

# e-Government Service Evaluation: a multiple-item scale for assessing information quality

Andrea Bikfalvi<sup>1</sup>, Josep Lluís de la Rosa<sup>2</sup>, Terence N Keefe<sup>3</sup>

<sup>1</sup>Department of Business Administration and Product Design, <sup>2</sup>TECNIO Centre EASY, VICOROB Institute, <sup>3</sup> Faculty of ACES - Computing

<sup>1,2</sup> University of Girona, <sup>3</sup> Sheffield Hallam University

<sup>1,2</sup> Campus Montilivi, <sup>3</sup> Cantor Building - Arundel Street

<sup>1,2</sup> 17071 Girona Spain, <sup>3</sup> S1 2NU Sheffield UK

andrea.bikfalvi@udg.edu

pepluis@eia.udg.edu

T.Keefe@shu.ac.uk

**Abstract:** A considerable aspect in improving e-government services is the development of e-services that satisfy citizen needs in a more efficient way. In order to provide high quality service adequate service quality assessment models should be constructed. This article is aimed to propose a methodology for developing holistic service quality assessment tools with special emphasis on online information. Consequently, a methodological proposal is constructed (e-InfoQual) and it is tested in 5 participant local administrations part of a complex IT project, generating service innovation ultimately aiming to bring value for citizens. It usefulness is argued for the two main communities involved, namely researchers and practitioners.

## 1 Introduction

The gradually increasing awareness of creating high quality e-government services delivery inevitably transforms into a call for a conceptual model for its assessment. Previous research in the field shows the impossibility of a one-size-fits-all approach. Therefore, the authors of this paper will provide a methodological process to follow when wanting to develop an e-service quality assessment tool, the subsequent tool and the results of the assessment. Considerations of the method's adaptability and universality are presented with the aim of providing value both for researchers and practitioners.

The umbrella term of E-Government refers to the employment of Information and Communication Technologies (ICT) in administration for delivering services with the ultimate aim of generating value for the society. Online public services at all levels of government are being widely implemented in Europe and worldwide. The focus on bringing the public services online has shifted the administration towards a user-centric public services oriented to satisfy citizen and business needs. While citizens should receive increasingly effective and efficient user-friendly services, public administrations

should be able to benefit from all facets of IT introduction consequences (cost advantage, service optimization, organizational change).

Organizations in the public sector have made important investment in ICTs in order to internally and externally maximize their efficiency, visibility, communication, image, transparency and interaction with their users. In this context, according to the study [KD12] service quality is a source of public value creation and quality service is a kind of public value. Historically and in practice, service monitoring and quality assessment has not been perceived as priority evaluation area due to a variety of reasons. Often the monopolistic nature of the service provision, the lack of specific service quality expertise, the absence of awareness and practice in the field of service quality monitoring and its characteristics, pressure of other priorities make this area lag behind others.

Different authors [ZPM00] [PM12] [PM06] agree that the multidimensional concept of e-service quality makes this topic complex. Although evaluation frameworks exist, the literature is not so robust as in other fields of knowledge. Richness in definitions, concepts and contexts contribute to increasing difficulty of understanding the e-service body of knowledge, further translated into the fact that there is no consensus on its underlying quality dimensions [SD05].

As part of the “iSAC6+, unique European citizens’ advisory service” multinational research project we intend to develop a quality model for e-government services finding a balance between function and context. The iSAC6+ is an open source software search tool which is able to understand natural language questions and to answer them based on an underlying search engine. It is an innovative ICT solution aimed at enhancing the capability of various public authorities to respond to citizens’ attention and information requirements at European level. The main goal of the project [iS13] is to provide European citizens and companies with a common and continuously updated local online citizens’ advisory service, by the means of an automatized information search facility (iSAC).

Service quality assessment is in the interest of all: ICT solutions developers are interested in detecting areas of concern and continuously improve their product. Implementing organizations (practitioners) create service innovation where quality monitoring becomes a must especially when wanting to demonstrate value for money of the ICT investment to generate trust in their solution’s effectiveness. Researchers face a challenge also, since neither the concept of service nor the field of quality is homogeneous in general and less in e-Government contexts.

In order to match these objectives the purpose of the present paper is to generate a conceptual foundation and an incremental method aimed at examining what is necessary for determining quality of e-government services.

The paper is structured in six sections. This introduction is followed by literature review. The next section describes the methodology employed, while the fourth section presents our results followed by the discussion. The paper ends with a brief concluding remark.

## **2 Literature review**

According to the research [PM06], the main characteristic of service quality evaluation models aimed at measuring electronic service quality is that most of the studies result from composition, adaptation and extension of existing models. Therefore a literature review is an important step in constructing an e-government service evaluation tool.

