

Assessment of E-services and their Systems

Egidijus Ostasius, Zivile Petraviciute

Vilnius Gediminas Technical University
Sauletekio av. 11, LT-10223, Vilnius, Lithuania
e-mail: egidijusostasius@gama.vtu.lt, zivile.petraviciute@vgtu.lt

Modern economy is shifting from goods to services. Together with rapid expansion of the information economy and electronic networks it converges in the concept of e-service. Public administrations like any other organizations or individuals can provide electronic services using modern information and communication technologies. A primary goal for public sector organizations is not only to improve operation efficiency and organizational effectiveness to resolve significant, long-term challenges but they need to use existing resources more efficiently to provide public services, must improve the control of their budgets as such projects are mostly funded by tax payers.

E-services are developed by applying new technologies, standards and learning from the best practices. We can define e-services as the result of automation, enhancement and integration of the business processes of the traditional services that are moving towards the e-services on demand. Due to their increasing complexity public services are typically not implemented by a single organization that provides the service. Instead, they are composed of independent services hosted by different data and service providers. The growing users' requirements stimulate the provided e-services to respond more effectively to their needs. E-services should be easily and simply accessed in some standard way using different access media and devices. The developments of e-service models were made for the purpose of contributing to a more qualitative and effective development of e-services. The varying complexity, different maturity and rapid growth of the number of new e-services promote the assessment and their comparison with each other. It is vital to discover procedures which can examine these e-services and their systems.

The e-service models make it possible to measure e-services and their systems in different ways and dimensions. The periodic evaluation (or self-evaluation) of e-services is challenged in the need of assessment in what sophistication level the e-service is at the current moment.

This paper presents the e-service evaluation model for the assessment and comparison of e-services in public sector and their systems. The e-service evaluation model will assist the authorities and other organizations to assess the maturity and complexity of the e-services provided, and the systems that support these services. It should be helpful in comparing of e-services with other e-services or the same e-services provided by other organizations in the country and/or with other countries. The e-service model is based on the Reference Model for Service Oriented Architecture. The hierarchical structure of evaluation criteria that is the basis of the e-service evaluation model is presented.

Keywords: *e-government, e-service, evaluation model, complexity, e-service maturity.*

Introduction

The primary goal of most governments is to provide better services to citizens, private sector and communities which raise new demands and aspire better performance, efficiency and renewed focus on delivering these services. On one hand, new achievements and possibilities of information technologies and communication (ICT) inspire new trends towards reforming governments into e-governments. On the other hand, EU Service Directive on services in the internal market (EU Directive, 2006) government administrations have to intensify their offer of e-services. These and some other reasons promote most Lithuanian public institutions to participate in the development and implementation of e-government projects (Gatautis, 2008). ICT is treated only as an instrument for the moving from traditional service delivery to the services in electronic domain or from the e-services in some sophistication (or maturity) level to the higher level. It is followed by the increase of the amount, complexity and integration of systems providing these e-services. In these conditions the development of Lithuanian e-government interoperability framework was started according to the best practices and world experience (Gatautis, Kulvietis, Vitkauskaitė, 2009). It is very important for effective development of the systems providing e-services especially in public sector. All these aspects require some methods for characterization or classification of such e-services and their systems. There is also need of measuring tools to show their respective areas of strengths and weaknesses with the e-government readiness domain. It is desirable to have possibilities for a comparative assessment of the e-services provided by different administrations in the country or among the countries to measure their status and progress trends of development.

Some parts of the actual problems were researched and methods were proposed by different authors. There were presented methods (ANAO, 1999), (SAFAD, 2000), (Lane, Lee, 2001), (Hiller, Belanger, 2001) that were well discussed (Persson, Goldkuhl, 2005). The other options for this type of models were presented in some works (Moon, 2002), (Siau, Long, 2005), (Andersen Henriksen, 2006). All these methods measure the sophistication level for e-services: they bear the basic features in common and are based on the stage models of sophistication.

Some studies with stage model methodologies of measuring sophistication level applied were conducted and

they have ranked countries for e-government implementation. e-Europe benchmarking (EU, 2009) methodology essentially is based on online availability and ranking of e-services by the level of sophistication – five-stage maturity model:

1) *Information*: information necessary to start the procedure to obtain the service available on the web.

2) *One way interaction*: downloadable or printable form to start the procedure to obtain the service on the web.

3) *Two-way interaction*: electronic forms to start the procedure to obtain the service on the web.

4) *Transaction*: full electronic case handling of the procedure by the service provider.

5) *Targetisation*: proactive, automated service delivery.

EU has defined an initial set of 20 e-services; it assesses the existence and maturity levels of these services in EU member countries. The EU report assigns scores to each e-service according to the level of sophistication that is for the comparing of the same e-services in different countries. If more than one provider or level of government provides the service at different levels of sophistication, weighted averages are calculated for the service.

UN study of benchmarking government (United Nations, 2008) seeks to provide governments worldwide with a measuring tool that shows their respective areas of strengths and weaknesses with the e-government readiness domain. The objectives of the study are to provide a:

- comparative assessment of the Member States' ability to transform their governments by using information and communication technologies to deliver online services and products to their citizens;
- benchmarking tool to monitor the advancement of governments in implementing e-government services.

One of the three main measures of the method of the study - the Web Measure Index was based upon another five stage model of sophistication:

1) *Emerging*: a government's online presence is mainly comprised of a web page and/or an official website. Much of the information is static and there is little interaction with the customer of the service.

