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Evaluation and design of e-government: A holistic overview of e-government initiatives in Harrisonburg, and the challenges of adopting a citizen-centered design

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Evaluation and Design of E-Government:
A holistic overview of e-Government initiatives in Harrisonburg, and the
challenges of adopting a Citizen-Centered Design

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A thesis submitted to the Graduate Faculty of

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PREFACE

For the past three semesters, I have been looking at different aspects of e-Government. My motivation behind studying this topic comes from my time spent in Caracas, Venezuela, where I was able to experience the challenges of living in a polarized country where the relationship between government and citizen is severely damaged. Moreover, as an undergrad in International Affairs, I was able to learn the theories behind different political processes, as well as gaining an understanding of the responsibilities governments have to their constituents. Thinking about the ways these responsibilities are met, I turn to technology. I believe appropriate technology can be a way to bridge a gap between governments and citizens, facilitating service delivery as well as government accountability. Consequently, I look at e-Government.

Initially, I had the opportunity to learn about designing software using a user-centered approach, and thought this could be a good way to implement specific e-Government projects. My second semester, I had the opportunity to participate in the creation of a web-based application for the Resource Recovery Facility in Harrisonburg (a municipal waste-to-energy facility), giving me the opportunity to apply a user-centered approach within a governmental framework. These experiences led me to focus on project-level aspects of e-Government. However, before implementing a project, it is important to comprehend what is currently being offered, and to have a clear understanding of the governmental agency that will offer the service.

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ABSTRACT

BRIAN PEREZ

Evaluation and Design of E-Government:
A holistic overview of the e-Government initiatives in Harrisonburg, and the challenges of adopting a Citizen-Centered Design

In the past decade, e-Government has received a lot of attention from academia, policy agencies, and IT providers, all of whom attempt to assess and track the factors that lead to a successful e-Government service. I propose a top-level approach assessing e-Government in Harrisonburg as a whole, and then I explore project-level methods of design and implementation. More specifically, I identify 29 electronic services offered by the City and rank them according to a pre-defined four-stage ranking system. This assessment demonstrates that the majority of the services considered fall under the “Interaction” and “Transaction” stages (Stages 2 and 3 respectively). This organizational approach is followed by an analysis of the factors that may lead to failure and lack of use of e-Government initiatives, and how a citizen-centered design can be employed to avoid such failures. I then describe the challenges of using a citizen-centered design in e-Government based on my experiences working on the Resource Recovery Facility in Harrisonburg. Lastly, I examine future research topics that should be considered when discussing e-Government. **KEYWORDS:** e-Government, e-Governance, user-centered Design (UCD), maturity models, evaluation, design, assessment, citizen-centered design.

1 INTRODUCTION

Electronic Government (e-Government) is defined as the use of Information Communication Technologies (ICTs) to improve the delivery of government services, enhance the quality of government operations, and facilitate government interaction amongst individual citizens and organizations (Warkentin *et al.*, 2002). In the past decade, e-Government has received a lot of attention from academia, policy agencies, and IT providers, all of whom attempt to assess and track the factors that lead to a successful e-Government service. One must differentiate between success at the project level and merely labeling a specific government as successful in implementing e-Government solutions. At the project level, such evaluations have adopted one-dimensional approaches, utilizing frameworks common in computer science as well as the business sector, while overlooking socio-political factors (Heeks, 2003). In regards to assessing governments' e-Government strategies, organizations such as the American Society for Public Administration and Public Technology Institute have suggested criteria and developed surveys to assess national and local e-Government initiatives (Holzer, 2008). These have not, however, been applied by the City of Harrisonburg.

This thesis will concentrate on e-Government at the project level as well as at the organizational/governmental level. I propose a top-level approach assessing e-Government in Harrisonburg as a whole, and then I explore project-level methods of design and implementation. More specifically, the purpose is to identify an appropriate methodology that can be used to analyze the current status of e-

Government in Harrisonburg, Virginia, by reviewing existing e-Government assessment models, which will then be applied to the City of Harrisonburg. This review will provide a detailed analysis of Harrisonburg's e-Government initiatives as well as suggestions for the development of future projects by identifying specific e-Government related indicators. This organizational approach will be followed by an analysis of the factors that may lead to failure and lack of use of such initiatives, and how a citizen-centered design can be employed to avoid such failures. I then describe the challenges of using citizen-centered design in e-Government based on the experiences obtained working on the Resource Recovery Facility in Harrisonburg. Lastly, I examine future research topics that should be considered when discussing e-Government.

1.1 Defining e-Government: e-Government Vs. e-Governance

Before assessing local-level electronic or "e" initiatives, it is important to have a clear understanding of the terminology. Academics and political institutions alike have referred to e-Government as the efficient and effective delivery of services from the public sector to citizens, business, and other political actors, by adopting ICT's (Sharma and Gupta, 2003). In order to account for the political nature of e-Government, authors and practitioners alike have turned to e-Governance defined as "a technology-mediated relationship between citizens and their governments from the perspective of potential electronic deliberation over civic communication, over policy evolution, and in democratic expressions of citizen will" (Marche and McNiven, 2003, p. 75). The United Nations Educational Scientific and Cultural Organization (UNESCO) states, "E-governance is generally considered

as a wider concept than e-Government, since it can bring about a change in the way... citizens relate to governments and to each other” (UNESCO, 2011). Relating both concepts, e-Government can be seen as a subset of e-governance. In simpler terms, e-Government relates to the efficient delivery of a service, while e-governance emphasizes the services that should be delivered.

Any attempts at assessing these “e” initiatives should not be limited to government or governance, but rather provide a holistic overview combining both concepts. The majority of people understand that government has a social, political, and economic responsibility. In other words, a government service is not limited to a transaction renewal or voting alone, but rather it is seen as set of obligations that must be delivered. Therefore, this paper will use e-Government and e-Governance interchangeably, defined as the use of ICT’s to improve the delivery of government services, enhance the quality of government operations, and facilitate government interaction among individual citizens and organizations (Warkentin *et al.*, 2002), with the understanding that the terms ‘services’ and ‘operations’ are inclusive of both political and transactional/business-like operations. In other words, this definition considers services that promote civic participation, such as e-voting, e-petitions, online town hall meetings, as well as transactional activities such as online license renewals, permit submissions, or bill payments, to name a few.

2 THE OVERALL ASSESMENT

2.1 Review of existing Assessment and Stage Models

Various organizations and disciplines (such as information systems, e-commerce, and business economics) have been trying to establish theoretical and practical procedures that will serve as paths to success. One of these procedures is through the identification of models that depict stages of growth, allowing organizations to understand their current status and develop plans for improvement. One of the better-known models is the Capability Maturity Model (CMM), originated by the Software Engineering Institute to assess the competences of software specific government contractors (Software Engineering Institute, 2011). As Humphrey informally describes:

“An organization at Level 1 is basically not doing much of anything. At Level 2, they're doing some planning, tracking, configuration management; they make some noises about quality assurance, that kind of stuff. A Level 3 organization begins to define processes—how they work, how they get things done, trainable things. At Level 4 they're using measurements. They have a framework for actually tracking and managing what they do, something statistically trackable. Level 5 organizations have a continuously improving process,” (Rosenberg, 2007, p. 244).

It is important to note that the CMM's primary focus was to assess potential contractors. However, as governments started to adopt technologies and offer their services through electronic means, political institutions, universities, and consulting firms provided their own models for assessing e-Government initiatives. The

following section will look into different models proposed by the private sector (Accenture's approach), the public/political sector (The United Nations model), and lastly, the academic sector (Layne and Lee model, PPR Model, Moon, Soussa, and Kaylor's approach).

2.1.1 Accenture's e-Government Overall Maturity

Accenture, in their 2001 report analyzed e-Government initiatives across 22 countries. Their methodology consisted of focusing on electronic services at the national level to devise a composite numerical index labeled "Overall Maturity" involving Service Maturity and Delivery Maturity. Service Maturity takes into account the number of services offered and the levels of completeness with which the service is offered, and is given a weight of 0.7. Furthermore, each service is classified based on the type of Government-Citizen interaction:

- a. *Publish – Passive/Passive*: There is no direct communication between government and the user. For example, the government has a website where it just displays relevant information.
- b. *Interact – Active/Passive*: The user actively communicates with government but does not necessarily receive a response or complete his/her transaction. An example of this is using email to request specific information or downloading different forms.
- c. *Transact – Active/Active*: There is a two-way communication between government and the user using the same communication link. For example, a user renews a driver's license, receives a confirmation follow up number, and ultimately receives the license, all done through an

automated service.

(Accenture, 2001)

The second component of the Overall Maturity, delivery maturity receives a weight of 0.3 and focuses on how the services are delivered (*e.g* single points of entry, design by customer intentions, CRMs, one stop portals). After both of these factors are combined, a percentage is calculated, which is later used to classify each country into 4 distinct groups: innovative leaders, visionary followers, steady achievers, and platform builders. These groups represent the level of e-Government maturity where the innovative leaders are the most mature, and the platform builders the least mature (see Table 1).

Table 1: Accenture's 4 Group Maturity Model (adapted from Accenture, 2001)

Group	Description	Approx. % ¹	Example
Innovative Leaders	Stand apart from other countries due to the high number of mature services offered online.	Above 38%	Canada, Singapore, USA
Visionary Followers	Those countries that have exhibited the beginnings of strong growth based on a solid base of services online and generally showing some development in Delivery Maturity.	37% - 27%	Norway, Australia, UK

¹ The publication does not provide an actual percentage score for each level; however, the numbers provided depict an approximate cut off point based on the ranking of each country.

Steady Achievers	Generally show a large breadth of services, but have significant opportunity to grow through maximizing the potential of online services and growing Delivery Maturity	26% - 19%	France, Spain, Belgium
Platform Builders	Low levels of online service, and large potential to develop a co-ordinated cross-agency web presence of government.	18% - 10%	Italy, Mexico, Brazil

2.1.2 The United Nations e-Government Maturity Model Proposition

The United Nations' Division for Public Economics and Public Administration (UNDEPA) and the American Society of Public Administration (ASPA), in an attempt to facilitate public administration, developed a 5-stage benchmarking strategy. This strategy focuses on web sites and web applications as a means to rank e-Government initiatives at the national level (UNDEPA and ASPA, 2002).