In general a model is defined as a representation of constructs aimed for imitation and comparison. We define quality model as an illustration of domains and the relationships established among and across them as determinants of service quality. The two main components of the concept were separated. On the one hand, we identified general service [PZB85] , site service [WW04] , information service [YCZZ05], self-service [DHS11] and technology service models [LH11], their quality dimensions and attributes. These were complemented with the Government context specific service quality models, for some examples see [PM12], [VV09].

This operation resulted in the identification of 59 main sources of information and close to 150 quality domains. Since the already mentioned importance of the context where the service is managed, provided and used, the field of e-Government has been analysed. E-Government represents authorities' desire to transform their services through the use of Information and Communication Technologies (ICT) and deliver public value. According to the e-Government approach 35 documents met this selection criterion, meaning that they are applied in the wide context on e-Government or e-service in Government. Again, the same distinction of primary and secondary source was applied following the same reasoning. See for example e-GovQual for models in the former and the application of SERVQUAL in the Scottish public sector service in the latter. At the end, 14 documents represent a primary source in this approach.

The summary of the primary models considered for the present paper is represented in Table 1. In the literature under investigation, both e-government and general models contain approximately the same number of dimensions which vary from 4 to 12. The literature survey confirms previous findings of [PM12] stating that all the studied models value mostly the quality of information presented on the website, its accuracy, understandability together with other characteristics.

## **3 Methodological approach**

### **3.1 Selecting quality domains**

After a careful revision of the quality dimensions contained in the primary research models a second classification was produced by joining synonyms. The check for differences between general and e-Government approaches did not demonstrate any major inconsistencies between most used dimensions. However, certain variances were observed in the dimensions' definitions, therefore there is a call for adaptation of any model for specific purposes. Three different targets and methods were used in order to

select quality domains and attributes; i) service quality experts, ii) practitioners, iii) Potential users of the service and habitual information search practices and tools.

*Experts* were provided with a list of most frequent domains of service quality in e-Gov and general models and they were clearly informed about the service, its functioning and context. In order to have a better insight to the phenomenon a Delphi method was used to initially assess and select items that construct the conceptual model. In terms of participants, two developers of iSAC information systems business professional, an information system research unit senior researcher and lecturer, 3 university research and teaching staff quality experts, a quality expert Spanish member of the ISO were asked to further select and validate the conceptual model and its attributes for the given objective. Repetitive, general and out of the focus items were removed and a final list of **4 quality domains and 21 quality attributes** remained in the list. *Practitioners* were provided with a reduced form of the list and the OPERA (Own Suggestions, Pair Suggestions, Explanations, Ranking, Arranging). After an intensive, in debate and contribution, workshop taking into account their local context and organisational setting, this community produced a list of **6 domains** important for their purposes. In order to complement the research and practitioner perspectives, a group of 88 students were asked to complete a short questionnaire. Students were explained the importance of the seeking information competence and the advantages and tools with special emphasis on search engines. They were asked to think about themselves as active information seeking persons/citizens and no additional help was facilitated. The question in the interest of our purpose was “*What are 6 attributes of the ideal information search engine?*”. Results were grouped and a final list of **10 domains** complement the previous two. The summary of the process is reflected in Figure 1. The implications of domains detected by all actors involved translate into: i) useful information regarding their interests, ii) it gives the possibility to detect and select common items, iii) it showed preferred priorities, finally it is helpful in agreeing on a joint model merging the interests of main parties involved.

Research & Experts	Practitioners	User
<ul style="list-style-type: none"> <li>• Information</li> <li>• Ease of use</li> <li>• Performance</li> <li>• Citizen support</li> </ul>	<ul style="list-style-type: none"> <li>• Efficiency/Fulfillment/Accuracy</li> <li>• Easy to use</li> <li>• Fast</li> <li>• Satisfaction</li> <li>• Recommend/WOM</li> <li>• Contact</li> </ul>	<ul style="list-style-type: none"> <li>• Fast</li> <li>• Effective</li> <li>• Information</li> <li>• Customization</li> <li>• Easy to use</li> <li>• No advertisement</li> <li>• Good design</li> <li>• Safety</li> <li>• Trust</li> <li>• Free</li> </ul>

Figure 1: Selected quality domains

The translation of these domains into a practical evaluation tool can be read in Table 1.