2) *Enhanced*: governments provide more information on public policy and governance. The links to archived information that is easily accessible to the customers of the service were created (e.g. documents, forms, reports, laws and regulations, and newsletters).

3) *Interactive*: governments deliver online services such as downloadable forms by introducing one-way interactions. In addition, the beginnings of an interactive portal or website with services to enhance the convenience of customers of the service are evident.

4) *Transactional*: governments begin to transform themselves by introducing two-way interactions between the customer and the government. It includes options for paying taxes, applying for ID cards, birth certificates, passports and license renewals, as well as other similar government to customer interactions, and allows the customer to access these services online 24/7. All transactions are conducted online.

5) *Connected*: governments transform themselves into a connected entity that responds to the needs of its citizens by developing an integrated back office infrastructure. This is the most sophisticated level of online e-government initiatives and is characterized by horizontal connections (among government agencies), vertical connections (central and local government agencies), infrastructure connections (interoperability issues), connections between governments and customers and connections among stakeholders (government, private sector, academic institutions, etc.).

According to the UN study as countries move upwards towards the stage of connected government, they pass through many thresholds in terms of infrastructure development, content delivery, business re-engineering, data management, security and customer management. Each country faces a number of similar challenges as it moves up to the higher stage, and the issue of how countries meet those challenges will determine the pace at which they migrate upwards. The Web Measure Index provides countries with a comparative ranking on their ability to deliver online services to their citizens.

In the paper by Coursey, Norris (2008), the authors present empirical evidence from three surveys of local e-government in the United States to test whether these models (Bamm, Di Maio, 2000), (Hiller, Belanger, 2001), (Ronaghan, 2001), (Wescott, 2001), (Lane, Lee, 2001) are accurate or useful for understanding the actual development of e-government. They claim that the models do not accurately describe or predict the development of e-government.

These all models predict the linear, stepwise, and progressive development of e-government. Governments begin with a fairly basic, in some cases even primitive, Web presence. They pass through predictable stages of e-government, such as interactivity, transactions, and integration, and then arrive at an e-government nirvana. This final step is described variously as either the seamless delivery of governmental information and services, e-participation, e-democracy, governmental transformation, or some combination of the above mentioned entities. The models do not, however, tell us how this progression or evolution will occur or how long it will take to fully unfold. In particular the models do not tell us how governments will overcome the numerous and significant barriers (e.g., financial, legal, organizational, technological, political), for example, to the integration of governmental information and services. Finally the models have been developed without any linkage to information technologies.

Another case of stage model application was presented by Hogrebe, Blinn, Nuttgens (2009) where among other e-government assessment criteria the 5 level stage model (Bamm, Di Maio, 2000) was used and every stage level defines the complexity level of the e-service. A Europe-wide comparative study of portals of all European capitals and all European cities with more than 500 000 inhabitants was focused on the implementation of G2B e-services in this work. The results of the study showed that the maturity levels at that time were low and there is a potential for development in order to achieve higher complexity levels.

An alternative for the stage models was presented by Lind, Forsgren, Salomonson, Albinsson (2007) where e-Co model for characterizing and evaluating the e-services was introduced. Instead of organizational point of view what is the key characteristic in most stage models the authors of e-Co model used the perspective of the consumers of the e-services - citizen as a centric value base.

All these e-service assessment cases referenced above illustrate the importance to develop evaluation methods and techniques that could be used for the e-service evaluation and maturity progress measurement. It also may be concluded that regular assessments of e-services and their systems are needed. The stages in stage models presented above are not as distinct from each other as they need to be. The assessments of e-services using these methods are not sufficient: borders between stages are unclear and not distinguishable from each other on the criteria given in the model (Persson, Goldkuhl, 2005). The new, more precise approaches and measures for such assessments are needed.

An attempt to characterize e-services in more detail was made by Goldkuhl, Persson (2006a) where e-diamond model was proposed. Instead of four categories in a standard one-dimensional (linear) stage model the three-dimensional e-diamond model consists of a classification with twelve categories. The authors claim that the e-diamond model (with more categories) gives a more adequate and nuanced classification of e-service and illustrated on real samples that by using the stage model the risk to get a false characterization of an e-service is obvious. Empirical and theoretical investigations supported the e-diamond model for e-service classification (Goldkuhl, Persson, 2006b). Practical application of e-diamond model was presented in the work by Lind, Goldkuhl (2008) where middle-range categories were identified instead of high-range characteristics of e-services applying stage models. As a result of categorization of public e-services, four classes of middle-range categories were identified.

Another approach to characterize e-services was based on value-based model (Albinsson, Forsgren, Lind 2006). It was assumed that e-services are supposed to be of value for individual citizens and are therefore based on the interpretation of citizen values for a particular service instead of an organizational point of view in the case of stage models. As a part of this model the e-diamond model (Goldkuhl, Persson, 2006a) was used for characterizing each e-service. The purpose of value model was to contribute to a more valuable and qualitative development of e-services: more complete e-services will contribute to more valuable e-services according to this model. The results of the value model measuring give new ideas for future development of e-services. These conclusions may be addressed to any other model that measures completeness of e-services in a proper manner.

The analysis of e-service assessment models indicated that research in the assessment of e-services and their systems is relevant as there is a lack of constructive enough and more precise methods for such assessments in practical use. The research is focused to the methods of evaluation of e-service maturity, complexity of the systems

providing these e-services with the final aim to identify a list of criteria for the assessment and comparison of e-services and their systems. Our research method is based on systematic, logical analysis of different models of e-services with the elements of practical theory approach (Cronen, 2001).