In the "Emerging Stage" (Stage 1), different agencies have their independent websites with limited and static information (*e.g.* a citizen may find a telephone number or mailing address for a specific department). In the "Enhanced Stage" (Stage 2), there is an increase in the number of agency websites, the information is frequently updated, and users are able to find detailed information regarding policy, legislation, or access to newsletters. Even though the sites are still independent, they

may link to each other through the use of hyperlinks (For example: Virginia's state website could link to municipal, or county-level websites). Stage 3, the "Interactive Stage", allows users to interact with their governments by downloading forms, submitting applications via email or regular mail. Stage 4 is seen as the "Transactional Stage," allowing citizens to renew their passports and driver's licenses, complete specific payments, or obtain birth certificates through the Internet. The last stage is the "Seamless" stage, in which the different levels of government become non-existent. The sites are organized following a "one-stop shop" approach based on needs and provided services. At the time of the report, there were no countries listed at this level; however, one could argue that the U.S.'s "<http://www.usa.gov>" portal is successful at providing a fully integrated approach. (UNDPEPA and ASPA, 2002).

The process to determine these 5 stages consists in accessing and analyzing national government websites, taking into account specific criteria (see below for details) that are used to produce a numerical scale (1 through 5) measured in intervals of 0.25. The criteria observed are the following:

- a. An official government web presence must exist;
- b. The type of service delivery available: basic or informational, interactive, transactional (This is similar to Accenture's distinction, previously mentioned);
- c. The presence of services in five critical sectors: education, health, labor/employment, welfare/social services and financial services;
- d. Use of single entry portals; and de facto portals (official national

government websites); and

- e. To a lesser degree, fidelity to strategic plans and use of specific e-Government teams.

(UNDPEPA and ASPA, 2002).

2.1.3 The Layne and Lee Model, and Andersen and Henriksen's revision

Karen Layne and Jungwoo Lee propose one of the most cited maturity models (Andersen and Henriksen, 2006). As shown in Figure 1, the authors suggest a 4-stage model taking into account not only the type of services offered to citizens but also the level of integration within different levels of government agencies (Layne and Lee, 2001).

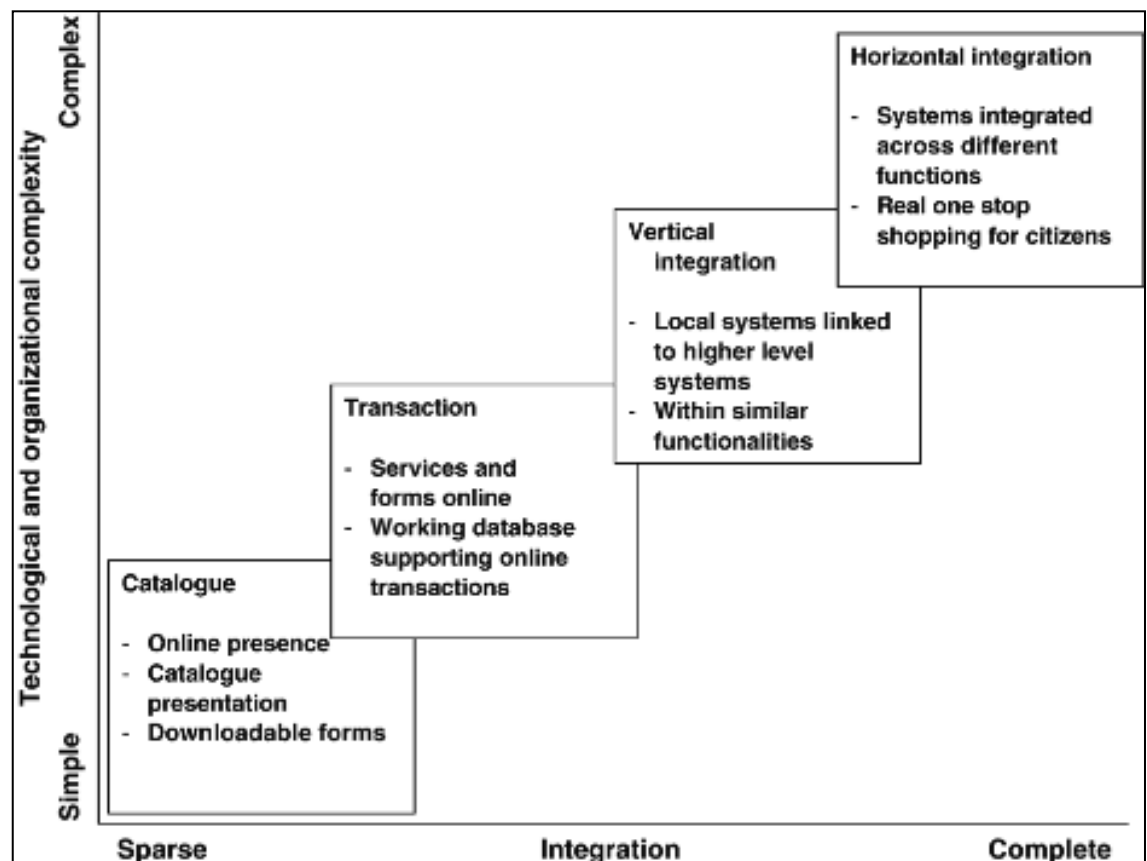


Figure 1: The Layne and Lee Model (Layne and Lee, 2001)

The first two stages (catalogue and transaction) are very similar to Stages 1 and 2 of the UN model. However, the last two stages are to an extent different. Vertical integration (Stage 3) eliminates the barriers dividing national, state and local levels of government, meaning that there are both front and back-end systems to support this integration. An example, as used in their paper is: “A drivers' license registration system at a state DMV might be linked to a national database of licensed truckers for cross checking” (Layne and Lee, 2001, p. 125). On the other hand, the final stage – horizontal integration – depicts the need to eliminate barriers across specific services and functions provided by different agencies. Consider the following example: “a business being able to pay its unemployment insurance to one state agency and its state business taxes to another state agency at the same time because systems in both agencies talk to each other or work from the same database” (Layne and Lee, 2001, p. 125). Both of these examples illustrate the benefits of having both vertical and horizontal integration. Even though the authors note that in 2001 there weren't any governments at this stage, today we see horizontal integration in the U.S., specifically when filing taxes online and submitting a Free Application for Federal Student (FAFSA) form, in which information is taken from the tax forms and automatically used to fill out similar requirements for the FAFSA.

Andersen and Henriksen (2006), argue that Layne and Lee's proposal is focused on the technological and internal aspects of e-Government as opposed to focusing on the actual services offered and the overall interaction. Moreover, the

revised model defines each phase as a continuous process not limited by time. In other words, governments can pursue multiple stages at any specific point in time; there is not a linear transition. As summarized in Figure 2, Phase I, *Cultivation*, involves the use of a local intranet within the Government, where users can access limited forms or emails. This stage prioritizes internal data integration as opposed to providing opportunities for user interaction. Phase 2, similar to Phase 1, still uses the local intranet structure, but focuses on the user interface elements as opposed to critical aspects such as back-end integration, data structures, and future maintenance costs. Phase III, *Maturity*, is the stage in which the government breaks away from the intranet, offering customized web interfaces for processing citizens' requests. In a sense the intention of the website is to offer a service and meet a need, rather than to provide organizational information. Finally, Phase IV, *Revolution*, implies a transfer in ownership of data and information, and services are provided in a way that allows for mobility and flexibility amongst citizens as well as government employees (*e.g.* being able to submit an issue online and track it from start to end) (Andersen and Henriksen, 2006).

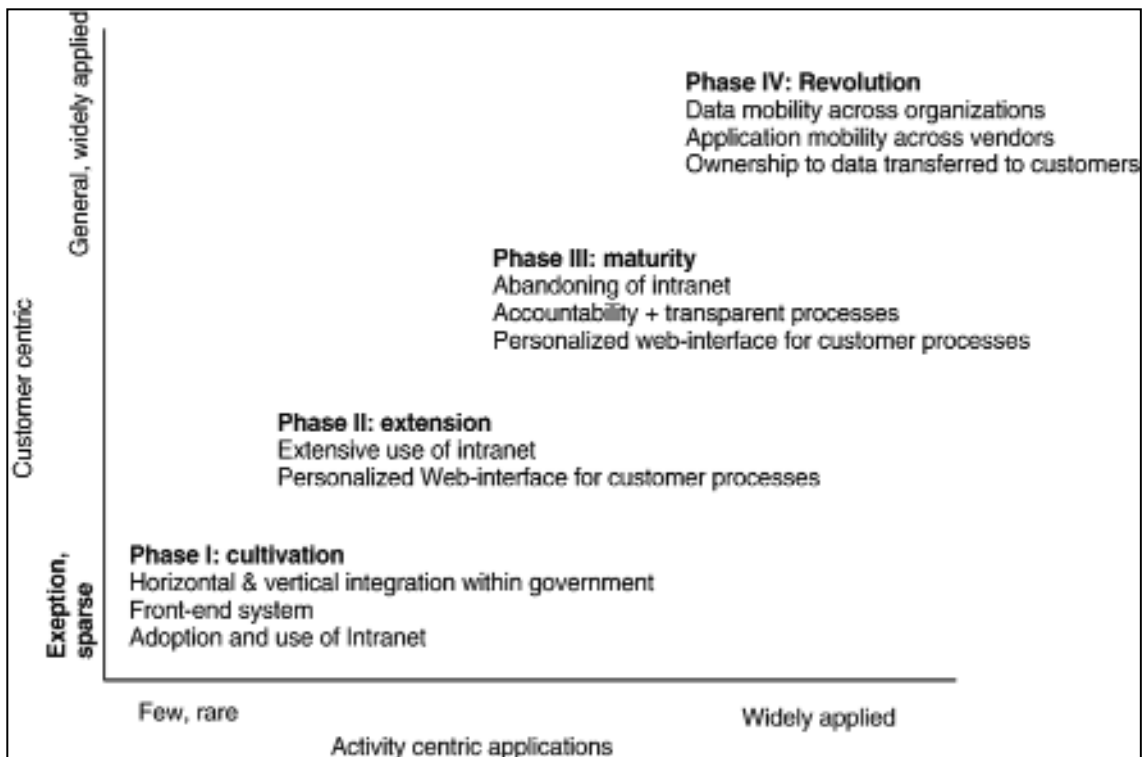


Figure 2: Andersen and Henriksen's Revised Model (Andersen and Henriksen, 2006)

2.1.4 Moon's Electronic Government Framework

M. Jae Moon, from the University of Texas A&M, adopted the e-Government model by Hiller and Belanger (2001), and devised his own five-stage model, taking into account the technologies being used as well as the different interactions with users. It is important to note that Moon not only included a political participation stage, but also went beyond the government to citizen interaction (G2C), considering government-to-government (G2G) as well as business-to-government (B2G) interactions.