Table 1: e-InfoQual 1.0

<b>Information - Layout and content</b>	<b>Ease of use</b>
<p>iSAC provides complete information                      iSAC provides accurate and concise information                      iSAC provides relevant information                      iSAC provides up-to-date information                      iSAC provides easy to understand information                      iSAC provides information at the right level of detail</p>	<p>iSAC6 is easy to find                      Using iSAC is easy                      I like iSAC because it permits using my own words                      I like iSAC because it finds the information even I make spelling mistakes                      Using iSAC enables me to find information quickly                      I like iSAC because it keeps my previous search</p>
<b>Performance</b>	<b>Citizen Support</b>
<p>iSAC6+ successfully responded on my first request                      iSAC6+ provided results quickly enough                      iSAC6+ makes it easy to find what I need                      iSAC6+ is responsive to my needs</p>	<p>I can easily find a telephone number to reach the institution/organization if there is a problem                      I can easily find a live person to speak to if there is a problem                      I can easily find a concrete e-mail to contact the institution/organization if there is a problem</p>
<b>Behaviour</b>	<b>Public value</b>
<p><i>Trust</i>                      I trust this website                      This site has a good reputation                      The site provides trustworthy information                      I trust the iSAC solution</p> <p><i>Use/reuse</i>                      I consider iSAC a first choice for my searches                      I will continue using iSAC for future searches</p> <p><i>Recommend</i>                      I am likely to say positive things about iSAC                      I am likely to recommend iSAC to friends and others for seeking information</p>	<p>Using iSAC saves my time                      iSAC makes it easier to interact with [name of organization]                      Using iSAC saves me from trouble (parking, cue, transport and travelling, etc)</p>
Overall satisfaction	
Overall, I am satisfied with the iSAC6+ service	

### 3.2 Service quality evaluation

In order to evaluate service quality an online survey took place. Data collection was web-based and respondents were notified about the survey once accessed and used the iSAC6+ homepage and service. A total of 219 respondents that comprised of citizens along with public employees, answered the online survey between 31<sup>st</sup> of March and 31 of July 2012. The demographic profile of survey respondents indicates a mature group of

Internet users, aged mostly between 30 and 50, with one out of two having a Bachelor or Master's degree. They are also familiar with both web use and e-government site content. Internet use is heavy amongst participants with 60% surfing on the Internet for more than 10 hours per week. They show a high familiarity with the e-Gov sites, 39% making a daily use and 38,5% visiting a site at least once per week. Three out of four respondents prefer self-service and the Internet is the preferred channel to contact an institution. The characteristics of respondents are similar to internet user profiles gathered in other studies.

#### 4 Results: Information Service quality – The big picture

We detect relatively high levels of agreement for the majority of the iSAC characteristics under evaluation. Minimum value of agreement is 47,9% for “*I like iSAC because it keeps my previous search*”, maximum is reached in 79,9% by the affirmation “*I trust this website*” and mean value of agreement is 68,6%. On the other hand, disagreement (sum of categories “Disagree” and “Strongly disagree”) varies between 3,2% for “*I trust this website*” and 19,6% “*I like iSAC+ because it keeps my previous search*”, having a mean of 7,6%. Overall satisfaction reaches 71,1% of agreement, 22,5% of respondents neither agree nor disagree and 6,4% of them express disagreement. Using the original scale and its numeric values, again the majority of characteristics under evaluation are well rated, almost reaching the level of good qualification. Overall satisfaction situates at 3,9 meaning again a good level value. In order to show main strengths and weaknesses detected, an arrangement from high to low of the mean values was performed. The results appear in Figure2.

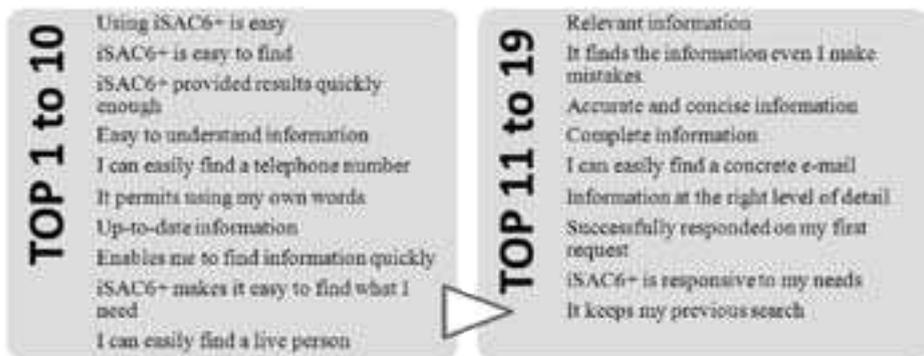


Figure 2: e-InfoQual main strengths and weaknesses

#### 5 Discussion

Using insights from the extant literature we conceptualize, test and interpret a multiple-item scale aimed to capture public employee’s and end-users/citizens perception on an

innovative service for searching information. In this section we discuss practical implications and offer directions for future research. Implications for practitioners are showed in Table 2. We list the main areas of concern and list possible actions to overcome them.