We suggest to evaluate and to separate e-services from each other in a more detailed way by seeking to identify the main aspects of the e-service characteristics. This paper provides an alternative model for e-service evaluation and presents an approach that could provide more comprehensive assessment for maturity and complexity of e-services and the systems that provide them. It also could fill the gap of the lack of self-evaluation methodology or comparison of e-service maturity, complexity in more detailed aspects for the purposes of the enhancement of e-services.

The presented e-service evaluation model is composed as a multi-attribute model of evaluation criteria that are used to assess the sophistication level of e-service. Taking into consideration that the higher sophistication level means the higher maturity of the e-service the higher sophistication level causes the higher service level. Assuming that technology and service levels are intimately interwoven factors the technological complexity is higher when the service level is higher for the system that provides the e-service (Persson, Goldkuhl, 2005). Defining e-services as the result of automation, enhancement and integration of the business processes of the traditional services that are moving towards the e-services *on demand* (IBM, 2003) the higher service level means the more complex system providing the e-service. And contrary – the higher sophistication level means the simpler e-service from the user point of view (at least it should happen if the automation level is high enough). There are several reasons for a need to measure the complexity for such systems (e.g. the measures may be used as a guidance making decision for investments on e-service system development or comparing different e-service systems). As the complexity of the systems or technological level directly depends on the maturity of the e-services provided, the evaluation of the e-service maturity means also the evaluation of the system complexity.

Constructing Evaluation Criteria

The e-service evaluation model is based on multi-attribute model. The approach was originated from decision analysis (Clemen, 1996) where a multi-attribute model represents a decomposition of a decision problem into smaller and less complex subproblems. In our case the problems are changed to categories, subproblems – to subcategories. It is aimed to assess the utility of options (or alternatives) that occur in assessment process. The model is composed of attributes that are organized hierarchically so that the attributes that occur on higher levels of the hierarchy depend on the lower-level ones. According to their position in the hierarchy, we distinguish between basic attributes (hierarchy leaves or terminal nodes) and aggregate attributes (internal nodes, including the roots of the hierarchy). Basic attributes represent inputs of the model, while the roots represent its output.

The selection of the criteria for the model was in accordance with the principles: 1) the importance and informativeness of the criteria, 2) the specific technological nature of the elements of e-services, and 3) the possibility to measure these criteria in practice.

For the construction of the e-service evaluation model we used different elements of service models that are important for the assessment in our context: the entities of Reference Model (RM) for Service-oriented Architecture (Reference Model, 2006), the service categorization according the model presented by Persson, Goldkuhl (2005), and the elements of the e-service model procedure (Ostasius, Petraviciute, 2010) that is graphically presented in Fig.1. We grouped the evaluation criteria in the hierarchical tree that represents a decomposition of attributes of criteria of different levels.

The first group of attributes is related with the *visibility* of the e-service (Reference Model, 2006). *Visibility* means that a service provider and consumer have to be able to ‘see’ each other in order to interact with each other. One of the entities that visibility is based is *awareness*. *Awareness* means that a both service provider and service consumer must have information that would lead them to know of the other’s existence. The information about the e-service may be presented as *electronic description* and *policy* including it in a service directory or broadcasting it to all service consumers. There must be sufficient information about the e-service and the method for the consumer to interact with the service in such a manner and form that a potential consumer is aware of existence and capabilities of the e-service. It is also desirable if an *on-line demo* version for the e-service is available where customers could look and test the e-service on their own before they use it. Another entity that *visibility* is based on is *reachability* that means that service participants must be able to communicate with each other. If there is no communication between the consumer and provider then the service is not visible to the consumer and he/she cannot use it. As *reachability* means the possibility to communicate there are different options of means for the electronic communication. Most common is public *Internet* but there are more *other communication means* as well.

The second group of attributes is related with the identification of a user (customer) of the e-service. Public services (C1) (Persson, Goldkuhl, 2005) are limited to services that need no identification of the users (customers) as they are publicly available to all citizens in a continuum of increasing interaction possibilities limited by the absent need for identifying the user (customer) in any degree at all. Services under this category do not involve the secure identification of the user (customer). Directed (or individualized) services (C2) are built up from services that need the user to be indirectly identified; it means that identification is carried out in an automatic way using non-secured – semi personalized means for identification (e.g. e-mail address). Restricted services (C3) are based upon the need for a securely identified user of the services that transfer information that is of no interest and that should not be accessible to people other than the user (customer) himself. This category requires secured means for user identification (e.g. eID) and has subcategories accordingly

that are related with the option how a customer identification is handled:

- *outside information system (IS) initiation (SC1)* means user identification outside the scope of information system: identification is carried out via the traditional signed document manually or in an automatic way using electronic means of the third party;
- *inside IS initiation (SC2)* means user identification inside the scope of information system: identification is carried out in an automatic way using secured – fully personalized means for identification.