Stage 1, "one-way communication," similar to the previous models, consists of the dissemination of information through the use of simple websites. For example, at the G2C level, this could be achieved by posting information about Medicare and Medicaid. Moon's stage 2, "two-way communication," is similar to the

UN's interactive stage, in which the government uses email and other data transfer technologies in order to communicate with the citizen, business, and agency. Stage 3 extends the two-way communication to include financial and transactional services, for example, passport renewals or paying for bills, by creating 'web and data' based applications. Stage 4, "vertical and horizontal integration," as the name suggests, is similar to the propositions in Andersen and Henriksen's model previously described, in which there is an attempt to provide seamless and integrated front and back-end services across different agencies (*e.g.* the one-stop solutions). The final stage, "political participation" focuses on the use of web-based systems to promote political activity; for example, online voting, online town hall meetings, and the use of social media, chat rooms, and online forums (Moon, 2002).

Up to this point this thesis has examined different stages originating from the private and public sectors, as well as from academia. As one would expect, these stage-based models share some similarities: they take into account not only the front-end systems, but also the back-end infrastructure supporting the actual services. At the same time, these models tend to focus on national-level initiatives. It is important to note that although these models are useful, they must be adapted if applied to municipal levels of government. By focusing on national-level initiatives one can get the bigger picture; however, one can easily overlook local- and municipal-level problems and factors. On the other hand, looking at back-end systems implies that the researcher has access to such infrastructure; however, as stated in the Introduction, this study focuses on the perspectives of the citizens, who typically do not have access to the back-end architecture. For these reasons the next

section will look at studies conducted at the municipal level, acknowledging not only the different stages they propose, but also the methodologies used to evaluate and characterize a particular stage.

2.1.5 Sousa's Approach and its Application in Spain, Ibero-America, and Peru

Sousa (2006) in his evaluation of e-Government in Spain looks at cities with a population of 50,000 or more, and identifies 16 e-services, distributed across a five-stage model. In the first stage, "Presence," the focus is to publish information, by considering the following services: applications (document downloads), council/municipal newsletter, browser/search engine, and web map. Stage 2, "Urban Information," is intended to give citizens information regarding street maps, transportation, and urbanization. Stage 3, "Interaction," refers to simple two-way communication between government officials and citizens by analyzing email and telephone listings services. Stage 4, "Transaction," turns to more sophisticated and electronic forms of communication (including authentication, application submissions, and other similar services) between citizens and government. The specific services considered in this stage are mobile phones, online proceedings, follow-up (monitoring), digital certificates, citizen portfolios, online payments, and customization. Lastly, stage 5, "e-Democracy," takes into account services that promote citizen participation in the political process (*e.g.* online forums, chats, blogs, social media, surveys). Table 2 provides a summarized description of Sousa's model (Alianza Sumaq, 2006; Sousa and Lopez, 2006).

Table 2: Sousa's Model (Alianza Sumaq, 2006; Sousa and Lopez, 2006)

Less Complex	Phase	Service	Explanation
	1. Presence	Applications (Document Downloads)	Proceeding documents (general information, planes and so on)
		Council/Municipal Newsletter	Acts or change of laws.
		Browser/Search Engine	Finding information inside city web pages
		Web Map	Map of the website
	2. Urban Information.	Street Map	City map with all streets (can be static or dynamic)
		Transportation	Info. on buses, routes, meters, parking, etc.
	3. Interaction	Emails	Email is available to send or request info.
		Telephone Listings	Public servants phone numbers are listed.
	4. Transaction	Mobile Phone	Is possible to access to the content to website from a mobile phone (e.g. WAP) and receive information by council through mobile phones (e.g. SMS or similar)
		Online Proceeding	Is possible to do a proceeding via the web, e.g. change address, request of circulation permission, request commercial licenses.
		Follow up (Monitoring)	Citizen can follow the state of their proceeding (even if it wasn't initiated online)

More Complex		Digital Certificate	Is it possible to obtain certificates (e.g. birth, death), through the website
		Citizen Portfolio	Citizens have access to their information and are able to update it
		Online Payments	Is it possible to submit payments (e.g. a permission, a licenses, fees, etc.) via the web using debit or credit card
		Customization	Is it possible to personalize the website according to user preferences
	5. e-Democracy	Citizen Participation	Are there online discussion forums related to city problems.

The model uses a quantifiable approach in which each stage is given a weight: Stage 1: 0.25; Stage 2: 0.5; Stage 3: 0.75; Stage 4: 1; Stage 5: 1.25. This weight is multiplied by the total number of e-services offered, and totaled to obtain an e-Value that can be used to compare e-Government initiatives across different municipalities. This quantitative component of comparison, has allowed this approach to be replicated in the analysis of e-Government initiatives across Ibero-American countries (Alianza Sumaq, 2006).

2.1.6 Kaylor's Methodology in Assessing American Cities

Similarly to Sousa's method, Charles Kaylor (2001) provides a list of functional dimensions encapsulating specific services and functions typically offered by municipalities in the US (see Figure 3 for a complete list).

<p><u>Payments</u></p> <ul style="list-style-type: none"> ● Utilities ● Taxes ● Fines ● Permits ● Registrations <p><u>Registration</u></p> <ul style="list-style-type: none"> ● Facilities ● Classes ● Voter <p><u>Permits</u></p> <ul style="list-style-type: none"> ● Building ● Parking ● Temporary Use ● Right-of-way ● Street Vendor ● Sidewalk Dining <p><u>Customer Service</u></p> <ul style="list-style-type: none"> ● Action Requests (Complaints) ● Code Enforcement ● Parking Referee ● Payment Histories ● Schedules (hours of operation) ● Utility Start/Stop ● Information Requests <p><u>Communication</u></p> <ul style="list-style-type: none"> ● Incidental Closure ● Emergency Management ● Road Closure/Detour <p><u>Licenses</u></p> <ul style="list-style-type: none"> ● Bike ● Dog ● Taxi ● Business 	<p><u>Images</u></p> <ul style="list-style-type: none"> ● GIS Online (comprehensive) ● AS-built Images ● Plat Maps ● Document Management System <p><u>Audio/Video</u></p> <ul style="list-style-type: none"> ● Streaming Video of City Council Meetings ● Live Traffic Cams ● Auto-only broadcast of Council Meetings ● Video or Still-image Tour of Town ● Video Walk-through Directions to Departments/ Facilities <p><u>Documents</u></p> <ul style="list-style-type: none"> ● Minutes of Meetings ● City Code ● City Charter ● Budget Report ● Downloadable Forms <p><u>Applications</u></p> <ul style="list-style-type: none"> ● Job Applications ● Bidder Applications ● Affirmative Action Forms <p><u>E-Procurement</u></p> <ul style="list-style-type: none"> ● Bids On-line <p><u>Miscellaneous</u></p> <ul style="list-style-type: none"> ● Property Assessment History Lookup ● Zoning Lookup ● On-line Surveys/Polls ● Conversation Forums ● Scheduled E-meetings
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Figure 3: Kaylor's List of Services (Kaylor, 2001)

Each service is then evaluated based on a four-point rubric, and summed to obtain a comparative e-Score. The points are allocated as follows:

1. Information about a specific topic or service exists online;
2. There is a link to a relevant contact (e.g. phone or email);
3. Forms are available for download; and

4. Transactions or other forms of interaction occur completely over the Internet.

(Kaylor et al., 2001)

Regardless of the actual e-Score, this last approach breaks down each service, allowing the reviewers to conduct an individual and itemized analysis. This method allows one to easily identify services that need improvement.

2.2 An Appropriate Model for the City Of Harrisonburg

As we can see, all these different models share similar classification schemes. We see that it is common to distinguish the types of services offered by whether they are informational, interactive, transactional, or political in nature. Even though Moon incorporates a political component in his stage analysis, one could argue that a city could offer political type services, using an informational or interactive approach. For example, a web site could list a phone number or an email address showing the procedures to submit complaints, without having an online interactive system. Moreover, the city's website could allow users to download ballots or surveys, which can later be mailed in. At the same time there seems to be an attempt to assess the levels of integration taking into account both front and back end systems. As previously stated, analyzing back end systems implies that the researcher has access to such infrastructure.

The location where these studies take place should also be considered. Kaylor's study focused on cities with populations exceeding 100,000 inhabitants, meaning that there is a possibility that certain indicators and services identified may not apply to a culturally diverse city with roughly 48,000 inhabitants, such as

Harrisonburg (U.S. Census Bureau, 2011). Along similar lines, due to the date of these publications, the indicators and services may need to be revised and updated to match the currently available technologies. Others have proposed using surveys such as the Municipal E-government Assessment Project 3 (MeGap3) to get a detailed assessment (Flak et al., 2005). However, despite the fact that this approach can lead to some useful data, it is dependent upon responses from governmental officials who may not have the time for surveys. Furthermore, it may be difficult to translate a wide range of qualitative and quantitative questions into a simple five-stage model. Needless to say the time, commitment and costs in performing such audits may not be feasible for many local governmental offices.

