goals that participatory governments have had throughout history: to serve the people, to serve them anywhere, and to serve them immediately. In about 1878 when the telephone was invented, instant access to government officials who were in distant offices became possible. Transitioning from past offerings of agency services to EG online services is the transition from a system where the user must move close to the information to access it, to a system where the information moves closer to the user. This transition often allows citizens to obtain the same information that officials and administrators manage, at nearly the same time.

There are several possible advantages of an integrated and comprehensive EG system:

Advantages of user interface standards

a.] Fit user expectations: the user does not have to adjust to different interfaces

b.] Make information presentation standardized and centralized

c.] Changes can be made in a standardized way from a central location

Advantages of a user model

a.] Self-identify one time only for multiple service events

b.] Information that is often used is presented prominently

c.] User's historical events can be remembered

Advantages of data standards

a.] Information can be brought together in new ways

b.] Specialized programmers are not required for making new software applications

c.] Users and communities can innovate new ways of using information

d.] Information is easier for users to find when it looks the way users expect

Advantages of speed and centralization

a.] Information is brought to the user, the user does not have to search through peripheral sources

b.] Agency to agency communication and interaction could be improved

c.] Information from different agencies can be used together

Services can be agglomerated in the design of EG systems so that users of the system can access what they may believe to be related services together. Agency communications and inter-agency relationships can be augmented and perhaps improved. Public notices can be made available quickly to online populations.

As described by Russian Deputy Prime Minister Sergei Ivanov, speaking of Russian EG system development, "It is this system that will allow us to provide a wide range of government services to Russian citizens in electronic form, creating a single information system to span all government agencies, ministries and departments,"[11].

Acknowledgment

The author wishes to thankfully acknowledge the support of Miao Zhenjiang, Zhang Wenying, and Liu Yanqing

[1] 'A Decision maker's guide to videotex and teletext', (General Information Program and UNISIST, United Nation's Educational, Scientific and Cultural Organization, Paris, 1986),
alternative, http://unesdoc.unesco.org/images/0006/000689/068919eb.pdf , accessed July 2011
[2] 'Population (1978-2007)',
http://www.ebeijing.gov.cn/feature_2/Statistics/Population/t1071369.htm , accessed July 2011
[3]'Agency Transformation'
http://www.doi.gov/ocio/architecture/mbt/guidance.htm ,
accessed July 2009
[4] 'Office of Electronic Government and Technology',
http://webharvest.gov/congress110th/20081127183221/http://www.estrategy.gov/ , accessed July 2011
[5] 'Core.gov provides a collaboration environment for component development, registration and reuse',

http://www.core.gov/ , accessed July 2009
alternative, http://govitwiki.com/wiki/CORE.gov , accessed July2011
[6] Austrailian Government EG system reference models
http://www.egov.vic.gov.au/ , accessed July 2011
[7] Example (USA) government policy on standards
http://standards.gov/standards.cfm , accessed July 2011
[8] Standards on elections, emergency management among others have been written by the Oasis group.
http://www.oasis-open.org/committees/tc_cat.php?cat=govlegal ,
accessed July 2011
[9] Dublin Core Metadata Initiative (DCMI)
http://dublincore.org/documents/dces/ , accessed July 2011
[10] Australian Government Locator Service (AGLS) Metadata Elements
http://www.naa.gov.au/records-management/create-capture-describe/describe/agls/index.aspx , accessed July 2011
[11] Deputy Prime Minister Sergei Ivanov, February 11, 2008,
(Russian) Information Technology and Communications Ministry
http://top.rbc.ru/english/index.shtml?/news/english/2008/02/11/11143154_bod.shtml , accessed July 2011