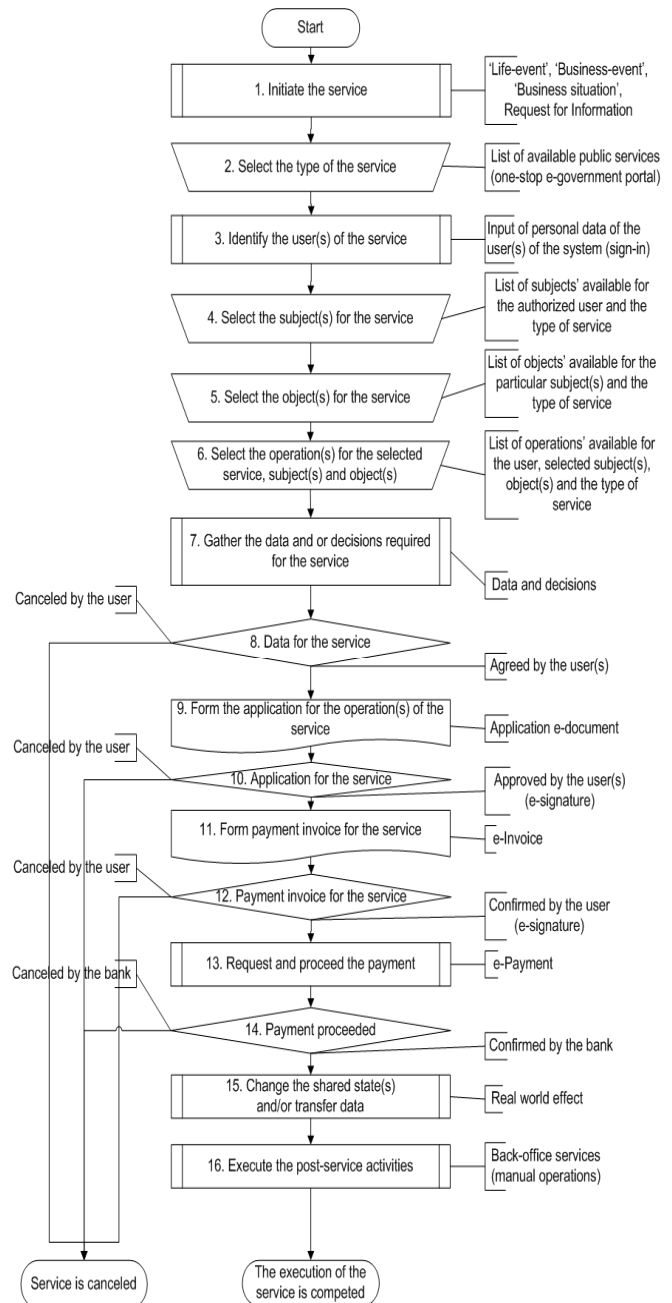


Figure 1. E-service model procedure (Ostasius, Petraviciute, 2010)

User identification (Figure 1, 3rd step) (Ostasius, Petraviciute, 2010) starts from authentication activity where the identity of the person accessing services is executed and continues with authorization – the activity

that allows the access to the services that are conditioned by the individual's access level and his *role*. The user who will be using the services offered can possess one or a combination of the following roles: *individual* (the user as the customer of the service), *agent* or *organizational representative* (the user represents the customer).

The third group of attributes is related with the e-service *case handling* that means data collection (all the data that are required for the service should be collected) and decisions to be taken (internal approvals or rejections that are required for the service) (Figure 1, 7th step; Ostasius, Petraviciute, 2010). All the data if they are accessed electronically should be collected in an automatic way. Other required data that cannot be accessed electronically or not available in electronic form should be entered *manually*. Next subcategories are related with this group. *Manual case process* (SC3) (Persson, Goldkuhl, 2005) means that handling and decision will be taken by a handling officer in the agency. Depending on the specific of data and the decision to be made it could be done in several ways: by the customer himself or entered by the agent or the organizational representative of the organization that provide the service or from the external organization according to the contents of the data sources - documents provided by the customer or organization. In all these cases the agent or the organizational representative has to approve electronically the certainty of the entered data that are based on the original documents that were presented or of the decisions that are based on obligations that the agent or the organizational representative possesses.

This subcategory may be characterized by the following attributes:

1. The use of an *interactive form* in on-line processing. That means the user (customer) fills electronic forms interactively.
2. The use of a *non-interactive form*. That means the electronic form can be downloaded, filled with data and uploaded or sent by the user (customer).
3. The *electronic approval* of data. It may be required in this case that data and/or decision must be approved by the user (customer) electronically.

Automated case process (SC4) means that data collection and/or the decisions in certain cases will be conducted in an automatic way by programmed rules in an information system and no manual actions are needed for e-service case handling. The possibility of *electronic notification* allows monitor the progress of the e-service process.

The fourth group of attributes is related with the e-service *document handling*. After the data and/or decisions are collected and confirmed an *electronic application* (*service contract*) for the service may be formed (Fig. 1, 9th step) (Ostasius, Petraviciute, 2010). It is optional depending on the specific of the service and is formed according to the selections, decisions and data collected. It is an option to use *electronic document* here or to add some *attachments* (e.g. documents, pictures) in electronic form to the application if it is necessary for the e-service. There may be other type of documents required that depend on the specific of the service in electronic or non-electronic

form. Any electronic document may be *authenticated* by the user (customer) using electronic signature if it is required and if means for this action are available.

The fifth group of attributes is related with the *payment handling*. Direct payment for the e-service is optional and consists of two types: using *internet banking* or *other electronic payment* methods if such means are available (e.g. Credit/Debit cards).

The sixth group of attributes is an *integration of services* (C4) category that covers integration of government-to-government and other third party services for the e-service. This category has several subcategories.

1. *Joint information services* (SC5) subcategory bridges borders between government agencies and other organizations. In our case, it covers common horizontal services such as electronic identification, electronic signature, electronic payment or other electronic services that are provided by other agencies and/or third parties.

2. *Info or decision provision* (SC6) required where an agency can be relying on input information or a decision from another agency or third party organization in order to be able to take a decision in a case relating the specific customer and/or service. The particular e-services may be controlled by one or several *electronic restrictions* that are originated in other agencies or third parties. There also may be an option for the *electronic approval of the decisions* from other agency or third party organization during the e-service procedure if it is necessary.