Assessing e-Government initiatives in Harrisonburg will be accomplished by visiting the City's website, <http://www.harrisonburgva.gov>, and analyzing specific criteria in order to classify the City's online services and information according to a pre-defined four-stage ranking system. A total of 29 services/indicators were chosen based on the examples of Kaylor (2001), Sousa (2006), and Moon (2002). In addition to these studies, the selection process also considered an overview of Harrisonburg's, Charlottesville's, and Winchester's governmental websites. For the analysis, as shown in Table 3, Harrisonburg's services were organized into seven categories: payments, registration, transparency, urban information, citizen services, political engagement, and entertainment.

Table 3: List of Indicators Used in Harrisonburg's Analysis

Categories	Services
Payments	Utilities
	Taxes
	Fines
	Permits (<i>i.e.</i> dog, parking, planning and zoning)
Registration, License, and Permits	Voting
	Citizen Academy
	Citizen's Police Academy
	Party and Event Registration
	Permits (<i>i.e.</i> dog, parking, planning and zoning)
Transparency	City Code
	Budget Info.
	Comprehensive Plan
Urban Info.	City Maps
	Public Transportation (route info.)
	Real Estate Assessment
Citizen Service	Communicating with dep. Officials
	Notifications (<i>i.e.</i> road closure, traffic, emergency)
	Job Application Info.
	Parking Appeals
	Action Requests - Complaints
	Moving Guide
Political Engagement	City Council Meetings
	Gov. Citizens Forums
	Surveys and Polls
	Suggestion Submission
	Voting Precinct Look up
Entertainment	City Tour
	Recreation Event Registration
	Library Info.

As previously stated, each service mentioned in Table 3 will then be ranked based on a revised four-point scale that considers the method of delivery. The ranking system used is defined as follows:

1. Informational: Does the specific service have an online presence? Is there information in text format helping the user complete his or her task? For example: a) Guidelines and procedures are listed; b) If the service falls under a different agency, is there a link directing the user to that agency? c) Is there an email address, mailing address, or phone number through which the user can obtain information about the specific service?
2. Simple Interaction: This stage focuses on simple one-way interactions in which citizens can download specific documents related to the tasks they are trying to complete. An example would be being able to download permits without visiting the actual agencies.
3. Transactions: Here the focus shifts to two-way interactions. Can the user complete his or her request through the web? Is the service offered through a web-based application? An example is paying bills online, submitting suggestions via online forms and surveys, accessing searchable databases, and viewing live stream videos of meetings and events?
4. Mobile Interactions: Is there a specific mobile device application for the particular service?

As we can see, one of the main differences from Kaylor's methodology is that this approach adds a political category with relevant services that will be ranked. The underlying proposition also differs from Moon's (2002) method, given that it views political participation as a category as opposed to a rank or stage. In other words, a service that promotes political participation is viewed similar as to a

service that facilitates bill payments, in the sense that either of these can be delivered in a simple informational form or a fully transactional form. Consider the following example: on one hand “Government *A*’s” website can instruct citizens to pay their bills by mailing their payments, the same way it can instruct citizens to submit their complaints by mailing a letter. On the other hand, “Government *B*’s” site provides an interactive system that allows citizens to pay their bills and submit their complaints online. In both cases, the political services are being offered; the only difference lies in the way they are offered. Along similar lines, another major difference is that the ranking system used here acknowledges mobile applications as a method of service delivery.

Focusing on individual categories and placing each service into one of the four rankings will help government officials identify those services that need improvement.

2.3 Results and Suggestions

Rather than displaying static information detailing the City’s history or organizational structure, Harrisonburg’s main web site has a portal type of feel, with a broad scope that mainly focuses on tasks and services. In other words, the design and structure attempts to address citizens’ concerns by redirecting them to a specific task, service or department. But it is not possible for citizens to customize the site based on their preferences via the use of a secured log in.

Table 4 depicts Harrisonburg’s standing based on the indicators and ranking explained in the previous section. As shown in Table 4, one can see that the majority

of the services offered fall under the “Interaction” and “Transaction” stages (Stages 2 and 3 respectively.)

Table 4: Results of Harrisonburg's e-Government Standing

Indicators		Ranking/Stages				
Categories	Services	N/A	1 Informational	2 Interaction	3 Transaction	4 Mobile App
Payments	Utilities				Web-based	
	Taxes				Web-based	
	Fines		Where to, Guide			
	Permits (i.e. dog, parking, planning and zoning)		How to guide			
Registration, License and Permits	Voting		How to, guide			
	Citizen Academy		Guide	PDFs	Web-based	
	Citizen Police Academy			PDFs		
	Party and Event Registration		How to, guide			
	Permits (i.e. dog, parking, planning and zoning)			PDFs		
Transparency	City Code				Searchable Database	
	Budget Info.			PDFs		
	Comprehensive Plan			PDFs		
Urban Info.	City Maps			PDFs	GIS	
	Public Transportation (route info.)			PDFs	Web-Based real time info.	Real time info: sms, voice, web
	Real Estate Assessment				Web-based System	
Citizen Service	Communicating with dep. officials		Emails, phone, mailing address		Contact form	
	Notifications (i.e. road closure, traffic, emergency)		Link Redirecting to 511 service			
	Job Application Info.				Web-based	

	Parking Appeals			PDFs		
	Action Requests - Complaints		Contact Public Info. Office (email and phone)		Web-based (Traffic sign and signal repair only)	
	Moving Guide		How to guide			
Political Engagement	City Council Meetings			PDFs minutes	Video feed and searchable archive	
	Gov. Citizens Forums	N/A				
	Surveys and Polls	N/A				
	Suggestion Submission		Contact Public Info. Office (email and phone)			
	Voting Precinct Look up			PDF map		
Entertainment	City Tour				Web-based and stream	
	Recreation Event Registration				Web-based	
	Library, parks and activity center. Info.			PDFs newsletters		

There are many downloadable forms and documents across the different categories available to the citizens, and having this information is important; however, the process could be improved by implementing a web-based system allowing citizens to submit their forms online. Alternatively, there are specific services that enjoy a web-based transaction presence. Moreover, seven of the 13 “Transaction” (i.e. web-based) services are offered via third-party entities (*e.g.* *nextBus* provides real time information of Harrisonburg buses, *NeoGov* allows citizens to review and submit job applications, *Granicus* facilitates the live-streaming and searching of the city’s council meetings, *WeBTrac* allows citizens to register for recreational activities, and *MuniCode* facilitates the search of the City’s

code of ordinance). There are also a few simple application that appear to have been created in house, such as the utilities and tax paying services, as well some basic contact forms.

Furthermore, services within the same categories have different rankings. A good example is in the payments category, in which citizens can pay their utilities and property taxes online (by entering a bill or account number). However, in the case of paying fines (*e.g.* for a parking violation), one has to mail a check or submit it in person. A simple solution would be to develop an online system with which citizens could pay their fines via the Internet, similar to the services offered on Charlottesville's site <https://www.paybill.com/charlottesville/parkingtickets/> (Charlottesville, 2011). When submitting registrations, or applications for licenses and permits, a citizen can use the Internet to register for the City's "Citizen Academy."² However, when requesting a license or permit (*e.g.* dog, parking, planning or zoning) only PDF forms are available for download. Using the application for a parking permit as an example, one can download a map specifying the areas where parking permits are needed, as well as contact information describing how to obtain and pay for a permit. This process could be made more efficient by allowing a citizen to type in his or her address to determine if a permit is needed, and if so, then the system would process the request and allow the citizen to track its progress. The City already uses a similar application in the Parks and Recreation Department, which allows citizens to sign up for classes and recreational

² "The Harrisonburg Citizen Academy is a 12 week program that allows city residents to learn more about the functions of city departments and services." (Harrisonburg, 2012)

events. These suggestions would update and modernize these services from an informational stage to a transactional one.

When considering the categories of transparency and political participation, the City provides access to information pertaining to the budget, the City's master plan as well as a searchable database of videos of town hall meetings. However, it doesn't allow citizens to make suggestions or question the content. Moreover, focusing on the current website, we see that there isn't a system that captures the opinion of the citizens, allowing them to express their opinions, concerns, or submit a suggestion. It is for this reason that the City could benefit from implementing an online suggestion, survey, and reporting system, similar to Charlottesville's 'Surveys, Forms and Requests' online forms (Charlottesville, 2011). This would make the governments' political engagement tools more interactive updating them to a more transactional stage. An important resource to consider is the use of social media such as Facebook and Twitter. Harrisonburg's Facebook page promotes citizen participation and political engagement providing a way for citizens to be updated on upcoming events, the City's agenda, emergency information, as well as offering a regulated space for comments and suggestions. Needless to say, the use of Facebook will be limited by privacy and security concerns, as well as the overall attitudes and perceptions of the individual citizens (Harrisonburg, 2011).

Another important category that could be improved is the "citizen service" category, specifically the action request indicator. Currently, the only way a citizen can submit a complaint, request a service, or report an issue, is by contacting the specific departments by phone, mail, or email. With the exception of reporting

issues related to a traffic signal, citizens have the ability to submit a service request via an online web-based system (Harrisonburg, 2012). Other cities, such as Boston and Virginia Beach, have expanded this concept to include more services, such as trash pick up, pot hole repair, and animal control, to name a few (Virginia Beach; Boston, 2012). It is important to highlight that Boston also offers a mobile version of this request submission system, named "*Citizens Connect*," showing the possibility of providing Stage 4 "mobile" applications in governmental settings. Boston also provides an online chat service promoting another way for citizens to communicate with their representatives (Boston, 2012).

The Harrisonburg Department of Public Transportation can be seen as one of the pioneers in using mobile technologies, with the implementation of *NextBus*. *NextBus* is a GPS-based route prediction service that allows citizens to obtain real time information on busses and routes via text/sms messages, automated call service, and by using the Internet, which can be accessed by a computer or a mobile phone (Harrisonburg, 2012). This initiative can encourage other agencies in Harrisonburg to consider adopting mobile device applications.