Table 2. Areas of concern and general recommended actions

Use/Reuse	Organizations should devote effort to promotional activity demonstrating and supporting iSAC services and benefits
Performance	Continuously improve, widen, update the semantic network
Information layout and content	Design pages with accurate, complete and relevant information Make sure information is updated periodically Avoid using administrative language. Information should presented in an optimum form (avoid too much or too little information) Information pages should be visually pleasant with added elements used in accordance with web guidelines and standards Information should be accessible for all citizens Date of information presented reviews should be given
Citizen support	Assist users in their queries and transactions with information by user friendly interfaces Contact details should be always visible or easily found Users should have alternative solutions when they require assistance
Ease of use	iSAC should be visible Users should be aware about the abilities of the tool (Using your own words to find what you need) Press releases and promotional material should be widely available Pages should load fast and sites designed with reduced loads when searching for information
Recommend	“Tell a friend” or “Like” style buttons should enhance the tool’s use
Trust	Security policies and procedures should be open and accessible to ensure users feel secure when conducting their personal business “Secure Site elements” from Third Party Organizations may contribute to and enhance user trust

Future research should cover at least three main lines: 1) repeated or continuous evaluations in time in order to capture evolution in perception and possible explanations for that especially when organisation face user dissatisfaction or a diminishing satisfaction, 2) the coverage of wider user public in both number and typology 3) tests to validate the proposal in any information provider institution facilitation the process with a search solution; this would further enhance knowledge upon the proposal’s universality.

## 6 Concluding remarks

In conclusion, 7 out of 10 users are satisfied with the iSAC service and with exception of one particular aspect, rated as fair, the service is rated as good and associated problems are minor. Even significant differences according to user typology are impossible to detect, internal employees value the ease of use aspect of the tool most while external users prefer information layout and content aspects. Significant differences exist between pilots, especially two. Future research has to contemplate the general reticence of public sector towards evaluations, in general. Future assessment has to take into account a shortened version of the questionnaire. Going beyond this particular project, organisations are recommended to continuously monitor service quality. Innovation adopters are also recommended to consider service quality as an important (maybe overriding) aspect since the ultimate user perception is the key aspect in the innovation's adoption, uptake and spreading.

## References

- [DHS11] D. X. Ding, P. J. H. Hu, O. R. L. Sheng. e-SELFQUAL: A scale for measuring online self-service quality. In: *Journal of Business Research*, 64(5):508-515, 2011.
- [iS13] iSAC6+: A unique European citizens' attention service, ePractice case study, accessed <http://www.epractice.eu/en/cases/isac6plus>, 2013.
- [KD12] K. Karunasena, H. Deng. Critical factors for evaluating the public value of e-government in Sri Lanka. *Government Information Quarterly*, 29:76–84, 2012.
- [LH11] J. S. C. Lin, P. L. Hsieh. Assessing the Self-service Technology Encounters: Development and Validation of SSTQUAL Scale. In: *Journal of Retailing*, 87(2):194 - 206, 2011.
- [PM06] X. Papadomichelaki, G. Mentzas. A Review of Quality Dimensions in e-Government Services. In: *EGOV'06 Proceedings of the 5th international conference on Electronic Government*, LNCS 4084, pp. 128–138, 2006.
- [PM12] X. Papadomichelaki, G. Mentzas. e-GovQual: A multiple-item scale for assessing e-government service quality. In: *Government Information Quarterly*, 29:98–109, 2012.
- [PZB85] A. Parasuraman, V. A. Zeithaml, L. L. Berry. A Conceptual Model of Service Quality and Its Implications for Future Research. In: *The Journal of Marketing*, 49(4):41-50, 1985.
- [SD05] N. Seth, S.G. Deshmukh. Service quality models: a review. In: *International Journal of Quality & Reliability Management* 22(9), 913-949, 2005.
- [VV09] P. Verdegem, G. Verleye. User-centered E-Government in practice: A comprehensive model for measuring user satisfaction. In: *Government Information Quarterly*, 26:487-497, 2009.
- [WW04] H.W. Webb, L.A. Webb. SiteQual: an integrated measure of Web site quality. In: *The Journal of Enterprise Information Management*, 17(6), pp. 430-440, 2004.
- [YCZZ05] Z. Yang, S. Cai, Z. Zhou, N. Zhou. e-GovQual: Development and validation of an instrument to measure user perceived service quality of information presenting Web portals. In: *Information & Management*, 42, pp. 575–589, 2005.
- [ZPM00] V. A. Zeithaml, A. Parasuraman, A. Malhotra. A conceptual framework for understanding e-service quality: Implications for future research and managerial practice. In: *MSI Working Paper 00115* p.149, Cambridge, 2000.