3. *Database access* (SC7) subcategory is needed for accessing a database in another agency or third party organization for receiving a piece of information needed for the e-service or decision to be taken in a certain case. There are options when the information is requested from *registers* or *other electronic data sources*.

4. *Transparency* in processes of several independent decisions (SC8) is when certain decisions need to be taken independently by several agencies or departments in order for the case process to be completed.

The seventh group of attributes covers *post-service activities* processes that are *manual* or *not automated* and they are needed for the completion of e-service process. The system may *request* for the human interaction to proceed some activities (e.g. logistics, printing certificates, non-electronic delivering of e-service results). It is optional when the completion of the e-service may be finalized by the automatic forming and *electronic delivery* of the e-service results: *electronic certificates*, *electronic invoices* or *other results* that can be delivered electronically if it is requested by the user (customer).

According to RM (Reference Model, 2006) the consequence of the *service* is a realization of one or more *real world effects*. These effects may include information returned in response to a request for that information or a change to the *shared state* of defined entities, or some combination of both. *Real world effect* means that the goal of the service consumer can often be expressed as 'trying to get the service to do something'.

The eighth group of criteria covers the *real world effect*: return of the requested *information* and change of *shared state* of the defined entity of the e-service – object or subject.

Table 1

The hierarchical tree of criteria

E-service evaluation model	
1- Visibility	Visibility of the e-service
-- Awareness	Information about the e-service
---- e-Description	Electronic description and policy of the e-service
---- On-line demo	Existence of an on-line demo for the e-service
-- Reachability	Means for communication
---- Internet	Public internet
---- Other means	Other communication means
2- E-service user	User of the e-service
-- User identification	Identification of the user of e-service
--- Public services	Need no identification of the user
--- Directed services	Need the user to be identified indirectly
----- Semi personalized	Usability of not secured means for identification
--- Restricted services	Need for a securely identified user
----- Outside IS initiation	Identification of the user outside the scope of IS
----- Inside IS initiation	Identification of the user inside the scope of IS
----- Fully personalized	Usability of secured means for identification
-- User role	Possible option of user roles for the e-service
--- Individual (customer)	Customer of the e-service
--- Agent	Agent that represents the customer of the e-service
--- Organizational representative	Organization that has obligation for customer e-service
3- Case handling	E-service process handling
---- Manual case processes	Manual input of data and/or decision (human-to-system interaction)
----- Interactive forms	Interactive on-line forms (info and decision)
----- Non-interactive forms	Forms downloaded, filled and uploaded or sent by e-mail (info and decision)
----- e-Approval	Internal approval of data and/or decision electronically
---- Automated case processes	Automatic case handling
---- e-Notification	Notification about the progress of the e-service
4- Document handling	Automatic handling of the document
-- Application	An application for the service (service contract)
---- e-Application	Usability of electronic application
---- Attachments	Electronic documents can be attached
-- Other documents	Other document for the service
---- e-Document	Usability of other electronic document
-- e-Authentication	Electronic authentication of the document
5- E-payment	Electronic payment of service
-- Internet banking	Direct e-Payment through internet banking
-- Other e-Payment method	Direct e-Payment through other means
6- Integration of services	Integration of services and agencies (system-to-system interaction)
---- Joint information services	Joint web production
----- e-Identification	Electronic identification service through third party
----- e-Signature	Electronic signature service through third party
----- e-Payment	Electronic payment service through third party
----- Other e-service	Other electronic service through third party

---- Info or decision	External info or decision provision required
----- e-Restriction	Electronic restriction of e-service
----- e-Approval of decision	External electronic approval of e-service
---- Database access	Database access in information gathering
----- Registers	Electronic data exchange with registers
----- Other electronic data sources	Electronic data exchange with other data sources
---- Transparency	Transparency in processes of several independent decisions
7- Post-service activities	E-service completion activities
-- Manual or not automated processes	Not automated activities
---- e-Request	Request for human interaction (system-to-human interaction)
-- e-Delivery	Electronic delivery of e-service results
---- e-Certificate	Electronic certificate can be formed and downloaded
---- e-Invoice	Electronic invoice can be formed and downloaded
---- Other results e-delivery	Electronic delivery of other results of e-service
8- Real world effect	Consequence of invoking the e-service
---- Information return	Response to the request for that information
---- Change of shared state	A change of shared state of defined entity

Conclusions and future work

Models and methods are needed for the evaluation and verification of public e-services and their systems. The existing stage models that are mostly used for the measurement of e-service sophistication (or maturity) level are not accurate enough. More precise and detailed methods and models for the evaluation of e-services and their systems are needed.

We constructed and presented the e-service evaluation model for e-service assessment and comparison in this paper. The basis for e-service evaluation model was Reference Model (RM) for Service-oriented Architecture (Reference Model, 2006) and the e-service models presented by Persson, Goldkuhl (2005) and Ostasius, Petravičiute (2010).

The presented e-service evaluation model can be used for self-evaluation, benchmarking of e-services, the assessment and comparison of different e-services in a country or in different countries, or to assess and compare the same type of e-services in different countries.

Future works that are planned are focused on the validation of the presented e-service evaluation model in practical testing on real existing e-services and the systems that provide these services.