Implementing any of these examples, *Nextbus*, *Citizens-Connect*, or *VA Beach's Online Services*, would further improve Harrisonburg's e-Government ranking, while facilitating government-citizen interactions and increasing transparency.

3 E-GOVERNMENT FAILURE

3.1 Defining e-Government Failure

The wide use of information communication technologies (ICT's) such as the Internet, wireless networks, mobile applications, and telecommunications infrastructures has facilitated the process of communication, creating a society that is dependent on information. Not only is it possible to have access to the information (e.g. a news update, an email, or a business service), but with the rise of web-based application, the expectation of interaction exists; users retrieve the information they need, when they need it, and act upon it with minimal and unnoticeable delays. In other words, we have grown accustomed to the availability of "e-" services, such as e-Commerce, e-Learning, and e-Government, with the understanding that the electronic delivery of a service will be more efficient and widespread.

Needless to say, there has been an increase in these e- initiatives within the government sector. From 1995 to 2000 there was approximately an 11870% increase in the number of governmental websites (Muir and Oppenheim, 2002). As the technology and resources become cheaper, one could expect that this number will continue to increase. Furthermore, technology has come a long way since 1995; firms and organizations have evolved from having simple websites displaying information to providing an interactive system of services and transactions. It is important, however, to realize that the availability of these sites and services does not necessarily mean that they are actually being used or are successful in bringing

government and citizens closer.

A study assessing the implications of e-Government in the European Union (EU), presented to the European Commission Directorate General for Information Society and Media, reported that about 50% of users and businesses in the EU are not using e-Government, and those that are, are only “modestly satisfied” (Cappgemini, 2009). Furthermore, a 2008 pilot study surveying 10,000 citizens from ten EU countries reported that one-third of the participants are “not at all satisfied” with their e-Government experience (Van Gompel, 2009, p. 143). Similarly, the outcomes in developing countries are just as bad or even worse. Richard Heeks (2003), Director of the Center for Development Informatics at the University of Manchester, states, “the majority of e-Government-for-development projects fail;” about 85% of these initiatives are either total or partial failures (pp. 1-2).

Before tackling specific issues and implementing solutions, it is important to understand how e-Government is evaluated and how failure has been defined. Going back to the definition, e-Government is the use of ICT’s for the purpose of “enhancing access to government... and improving the internal effectiveness, efficiency, and innovativeness of government (Hernon, Cullen, and Relyea, 2006, p. 3). The previous section focused on different stage models used to assess e-Government initiatives; the following section will consider the standards and metrics utilized by the public, private, and non-profit sectors, in order to label a given “e-” initiative as a success or a failure.

3.1.1 The United Nations Approach to Assessing Failure

The United Nations Public Administration (UNPAN) conducts one of the most

reputable assessments of e-Government (at the national level) with its bi-annual e-Government Development Index. This index consists of a 0 to 1 composite measurement of the capacity and willingness of UN member states to engage in the use of e-Government. In this system, failure is determined by the country's score: the lower the score the less successful the initiative. In addition to focusing on website development trends within each country, this metric also addresses elements of accessibility, such the population's educational level and the country's maturity of technological infrastructure. Moreover, the index is formulated based on three sub-indexes: the Web-measure index, the Telecommunication Infrastructure index, and the Human Capital index (UNPAN, 2010).

The Web-measure index consists of a four-stage model that determines a country's online presence based on the amount of information offered, as well as the level of services and interactions provided (*e.g.* providing the option to pay taxes online vs. displaying information about where to pay taxes). The Telecommunication Infrastructure index is a weighted average incorporating resources and infrastructure maturity, for example, the number of PCs and telephone lines per 1000 persons, or the number of Internet users per 1000 persons. Finally, the Human Capital index, based on the assumption that higher levels of education and skill will lead to higher levels of adoption and use of ICT's, focuses on the literacy rate and school enrollment ratios of a specific country. The issue with all of these sub-indices, and the e-Government Development index in general, is that its main focus is the country itself. As stated in the UPAN's site, "the measurement of e-Government is an assessment of a *state's use* of the Internet and

the World Wide Web... for provision of information...” (emphasis added, UNPAN, 2011).

Another form of measurement also conducted by the UN is the e-Participation score. Based on the name alone, one would expect this score to focus on the participants (i.e. the users and citizens); however, this is not the case. As stated in the UN e-Government survey report in 2008, the index focuses on the quality and the usefulness of the information and services provided by the institution for the purposes of increasing citizen participation (United Nations Department of Economic and Social Affairs, 2008, p. 17).

As we can see in both of these UN evaluations, the focus is on what is being offered as opposed to what is being used. On one hand, these measurements are useful; it is important to quantitatively assess the services offered. On the other hand, if the purpose of e-Government is to bridge the gap between government and citizens by meeting the citizens’ needs, one would expect that these evaluations should also account for citizen/user feedback.

3.1.2 Graphic User Interface (GUI) Metrics Approach to Assessing Failure

There have been several initiatives from both the private and public sector to provide a user/citizen form of evaluation that would incorporate the users’ opinions in the assessment process. Most of these suggestions rely on pre-existing forms of usability testing, often used by computer scientists in the design of graphical user interfaces. For example, this can involve asking the users to rate their experiences with the interface. Other questions may focus on the system’s responsiveness, promptness, accuracy and reliability. The user may be asked questions such as: Are

you satisfied with the number of mouse clicks it takes to achieve a certain goal?

Following this notion, an official report, published by the U.S General Accountability Office (GAO), proposed a set of metrics that could be used in the determining the use of e-Government services. Some of these are as follows (Koontz, 2004):

1. Number of visitors to a Web site per month;
2. Number of electronic comments submitted via e-mail;
3. Number of downloads (*e.g.* laws) accessed via government websites;
4. Percentage of users “completely satisfied” with a website; and
5. Number of grant applications and tax payments received online.

All these questions have valuable answers that attempt to quantify users’ experiences. This method not only evaluates the physical design aspects of the service (*e.g.* background, color schema, and navigability), but also focuses on the conceptual aspects (*i.e.* the actual information and content provided).

Unfortunately, despite the benefits, this testing method is oftentimes overlooked (Nielsen, 2012).

3.1.3 Private Sector Approach to Assessing Failure

In addition to the aforementioned assessment tools, Accenture has proposed its Public Sector Value Model, which defines value in terms of profits and costs. Furthermore, Accenture’s model emphasizes the cost-effectiveness of implementing an electronic service. As an example, this approach would compare the cost of hiring human agents to perform a task to replacing the human agents with automated and computerized processes (Accenture, Jupp and Younger, 2004). In 1994, the American Customer Satisfaction Index (ACSI) was created in an attempt to quantify

satisfaction in terms of perceived quality, expectation, and perceived value by using data obtained through phone interviews. This index not only evaluates static websites, but also ranks different e-Government services. As of October 2010, the Retirement estimator was the top ranked service by the ACSI. (ACSI, 2010; Social Security Administration, 2010). Consequently, this estimator can be used as a guideline for future projects. Using both these models, Accenture's and ACSI's, an e-Government failure would be defined as an initiative that does not generate revenue and fails to create "returning customers."

The issue with this approach is that it overemphasizes the client-service aspect of e-Government, in which the citizens are only seen as customers in need of a service. Moreover, governments, unlike business, are not profit driven which also speaks to the inappropriateness of this approach.

3.1.4 NGO Approach to Assessing Failure

It is unrealistic to expect governments to solve every problem. Because of these limitations, governments have relied on Non-Governmental Organizations (NGOs) to bridge any potential gaps in meeting the needs of their constituents, and also to serve as guarantors of transparency. In the field of e-Government, the Congressional Management Foundation (CMF) has assumed the responsibility of ensuring "good government through good management" by researching the effects of technology and management on the relationship between the members of Congress and the American public (CMF, 2011).

For the past 34 years, CMF has conducted research and sponsored training sessions that would facilitate the integration of technological management with

Congress in an effort to improve the communication between Capitol Hill and the public. After surveying 10,000 citizens in 2008, CMF found that a plurality of 43% of Americans who contacted their representative used the Internet as opposed to telephone or regular mail (CMF, 2011). However, as seen in Figure 4, a majority of the participants felt disconnected from Congress, believing that their opinions were often overlooked and that the information provided on the representative's website was untrustworthy (Goldsmith et al, 2008).

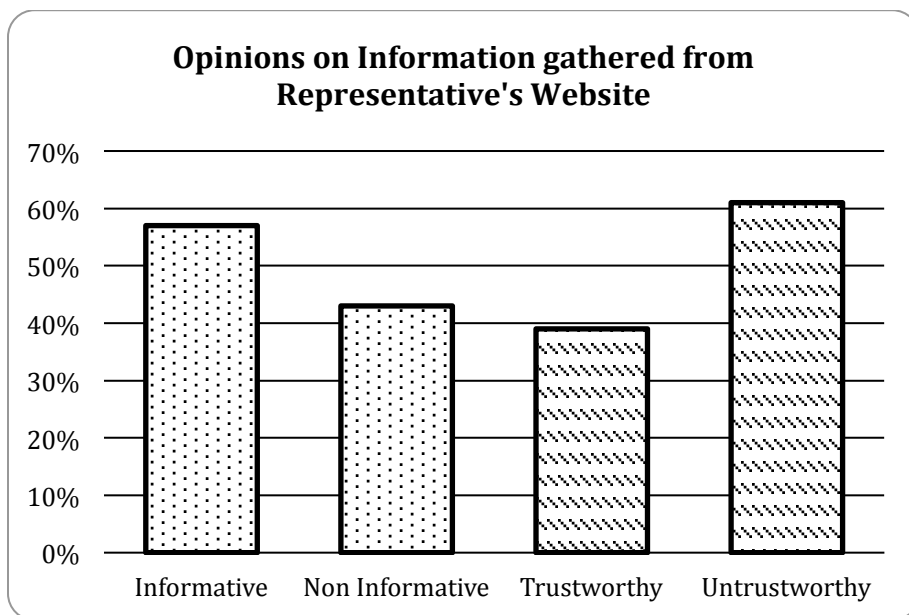


Figure 4: Opinions on Information Gathered From Representative's Website (Goldsmith et al., 2008)

Because of these findings, CMF developed the *Golden Mouse Award*, assessing the quality of congressional sites and rewarding senators and representatives maintaining the best websites (CMF and PMPU, 2011). This evaluation consists of interviewing actual citizens and determining their needs and expectations, as opposed to imitating the private sector or adopting the latest technologies. It is for this reason that the following section will be devoted to explaining CMF's methodology.

The websites are judged based on 93 different items ranging from timeliness, constituent services and casework, information on issues, usability, and floor and legislative processes, to name a few. As previously mentioned, the criteria for evaluation are determined using focus groups and interviews with actual citizens, congressional representatives, and congressional administrators in an effort to determine what the users expect when visiting a congressional site. Furthermore, each item is classified into 13 categories, and each category is given a particular weight, which changes every year according to the needs of the users. In 2009, the “amount of content on current issues” item was given the highest weight (0.33), followed by a weight of 0.31 given to the timeliness of the “information” item (*i.e.* if the information provided is up to date and relevant to the current Congress). Moreover, CMF has identified four key components most essential to a successful website: issue content, constituent casework, timeliness, and usability. In other words, for a website to be successful, it must encompass these four attributes. Lastly, the results for each Congressional website are sorted from highest to lowest, and the numerical values are then translated in to letter grades (A through F). Those websites receiving a grade of “A+, A, A-” are given the “gold, silver, and bronze” award (CMF and PMPU, 2009).

Combining Heeks’ (2010) language, with CMF’s proposed letter grades initiatives with a grade of “F” can be considered total failures, while those with grades ranging from D to B+ can be labeled as partial failures. Moreover, a successful initiative would be those receiving a grade of “A+, A, or A-.” Overall the reports, not only analyze the content of the websites, but also the Organization uses

citizens to develop the rubrics of evaluation. This form of evaluation provides a good overview of e-Government initiatives used at the Congressional level, but fails to consider other branches and levels of government. Overemphasizing the legislative branch may lead to misrepresentation when sending out surveys to obtain citizens' perspectives. One should ask if the typical American citizen is engaged with Congressional matters. A study done by The Pew Center on The States (2011) suggests that in mid-term elections only 40% of eligible voters actually vote. Consequently, one could argue that a citizen actively intrigued by the events on Capitol Hill is not a true representation of the general population, suggesting that the CMF findings are limited to a specific sector of the American people.

3.1.5 Assessing e-Government Failure: An Alternative Approach

The private, GUI, and NGO alternatives of e-Government assessment break away from the country ranking offered by the United Nations. At the same time, other scholars, such as Huang (2001), Dragulanescu (2002), and Gupta and Jana (2003) have identified different sets of criteria for evaluations, resulting in an assessment highlighting e-Government policies and laws, as well as the functions and services offered. Moreover, one must realize that each of these evaluation procedures will have its own set of metrics that define e-Government failure. Electronic Government practitioners should understand that any form of evaluation has its limitations. On the one hand, conducting a detailed analysis of an agency's website provides a thorough understanding of that particular agency's engagement with its users. On the other hand, this method is time-consuming and difficult to apply at an international level. This difficulty arises, in part, due to the lack of

international standards regarding good website development; furthermore, different countries offer different services that may be incomparable to one another. For example, just because a specific country does not allow online renewal of a drivers' license does not mean that it is less committed to e-Government; it could be that the country's laws require physical presence for renewals.

By reducing the scope, one must note that there is a tradeoff: quality (in-depth website analysis) vs. quantity (international ranking system). This tradeoff highlights the complexities of determining an international and citizen-centered metric of evaluation. However, as Hernon and Dugan (2006) suggest, performance metrics are not the only way to frame evaluation results: "not all results can or should be reduced to a simple metric" (p. 277). The reality is that all the aforementioned forms of evaluation are valuable. These methods highlight important aspects of the e-Government initiative that, if considered as a whole, can greatly improve the service. Under this approach, e-Government failure is dependent upon the metric and criteria used. However, regardless of the methodology, there are recurring factors that hinder e-Government adoption, leading to unsuccessful implementations. Consequently, one can simplify the definition of failure by focusing on its use.

Failure in e-Government can be analyzed through a framework of use and adoption; in other words, are citizens using the e-Government solution? If yes, then the "e" initiative is a success; if not, then reparative actions must be considered. One of the difficulties of this approach is that it relies on determining a threshold for successes and failures. One could declare a success if the service is used by 75% of

the population. Others may support a threshold of 65%, 99.9%, etc. Finding the 'best' percentage is beyond the scope of this paper. The important factor is that, despite the percentage, the question directly involves citizens in the evaluation process. There is a shift of focus from the technological infrastructure (the UN approach) or the amount of profit the services generate (the private sector approach) to the social factors involved in incorporating citizen's opinions' as part of a holistic evaluation.

3.2 Issues in e-Government Usage

Almarabeh and AbuAli (2010) conducted a thorough review of existing literature on e-Government usage and generated a comprehensive table exposing common challenges regarding the implementation and use of e-Government initiatives. Some of the issues considered included: infrastructure development (this relates to the hardware necessary for handling the technology), the digital divide (referring to the gap between those who use the Internet and those who do not), trust (the services must be reliable and trustworthy among users), accessibility (the services must reach all members of society), privacy (agencies must secure sensitive information protecting its citizens/users), and transparency (relates to government accountability and openness) (p.32). Other scholars look at variables such as age and social stratification to assess the challenges of e-Government usage. Trust, however, seems to be a critical component when addressing e-Government usage and adoption. Kumar *et al.* (2007) state: "trust is the most important underlying mechanism for e-Government adoption" (p. 66).

Trust in e-Government, like in any other discipline, is earned and dependent

on many factors. Trust implies mutual understanding. In the case of e-Government, this is an understanding among government, citizens/users, and the IT developers. By focusing efforts on building trust, one is indirectly improving the other factors, such as accessibility, privacy, and transparency. In order for citizens/users to trust an e-Government solution, all citizens must have exposure to it (availability and accessibility), feel safe and secure during their interactions (privacy), and understand and feel incorporated in the governmental process acting as a check and balance (transparency).

Many authors have provided solutions to these recurring issues. Almarabeh and AbuAli (2010), accompanying their summary of negative factors, also provide a summary of common solutions. For example, when assessing trust, these authors suggest limiting the scope of a service coupled with strong leadership. In the case of privacy, accessibility, and transparency, the solutions range from increasing documentation, improving training modules, and providing less-intrusive services (Almarabeh and AbuAli, 2010). These are all important considerations; however, it is important that all of these factors be addressed during the entire development process, shifting the evaluation method from focusing on the final product (*i.e.* evaluating the websites and e-services) to evaluating the creation, development, and delivery process. Heeks (2003) adheres to this approach, suggesting that the main cause of e-Government failure is a “design-reality gap” (p.3) in which there are many inconsistencies between “where we are now and where the e-Government project wants to get us” (p. 3). These gaps are a result of a lack of a specific design model for e-Government.

Furthermore, Heeks (2003) acknowledges that in the past, e-Government solutions have been implemented from three different perspectives: a technological push, a private sector push, and a geographical push (pp. 1- 5). Oftentimes, e-Government projects are designed based on existing technologies, engineering processes, and other hardware requirements. A hypothetical example illustrating this technological push could be that of governments switching to cloud-based solutions without reviewing the risks. Another form of development is to transfer successful solutions of the private sector into the public sector via “off-the-shelf solutions” under the assumption that if it worked in a business, it will work in government. Similarly, there is the geographical approach characterized by taking successful solutions from one country or city and applying them in a different setting.

These three design approaches contribute to the widening of the reality-design gap. Government is dependent on non-technical aspects and soft elements such as people, laws, culture, and politics that are oftentimes overlooked by the IT sector. Additionally, private businesses target specific users, which reduces the scope of the design. Another issue with the private sector approach is that the business world encourages competition, providing an environment in which different suppliers can supply similar products; however, this is not the case with governments. In other words, there are specific services that are only handled by unique government agencies, such as passport renewals or court hearings. Needless to say, one can't go to a private business to renew a passport. The geographic approach also has its limitations. Countries and states vary in demographics, in

political processes, and in needs. For example, Lisbon's "Lisbon Participates," a portal allowing citizens to share their opinions on topics such as urban planning and participatory budgeting (Lisbon, 2011; ePractice, 2012), will most likely fail if applied in a country such as Cuba, not only because Internet access in Cuba is highly restricted (Reporters Without Borders, 2012), but also because the level of political efficacy amongst the population is low (Lopez, 2002, pp. 60-61). As we can see, these design frameworks need to be revised, taking into consideration social aspects as well as local conditions (Heeks, 2003).

Moreover, these gaps can be reduced, bringing the "e" initiative closer to reality by adopting what I refer to as a citizen-centered design (CCD). CCD is a framework of development that incorporates citizens into the entire software lifecycle. In other words, citizens are involved in the process of gathering requirements, identifying the content that should be displayed, as well as testing the proposed solutions. This design approach will give citizens a voice in the process which, if heard, has the potential to build trust, thereby making government more transparent and consequently leading to an increase in the actual use of these "e-" services. All of this is theoretically sound; however, the question remains: how to put it into practice? What does it mean to engage in a citizen-centered design approach? These are the questions addressed in the following section.

3.3 Citizen Centered Design

A citizen-centered design consists in using the concepts that software engineers and human interaction experts have referred to as user-centered design (UCD). UCD is usually attributed to Donald Norman, a cognitive engineer with

experience in Harvard, Northwestern, Korea Institute of Advanced Technology, and Apple, and is focused on improving the interactions between humans and everyday objects (computerized or not) (Norman, 1986; www.jnd.org, 2011). UCD, as described by Abras (2004), “is a broad term to describe [a] design process in which end-users influence how a design takes shape” (p. 1). These influences can occur during the initial and final stages (*i.e.* requirement elicitation and usability testing) or throughout out the entire development cycle in which end-users are considered active stakeholders forming partnerships with the team of designers (Abras *et al.* 2004).