References

- Albinsson, L., Forsgren, O., Lind, M., & Salomonson, N. (2006). Public E-services: A Value Model and Trends Based on a Survey, in Swedish Governmental Agency for Innovation System, *Vinnova Report VR 2000:15*, December.
- ANAO (1999). Electronic Service Delivery, including Internet use by Commonwealth Government Agencies, Australian National Auditing Office, Canberra, Australia.
- Andersen, K. V., & Henriksen, H. Z. (2006). E-government maturity models: Extension of the Layne and Lee model, *Government Information Quarterly*, 23(2), 236-248.
- Bamm, C., & Maio, A. D. (2000). Gartner's Four Phases of E-Government Model. Gartner Inc.
- Clemen, R. T. (1996). Making Hard Decisions: An Introduction to Decision Analysis. Duxbury Press.
- Coursey, D., & Norris D. F. (2008). Models of E-Government: Are They Correct? An Empirical Assessment. *Public Administration Review*, 68(3). <http://www3.interscience.wiley.com/journal/119395746/abstract>
- Cronen, V. (2001). "Practical theory, practical art, and the pragmatic-systemic account of inquiry", in *Communication theory*, 11(1). <http://www3.interscience.wiley.com/journal/118990106/abstract?CRETRY=1&SRETRY=0>
- Directive (2006). 2006/123/EC of the European Parliament and the Council of 12 December 2006 on services in the internal market.
- EU (2009). Smarter, Faster, Better eGovernment. 8th eGovernment Benchmark Measurement.
- Gatautis, R. (2008). The Impact of ICT on Public and Private Sectors in Lithuania. *Inzinerine Ekonomika-Engineering Economics*(4), 18-28.
- Gatautis, R., Kulvietis, G., & Vitkauskaitė, E. (2009). Lithuanian eGovernment Interoperability Model. *Inzinerine Ekonomika-Engineering Economics*(2), 38-48.
- Goldkuhl, G., & Persson, A. (2006a). From E-ladder to E-diamond – Re-conceptualizing Models for Public E-services, in *Proceedings of the 14th European Conference on Information Systems*, Goteborg, Sweden. <http://www.google.lt/url?sa=t&source=web&ct=res&cd=1&ved=0CAkQFjAA&url=http%3A%2F%2Fwww.vits.org%2F%3FpageId%3D10%26pubId%3D588&rct=j&q=11.%09Goldkuhl%2C+G.%2C++Persson%2C+A..%3A+From+E-ladder+to+E-diamond+%E2%80%93+Re-conceptualising+Models+for+Public+E-services&ei=n6vGS8XoBMOKOOK86LAP&usg=AFQjCNFvWxwnlrfSTTNIy5oZTe7XhGDOIA&sig2=Nu3fT190VzWCrSbBwe-83A>
- Goldkuhl, G., & Persson, A. (2006b) Characteristics of Public E-services: Investigating the E-diamond Model, in *Proceedings of the First International Pragmatic Web Conference*, 21-23 September, 2006, Stuttgart, Germany. <http://www.vits.org/publikationer/dokument/596.pdf>
- Hiller, J., & Belanger, F. (2001). Privacy strategies for electronic government. Arlington: PricewaterhouseCoopers. <http://www.google.com/books?hl=lt&lr=&id=WGbqZN4M5j8C&oi=fnd&pg=PA162&dq=6.%09Hiller,+J.,+Belanger,+F.:+Privacy+strategies+for+electronic+government.+&ots=IzRXzkr6L2&sig=FAFMN4GdOSV167mxHgRbh37Gr8#v=onepage&q&f=false>
- Hogrebe, F., Blinn, N., & Nuttgens, M. (2009). Survey of E-Gov portals in European Capitals and Large Cities: A Benchmarking Study of G2B-Services. *Electronic Government – 8th International Conference*, EGOV 2009 Linz. http://www.springer.com/computer/general+issues/book/978-3-642-03515-?cm_mmc=Google_Book%20Search_Springer_0
- IBM (2003). Business Consulting Services. How e-government are you? e-government in France: State of play and perspectives. <http://www-935.ibm.com/services/id/igs/pdf/g510-3552-00-esr-e-government.pdf>
- Layne, K., & Lee, J. (2001). Developing fully functional E-government: A four stage model. *Government Information Quarterly*, 18, 122-136.
- Lind, M., Forsgren, O., Salomonson, N., & Albinsson, L. (2007). The E-co Model – Citizens' Driving E-Service Quality, in *51st Annual Conference of the International Society for the Systems Sciences (ISSS)*, August 5 – 10, 2007, Tokyo, Japan. <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.113.2967&rep=rep1&type=pdf>
- Lind, M., & Goldkuhl, G. (2008). Categories of Public e-Services – an Inquiry based on the e-Diamond Model, in *Collaboration and the Knowledge Economy: Issues, Applications, Case Studies*, Paul Cunningham and Miriam Cunningham (Eds) IOS Press, Amsterdam. http://www.adm.hb.se/~ml/pdf-filer/2008_eChallenges_ML-GG.pdf
- Ostasius, E., Petravičiute, Z., & Kulvietis, G. (2010). Constructing a Generic E-service Model in Public Sector. *16th International Conference on Information and Software Technologies IT-2010* April 21-23, 2010, Kaunas, Lithuania, 33-40 http://e-stud.vgtu.lt/files/dest/13822/ktu_it2010.pdf
- Persson, A., & Goldkuhl, G. (2005). Stage-models for public e-services - investigating conceptual foundations, accepted to the *2nd Scandinavian Workshop on e-Government*, Copenhagen. <http://www.vits.org/publikationer/dokument/492.pdf>
- Reference Model (2006). Reference Model for SOA, Version 1.0, OASIS Standard. <http://docs.oasis-open.org/soa-rm/v1.0/soa-rm.pdf>
- Ronaghan, S. A. (2001). Benchmarking E-Government: A Global Perspective. New York: United Nations Division for Public Economics and Public Administration and American Society for Public Administration. <http://www.buscalegis.ufsc.br/revistas/index.php/buscalegis/article/viewFile/2550/2121>

- SAFAD (2000). The 24/7 Agency: Criteria for 24/7 Agencies in the Networked Public Administration, Statskontoret, 41, Sweden.
- Siau, K., & Long, Y. (2005). Synthesizing e-government stage models - a meta-synthesis based on meta-ethnography approach", *Industrial Management + Data Systems*, 105(3-4), 443.
- United Nations (2008). E-Government Survey. http://www2.unpan.org/egovkb/global_reports/10report.htm#sa
- Wescott, C. G. (2001). E-Government in the Asia-Pacific Region. *Asian Journal of Political Science*, 9(2), 1-24.