For the purposes of establishing a specific e-Government design framework, in this section, the term “user” is substituted with “citizen” in an effort to emphasize the different interactions between governments and citizens. One may argue that citizens are users, and that this citizen-centered approach is just a play on words; this is true, citizens are users. However, the term “user” has been associated mostly with computer science contributing to the technical focus of e-Government discussion. Government-citizen interactions, as mentioned in previous sections, are dependent on soft elements (social and cultural factors) that need to be considered and are often overlooked by the computer science field.

There have been different methods proposed for proceeding with a UCD (Norman, 1986; Endsley, 2009; Preece *et al.*, 2002; The International Organization of Standardization, 2010). All of these; however, emphasize the importance of integrating the end user into the design, implementation, and evaluation processes. The International Organization of Standardization in its ISO 9241-210:2010 has

developed a set of guidelines detailing the ways in which the adequate design of hardware and software can enhance the human-system interaction. Figure 5 captures the general idea of ISO's suggested process (International Organization of Standardization, 2010; European Union, 2012).

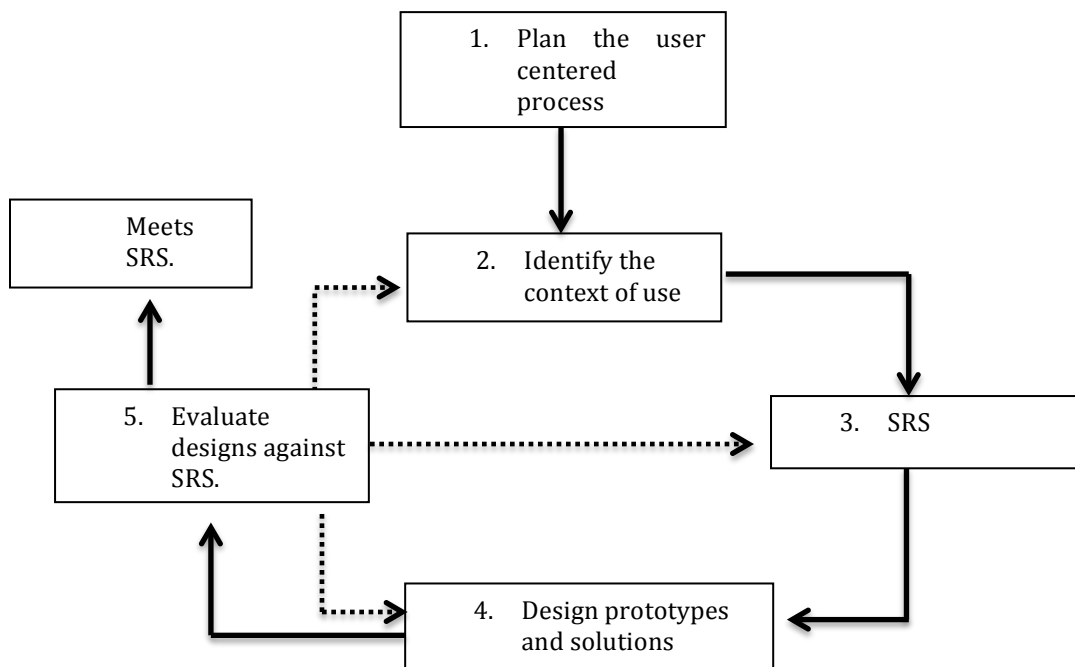


Figure 5: The User-Centered Process (ISO, 2010; EU, 2012)

Along similar lines, the U.S. government, realizing the value of “citizen” involvement, as well as in adherence to the provisions of the e-Government Act of 2002, which recognizes the importance of making Government information “accessible to the public,” has developed a comprehensive website, “www.usability.gov,” to educate and encourage different agencies to adopt a citizen-centered design when developing an “e” initiative (U.S. Government, 2011). These recommendations can be summarized in a 5-step iterative process listed below:

1. Identify the users: Who are the primary, secondary, and tertiary users?
2. Need Assessments: What are the needs and requirement of the users?

3. Develop Prototypes: What alternatives do we have to meet these needs?
4. Evaluate the Prototype: Is the prototype actually meeting the users' needs?
5. Implement the final product: Develop the final product, keeping in mind the users observations.

Taking the time to identify and classify the users is key when using this design approach. Surveying and holding interviews and focus groups with key stakeholders will facilitate the needs assessments stage while building cohesion amongst the users, stakeholders, and the development team. It creates a positive work environment in which everyone feels included. Moreover, reviewing existing documentation and observing the users' behaviors will give the development team a greater understanding of the situation at hand. Both of these resources will guide the developers in building different alternative solutions. Prototypes of these alternatives will not only serve the purpose of helping to solve the problem, but they may also be used as a resource to discover hidden needs, attitudes, and behaviors. At the same time, the evaluation process consists of summative and formative evaluations in which there is an incremental testing plan that uses interviews, focus groups, surveys, and other forms of usability testing in an effort to obtain user feedback, in addition to usability testing of the final product.

For e-Government, one may argue that these suggestions are no different than those used in computer science, where the IT sector imposes its methods, but overlooks the political and social factors. However, the fact that the government has enacted policies to encourage a UCD framework inherently implies the involvement of social-political actors. Moreover, this could be seen as the government's attempt

to standardized e-Government procedures (National Archives and Records Administration; U.S. Government, 2011).

3.3.1 CCD and e-Government in Practice: Harrisonburg Resource Recovery Facility

The aforementioned method coincides with James Madison University's "Interaction Design" hands-on course, in which students are given the opportunity of designing a team project applying a user-centered approach. The course requires students to conduct a needs assessment plan by performing interviews, surveys, focus groups, and reading existing documentation. This initial stage is followed by the development of low and high fidelity prototypes, which allow the teams not only to evaluate their proposed solutions, but also to discover hidden needs and requirements. Given the time limitations of a semester, actual implementation of the initial idea is not required; however, these experiences permit students to think of the users when developing future projects. After completing this course, in January 2011, I had the opportunity to put the theory into practice, working on a team-based project for Harrisonburg's Resource Recovery Facility (RRF).

The RRF is a facility that takes solid waste and converts it into steam which is used to heat and cool parts of the James Madison University (JMU) campus. Burning up to 200 tons of waste a day and generating an estimated 57,000 lbs. of steam each hour, one would expect there to be State and Federal guidelines, such as emission control that need to be closely monitored (Resource Recovery Facility, 2012). One of the ways in which this monitoring is accomplished is by having a machine operator visit each machine and log data such as temperature, water pressure,

emissions, etc. These data are recorded in paper-based forms, which are later manually entered into an MS Excel spreadsheet used to generate reports. As one can see, this process is inefficient not only because it relies on paper, but also because having to manually enter data after it is recorded takes time and adds unnecessary work. Mr. Joseph “Joe” Painter, the facility’s environmental manager, realizing these limitations agreed to a student-based project that would hope to improve the current system by combining mobile, web, and database technologies.

After having a preliminary meeting with Mr. Painter, the first step was to find a team of students with the knowledge and interest in such a project. Having the interest, but realizing my lack of experience with coding, I turned to the Computer Science Department where I met two CS graduate students. Also interested in the project was an Integrated Science and Technology undergraduate student. Having the initial team formed, we then held an introductory meeting with Mr. Painter in which the general scope of the project was discussed and the main users were identified. The project would consist of using an Android device to scan a specific machine, display the proper forms (by using the built in barcode scanner), and then enter the data into a database which would be accessed by Mr. Painter to generate the reports, getting rid of the paper-based system.

Once the users were defined, the following step focused on the needs assessment and the development of the requirements specification document. The development team held weekly meetings with Mr. Painter, who on certain occasions was accompanied by operation superintendent Carl Bishop. The meetings allowed us to review the existing documentation and analyze each form. In addition, the focus

groups with Mr. Painter and Mr. Bishop gave us some deeper insight into the needs of the facility and a clearer picture of how different levels of management viewed the entire process.

These client based meetings were followed by weekly development team meetings that tackled issues related to implementation, such as writing the requirement documents, defining the system architecture, and implementing the code. During the first months, the biggest challenge was agreeing on the requirements and setting an adequate scope for the project, taking into account that a semester is 16 weeks long. Also, during the initial stages one of the developers left the project, forcing us to redistribute the work among the three remaining members.

By the beginning of March 2011, the requirements were established, and we shifted our attention to building the prototypes. In order to build these alternative solutions, we needed to set up a server and a proper work environment. Given that the facility did not have a server available, a temporary one was set up. The months of March and April were focused on digitizing the paper forms, and creating both the web and mobile applications. Throughout this development phase, we continued meeting with Mr. Painter on a weekly basis, receiving his feedback while adhering to the summative evaluation aspects of UCD. In other words, the user was involved during the development process.

By the end of April, we had successfully met the goals set for the 16 weeks. We were able to complete the design and layout of the site, converting all the paper forms into web-based forms, as well as implementing the navigability of the mobile

application. Even though we had met our goals, and Mr. Painter was happy with the final deliverable, the project was incomplete and unusable. The actual database functionality was missing, and we still needed to implement the search, edit, and delete functions for both web and mobile applications. Acknowledging these limitations, the project was extended for another three months, and a new set of goals was defined. The development team also needed restructuring. In June 2011, two of the three original developers left the project, which meant that a new team had to be formed. Despite this transition, by the end of the summer, the new team had added the database functionality and was ready to transfer the system onto the RRF's servers and mobile devices, in order to proceed with the beta testing.

In March 2012, nearly a year after the project began; I had the opportunity to meet with Mr. Painter and a current developer to check on the present status of the system. The project has been put on hold. Unfortunately, the City's IT department has had more pressing issues that have delayed the approval and set up of the servers at the RRF (Stephen Knight, personal communication, March 28, 2012). At the same time, the facility has been in the process of major renovations, which have taken a top priority. Similarly, the facility has also lost some valuable team members; Mr. Bishop retired at the beginning of 2012, and the facilities manager took a different position, leaving Mr. Painter to fill two positions in addition to his own. Nonetheless, Mr. Painter's goal is to start the testing phase in July 2012 and start using the application towards the end of the year.

3.3.2 Limitations to CCD in e-Government

From the previous narrative one can see certain limitations that need to be considered when adopting a CCD within an e-Government context. The first consideration, as seen by the personnel changes in the RRF's development team, is that the stakeholders and people involved in the project may change. Fortunately, the original team had documented its progress accordingly, which helped in the transition from one team to the next. But most importantly, the fact that Mr. Painter, someone already involved in the project, stayed was key in the continuity of the project. Similarly, when Mr. Bishop retired, this also generated more work for Mr. Painter, reducing his time to dedicate to the project. In a broader context, this limitation is still present. Government contractors in charge of implementing e-Government solutions may add or remove personnel based on their needs and budgets. From the governmental side, officials may be reassigned to other duties, voted out of their positions, or a given agency may suffer a budget cut, putting ongoing projects on hold. Along similar lines, agencies are forced to reprioritize, just like the RRF was forced to do during the renovation period.

The negative aspects of politics and the search for power may also hinder progress. For example, a current government may approve an initiative only to be blocked four years later by a newly elected regime with different political beliefs. It is for this reason that governments must develop policies and long-term e-Government strategies, enforcing commitment regardless of who is in office. A good example demonstrating this commitment can be seen with the evolution of the "e-Government Act of 2002," in which the initial groundwork was laid by President

Clinton with the “Government Paper Elimination Act of 1998,” followed, by President Bush’s “e-Government Act of 2002” (The White House; The Library of Congress, 2012).

There are other concerns related to CCD in e-Government that were not evident in the RRF project. One of these is the identification of users. Governments must provide their services to all citizens: minorities, those with disabilities, those who are politically and technological savvy and those who are not. Consequently, there can be large differences in education levels, age groups, religion, culture, ideology, and language. Moreover, citizens play different roles when interacting with government agencies. The first role is interacting as a customer, in which the citizen has a transactional need (*e.g.* renewing a passport, paying taxes, applying for permits) that must be met. The second role is more informational; for example, when a person is interested in knowing the structure of government, or accessing historical policy and electoral records. At the same time, citizens are not the only ones interested in government interaction; tourists, expatriates, and migrants also need access to different types of “e” services. Furthermore, users of an e-Government service are not limited to people alone; different entities such as businesses, non-profit organizations, and other government agencies need an efficient way to file their taxes, access forms, and interact with the government. All these potential users have different needs, but with similar expectations that make it difficult to develop a “one size fits all” service (Følstad, A, 2007, p. 284).

Communication is also a barrier. This issue is not only evident in the initial learning curve present when humans first interact with a technology, but also

within agencies and governmental branches. This difficulty is most evident when analyzing communication among public safety agencies (NextGov, 2012). Another factor to consider is that the back-end systems that support the agencies' functionalities are not integrated, making it difficult to share information from one department to another. Under this disintegrated environment, adding an "e-" entity would increase the number of communication channels, which can potentially lead to further misunderstandings. However, holding focus groups, as part of a CCD, where citizens and government interact, will facilitate understanding. Similarly, involving the users and citizens in the evaluation of prototypes, will increase exposure to the technology while reducing the initial learning curve.

Security, privacy, and regulations also have a role in impeding a user-centered design. Governments encounter and process sensitive information, and are responsible for the safety of their constituents. Access to this information is oftentimes restricted by laws, clearances, and selective procedures that take time to overcome. Consequently, incorporating citizens into the design process of a Department of Defense service may lead to security breaches that may give access to classified information that can later be used for harmful purposes.

From a broader perspective, one could say that there is a discrepancy between the existing conceptual model of government and the proposed "e-" model. Traditionally, political and personal agendas, and legal and security constraints, coupled with undefined goal hierarchies have had a stronger influence in the design process of e-Government (and government in general) than the actual individual citizens. These challenges are indeed difficult to overcome; however, governments

have already started adopting a citizen-centered process in the development of their services. The U.S. has provided one-stop portals, such as “www.usa.gov,” which facilitates the interaction of citizens, businesses, and agencies with government. Furthermore, American e-Government services have appealed to the informational needs of their users, developing websites, such as the Library of Congress site “www.thomas.gov,” or the National Archives Records Administration “www.archives.gov,” in which users have access to previous Congressional Hearings and other historical documents (National Archives Records Administration; Library of Congress; 2011).

Improvements have also been made in regard to privacy and security. In the Senate report titled “e-Government reauthorization act of 2007,” there is an extension of the Federal Information Security Management Act (FISMA) that “established guidelines for computer security throughout the federal government” (Government Printing Office, 2008). Similarly, policies such as the requirements of a Privacy Impact Assessment, which “requires that agencies take into account privacy considerations and adopt appropriate privacy protections before developing or procuring IT systems,” aim to protect the users as well as the agencies (OMB, 2003). At an international level, e-Government is beginning to become more citizen-centered. Bahrain has adopted a user-centered design, ensuring citizen participation starting at the strategy formulation stage and continuing to the development stage (UN e-Government Survey, 2010). As previously stated, a citizen-centered design implies an iterative procedure that requires a multi-disciplinary approach in which technology, government, and citizens come together for a common purpose.

4 FUTURE RESEARCH: E-GOVERNMENT BEYOND THE CITIZEN

As more and more governments begin to utilize the potential of technology, such as developing electronic services that promote political participation, one must realize the potential e-Government has to redefine or reinforce the existing political process.

In the case of the United States, the founding fathers established the American system as a Republic; Article 4 Section 4 of the Constitution states, “the United States shall guarantee to every State in this Union a Republican Form of Government...” (National Archives Records Administration, 2011). Furthermore, James Madison realized the importance of a federalist system, in which each state enjoyed independent powers serving as a check on the federal government (Hamilton, Madison, Jay, 2009). The Constitution acknowledges this separation in the enumerated powers and the necessary and proper clauses, which grant the Federal Government specific and implied functions. Moreover, the 10th Amendment labeled as “the reserved powers” acknowledged states’ independence stating, “The powers not delegated to the United States by the Constitution, nor prohibited by it to the States, are reserved to the States respectively, or to the people” (National Archives Records Administration, 2011). This governmental structure gives rise to a bureaucratic system that functions via a vertical organizational structure in which States, adhering to their 10th Amendment, conflict with the federal government in reference to authority, autonomy, and independence. This vertical structure can be redefined through e-Government. As we have seen, one of the intentions of e-

Government is to facilitate communication among agencies with no consideration of how they are governmentally classified (local, state, federal). Seifert (2007) provides an illustrative example, stating that the one-stop portals such as “www.usa.gov” allow citizens to access information at a higher federal level. However, from this federal site the citizen can then be redirected to a specific state website (p.59) Similarly, digital services that allow citizens to communicate not only with their representatives, but also with specific members in government via a blog or an Internet forum, inherently promote direct participation. The following example will better illustrate this concept. Hypothetically, if residents of the 6th District of Virginia are unhappy with the House’s budget cuts, these residents have several options. First, they can directly contact Rep. Goodlatte in an effort to influence the outcome. A second alternative would be to directly contact the Speaker of the House, John Boehner, via his online communication form accessible at “www.speaker.gov/Contact.” In both of these examples (the use of portals, and the budget cut example), the electronic services are not only breaking the barriers of communication, but also breaking the vertical structures of government, making government more accessible.

It is important to understand the effects e-Government has on democracy. The use of e-Government initiatives by authoritarian regimes can either promote the regime’s popularity or indirectly lead to its demise. On one hand, we see how Venezuelan President Hugo Chavez’s use of Twitter to directly communicate with his supporters may promote his personable presidential style while encouraging a cult of personality. On the other hand, analyzing the 2011 uprisings in Egypt and

Tunisia, we see how social media such as Twitter and Facebook played a big role in organizing such revolutions (Stepanova, 2011, p. 1).

Electronic Government alone will not produce change; however, technology can facilitate interaction and diffuse information that may encourage revolutionary behavior that could lead to change. As Holzer, Hu & Song (2004) state, “these digital mechanisms at least provide a convenient platform to the public...and help transcend the limits of time, place and even money” (p. 313).

5 CONCLUSION

This thesis has focused on the individual experiences of citizens and the implications of evaluating, designing, and implementing e-Government at the local level. Some could argue that this perspective is rather limited, narrowing the focus to an interface or to a particular citizen experience. However, this individual focus is one of many approaches to discussing e-Government. Even within this limited scope there are social restrictions, such as policy constraints, and the importance of user identification that need to be considered when implementing e-Government.

The overall assessment has shown the difficulties in assessing e-Government initiatives at the local level. Based on the proposed methodology, we see that the City of Harrisonburg succeeds at providing simple interactions (Stage 2) as well as a good number of Stage 3 transactional services. Despite these offerings, there is room for improvement. The City could benefit from creating even more interactive and transactional applications, specifically producing online systems that facilitate the submission of forms and permits, as well as a suggestion form, in hopes of bridging the gap between the political authorities and the citizens.

At a larger scale, the proposed methodology can be expanded to consider more indicators, and develop a quantifiable rubric, which can then be used to provide a comparison between municipalities. This comparison will help public officials develop and implement adequate e-Government solutions. Another improvement to the methodology would be to survey public officials, and gain access to the internal aspects and back-end systems supporting Harrisonburg's e-Government initiatives.

Focusing on the project level, there are many benefits for governments to providing user-centered electronic services. Involving citizens in the design of such services will increase trust, which will then increase use. However, these initiatives need to be carefully planned and properly evaluated. Electronic government is a rapidly changing field that requires policy makers to be up-to-date with technological advancements. At the same time, those in the technology field need to understand that government operates at a different pace than the private sector. Furthermore, both public and private sectors need to cooperate, and realize that if the services are going to be used, the actual citizens must be taken into account.

In order to truly understand e-Government, one must realize that this field goes beyond the technologies and includes social, cultural, and political factors that need to be considered. Harrisonburg should continue developing “win-win” partnerships with the local universities and their students. There have been improvements, but there is still work to be done.

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