Egidijus Ostašius, Živilė Petravičiūtė

Elektroninių paslaugų ir jų sistemų vertinimas

Santrauka

Šiuolaikinė ekonomika vis sparčiau krypta nuo prekių mainų į paslaugų teikimą. Greitai plėtojantis informacijos ekonomikos ir elektroniniams tinklams šis procesas įsilieja į elektroninių paslaugų (toliau – e. paslaugos) plitimą. Viešos administracijos, valdžios institucijos, kaip ir bet kurios kitos organizacijos ar asmenys, gali teikti e. paslaugas, naudodamos šiuolaikines informacijos ir komunikacijų technologijas. Šių institucijų pirminiai tikslai yra ne tik vykdomos veiklos operacijų ir organizacijos efektyvumo gerinimas, kad būtų išspręsti pagrindiniai ilgalaikiai uždaviniai, bet ir efektyvesnis išteklių panaudojimas ir geresnis projektų biudžetų valdymas, kuriant naujas ar tobulinant esamas paslaugas vartotojams. Dažniausiai tokie viešojo sektoriaus projektai yra finansuojami iš valstybės biudžeto, Europos Sąjungos ar kitų fondų, todėl labai svarbu yra ne tik kokybiškai analizuoti, vertinti ir lyginti pačias e. paslaugas, bet ir sistemas bei projektus, kurie šias e. paslaugas realizuoja.

Viešojo sektoriaus paslaugos pasižymi tam tikrais ypatumais, kurie verčia analitikus elgtis skirtingai, ir tai riboja tiesioginių tų pačių metodų taikymą, pavyzdžiui, komercinėms e. paslaugoms vertinti. Visų pirma viešasis e. paslaugas paprastai reglamentuoja normos ir įstatymai, kur viena vertus, gali būti vertingi, ilgus metus kaupti viešojo sektoriaus žinių šaltiniai ir gali būti panaudoti paslaugų veiklos procesams perorganizuoti ir e. paslaugoms projektuoti. Kita vertus, jie gali veikti kaip apribojimai, nulemiantys kuriamą e. paslaugų brandą ar sudėtingumą (pavyzdžiui, paslaugai suteikti reikalingas paslaugos gavėjo parašas). Kita viešųjų paslaugų ypatybė yra ta, kad jų veiklos procesai apima ne vienos, o keleto skirtingų organizacijų veiksmus, reikalingus išsamiai realizuoti paslaugas (pavyzdžiui, teikiant paslaugas turi būti surinkti dokumentai, duomenys iš įvairių organizacijų arba priimami sprendimai skirtingose organizacijose, kad būtų įvykdytos teikiamos paslaugos sąlygos). Trečia viešųjų paslaugų ypatybė yra ta, kad jas reglamentuojantys teisiniai ir norminiai dokumentai skirtingų žmonių, dalyvaujančių paslaugų veiklos procesuose, gali būti interpretuojami skirtingai. Perkelti šias paslaugas į elektroninę erdvę, dažnai projektavimo fazėje veiklos procesų automatizavimas nėra vienintelis galimas sprendimas. Kartu turi būti peržiūrėti ir tobulinami norminiai dokumentai, perprojektuojami ir perorganizuojami veiklos procesai, tam, kad būtų pasiekti galutiniai tikslai, suformuluoti e. paslaugoms. Galiausiai visa tai įtakoja naujų veiklos scenarijų, tvarkų, reglamentų, e. paslaugų modelių kūrimą.

E. paslaugų modelių panaudojimas paslaugoms ir jas realizuojantiems veiklos procesams aprašyti, jiems apibendrinti padeda kokybiškiau ir efektyviau kurti pačias e. paslaugas. Panaudojant šiuos modelius, e. paslaugos paprastai yra tobulinamos taikant naujas technologijas, standartus ir mokantis iš gerosios praktikos, patirties pavyzdžių. Be to, šie modeliai gali būti panaudoti kuriant priemones ir metodus, kurie taikomi vertinant tiek kuriamas, tiek ir jau sukurtas e. paslaugas, jų išvystymo brandą ir jas realizuojančias sistemas skirtingais būdais ir pjūviais.

Tokie vertinimai gali būti atliekami organizacijoje trečiųjų šalių arba patiems vykdydami e. paslaugų įsivertinimus toje pačioje organizacijoje. Vienas iš e. paslaugų vertinimo pavyzdžių gali būti Lietuvos Respublikos elektroninės valdžios koncepcijos priemonių plano rezultatų matavimas pagal paslaugos perkėlimo į internetą brandos lygį. Kiti pavyzdžiai – Jungtinių Tautų, Europos Komisijos inicijuojami periodiniai šalių narių pasirinktų viešųjų paslaugų elektroninės brandos pažangos vertinimai. Paprastai tokio tipo vertinimams yra pasirenkami *pakopiniai modeliai*, kurių kiekvieną pakopą atitinka tam tikras e. paslaugos brandos lygis, tačiau jie nėra pakankamai tikslūs. Tokių vertinimų rezultatai dažnai yra netikslūs, kai skirtingos ar to paties tipo e. paslaugos yra įvertinamos vienodu brandos lygiu, neatsižvelgiant į subtilesnius jų ypatumus, tiek organizaciniu, veiklos procesų, tiek ir technologiniu požiūriais. Gal dėl to, kad e. paslaugų kūrimo laikotarpis nėra ilgas, todėl vertinimams skirtų metodų ir priemonių pasirinkimas, ypač praktiniam jų taikymui, dar nėra didelis ar patenkinamas, o vertinimas nėra tikslus.

E. paslaugas galime apibrėžti kaip tradicinių paslaugų perorganizavimo, automatizavimo, gerinimo ir veiklos procesų integracijos rezultatą, kurio galutinis tikslas - siekti e. paslaugų esant poreikiui sukūrimo. Šis procesas paprastai vyksta laipsniškai, pereinant nuo vieno brandos lygmens į kitą, aukštesnį, brandos lygmenį. Iliustruojant pakopinius modelius, aprašančius e. paslaugų brandos lygmenis, apibendrinančiu tipiniu pavyzdžiu gali būti modelis, kurį sudaro šios 5 pakopos: 1) informacijos apie paslaugą pateikimas; 2) vienusis interaktyvumas tarp vartotojo ir sistemos teikiant paslaugą; 3) dvipusis interaktyvumas teikiant paslaugą; 4) transakcija - visas paslaugos elektroninis pateikimas ir 5) proaktyvus, visiškai automatinis paslaugos ir jos rezultatu pateikimas.

Didėjantys vartotojų reikalavimai skatina teikti tokias e. paslaugas, kurios efektyviau tenkintų jų poreikius, būtų teikiamos tiesiogiai tam tikru standartiniu būdu, naudojant skirtingas prieigos terpes ir įrangą. Tyrimai rodo, kad didesnį pasisekimą turi tos viešojo sektoriaus e. paslaugos, kuriomis nesudėtinga naudotis paslaugos gavėjui. Tai reiškia, kad paslaugos turi būti kiek galima paprastesnės ir labiau suprantamos jų vartotojams (dar geriau – standartizuotos, sekant bankomatų ar internetinės bankininkystės pavyzdžiu). Ribotas paslaugų sudėtingumas dar nereiškia, kad ir sistemos, realizuojančios šias e. paslaugas, yra nesudėtingos; greičiau atvirkščiai, kuo e. paslauga yra aukštesnio brandos lygmens, tuo ją realizuojanti sistema tampa sudėtingesnė. Vienas iš šių sistemų sudėtingumo šaltinių yra tai, kad jos nėra įgyvendinamos tik vienos organizacijos, kuri teikia e. paslaugą, o yra sudarytos iš nepriklausomai realizuotų, tarpusavyje susietų e. paslaugų, kurias teikia skirtingi duomenų ir paslaugų teikėjai. Dėl įvairaus sistemų sudėtingumo, skirtingos e. paslaugų brandos ir greito naujų e. paslaugų dauginimo vertinamos ir lyginamos viena su kita ne tik pačios e. paslaugos, bet ir jas realizuojančios sistemos. Labai svarbu sukurti metodus ir procedūras, kurias naudojant būtų galima detalčiau analizuoti ne tik šias paslaugas, bet ir jas realizuojančių sistemų sudėtingumą.

Šiame straipsnyje nagrinėjami *objektai* yra e. paslaugos viešame sektoriuje, jų modeliai, e. paslaugų vertinimo metodai.

Straipsnio *tikslas* yra sukurti tikslesnį e. paslaugų ir jas realizuojančių sistemų vertinimo modelį analizuojant egzistuojančius e. paslaugų brandos vertinimo metodus ir modelius.

Darbe taikomi *metodai* remiasi sisteminė, loginė skirtingų e. paslaugų modelių analize su praktinės teorijos elementais.

Svarbiausi rezultatai. Vadovaujantis į paslaugas orientuotos architektūros abstrakčiuoju modeliu (Reference Model, 2006) ir taikant skirtingų autorių e. paslaugų modelius (Persson, Goldkuhl, 2005), (Ostašius, Petravičiūtė, 2010), sukonstruotas e. paslaugų viešame sektoriuje ir jų sistemų vertinimo modelis – vertinimo kriterijų hierarchinė struktūra.

Modelis padės valdžios institucijoms įvertinti viešojo sektoriaus e. paslaugų, kurias jos teikia, ir informacinių sistemų, kurios realizuoja šitas paslaugas, brandą ir sudėtingumą detaliau ir tiksliau, negu taikant „tradicionius“ pakopinius modelius. Siūlomas vertinimo modelis turėtų būti naudingas lyginant vienos institucijos teikiamas e. paslaugas su kito ar to paties tipo kitos institucijos teikiamomis e. paslaugomis arba lyginant skirtingų institucijų sistemas. Be to, pateikiamas e. paslaugų vertinimo modelis gali būti naudojamas ir lyginant to paties arba skirtingų tipų e. paslaugas, kurias teikia viešosios administracijos skirtingose šalyse.

Raktažodžiai: *e. valdžia, e. paslauga, vertinimo modelis, sudėtingumas, e. paslaugų branda*.

The article has been reviewed.

Received in April, 2010; accepted in October, 2010.