


# Local e-Government Information and Service Delivery

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**Abstract**—In this article we present a survey of the websites of 239 Portuguese municipalities. General characteristics of the web sites, available information and online delivery of services were observed. The study was conducted between February and May, 2010. Considering the results, we conclude that, despite the investments made in the past decade, local e-government in Portugal still exhibits medium level development in what relates information dissemination and remains substantially underdeveloped concerning online service delivery. We argue that a cultural breakthrough is needed in order to take full advantage of new technologies in government-to-citizen interactions at the local level in Portugal.

**Keywords** - e-government; government-to-citizen; information dissemination; online service delivery, public administration; local government.

## I. INTRODUCTION

Several definitions of e-government coexist [1, 2, 3, 4]. Generally, e-government addresses the improvement of public services, governance and democracy by developing client-centered approaches and improving internal and external interactions through the use of information and communication technologies combined with organizational change and knowledge acquisition. This broad definition includes various dimensions of e-government: information dissemination by government; online service delivery of public services; acquisition of goods and services by the public administration; cooperation between different branches of government; political participation of citizens; participation of stakeholders. In this article, we mainly focus on two of those dimensions at the local government level: information dissemination and online service delivery by Portuguese municipalities.

When information dissemination and online service delivery are at stake, it is common to use maturity stages to classify e-government development [5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16]. Maturity stage models generally rely on observable characteristics of web sites to classify e-government development. In this study we followed a similar approach by having observed the presence or absence of 39 specific items in the websites of 239 Portuguese municipalities.

According to international rankings Portugal has very good scores in relation to the offer of government information and services through the Web [15, 16]. However, these rankings typically address national governments achievements and local e-government remains substantially understudied, although some international studies exist [17, 18]. With this survey we intend to contribute to a better awareness of local e-government development in Portugal.

Although, as stated before, Portugal exhibits good positions in terms of international e-government benchmarks, e-government research in Portugal is still in an early phase. In the last decade, several articles were published internationally, including subjects as e-government platforms and architectures [19, 20, 21, 22, 23], security [24, 25], organizational interoperability [26], knowledge management [27, 28, 29], transparency [30], human language technologies [31, 32, 33], internet marketing [34], e-government strategies [35, 36] and assessment of e-government initiatives [37]. Relating specifically to the assessment of local e-government in Portugal, Santos e Amaral conducted studies of e-mail responsiveness and service maturity in Portuguese municipalities on a two-year basis, between 1999 and 2007 [38]. The authors used a four stage maturity model to assess online service delivery.

The remaining of this article is organized as follows: in the second section we present the methodology used to collect and analyze the empirical data; in the third section we present the results of the survey; in the fourth section we discuss the results; and in the fifth section we present some general conclusions.

## II. METHODOLOGY

The survey presented in this article was made by direct observation of the websites of a selection of Portuguese municipalities. As we wanted to assess the effects of e-government development projects in terms of dissemination of information and online delivery of services by local government, the municipalities were selected according to their participation in the Portuguese digital cities and regions program (*Programa Cidades e Regiões Digitais*), launched in

2002. Although there were later programs with similar objectives, involving some other municipalities, this specific program was chosen because in public administration modernization initiatives tend to have observable results only in medium term.

Table I lists the digital cities and regions projects that were included in the study and the number of municipalities that participated in each of those projects. The map in Figure 1 shows the involved municipalities in the Portuguese mainland. All municipalities from Açores and Madeira archipelagos were also included in the study.

The original sample was composed of 248 municipalities, approximately 81% of the Portuguese municipalities. However, only 239 valid observations were obtained, representing approximately 96% of the original sample and 78% of the existent municipalities.

TABLE I. DIGITAL CITIES AND REGIONS PROJECTS THAT WERE INCLUDED IN THE STUDY

<i>Digital cities and regions project</i>	<i>number of municipalities</i>
Açores Digital	19
Algarve Digital	13
Almada Digital	1
ALO Digital	4
Aveiro Digital	11
Beira Baixa Digital	10
Beja Digital	13
Braga Digital	1
Entre Douro e Vouga Digital	5
Évora Distrito Digital	14
Gaia Global	1
Leiria Digital	8
Litoral Alentejano Digital	5
Madeira Digital	11
Maia Digital	1
Médio Tejo Digital	10
Oeste Digital	12
Portalegre Digital	15
Porto Digital	1
Ribatejo Digital	11
Seixal Digital	1
Setúbal-Península Digital	7
Trás-os-Montes Digital	31
Vale do Ave Digital	10
Vale do Minho Digital	5
Vale do Sousa Digital	6
Valimar Digital	6
Viseu Digital	16

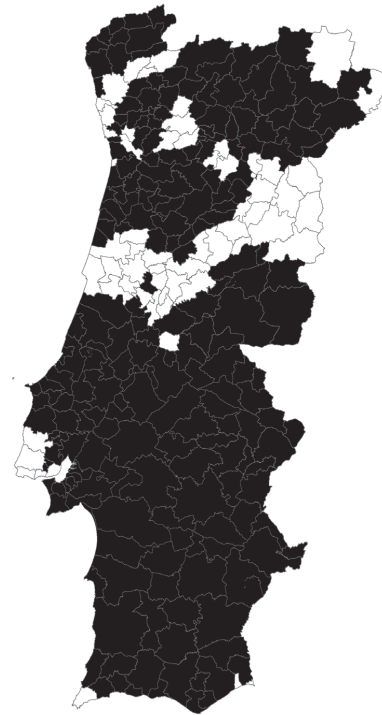


Figure 1. Mainland municipalities included in the study (Açores and Madeira archipelagos were also included in the study)

The characteristics observed in the municipal websites related to two different categories: general characteristics and available information; and online service delivery. In the first category, the presence or absence of the following items was registered:

- Website exists and is functional;
- Attendance through Skype and/or MSN Messenger is available;
- Online submission of complaints is possible;
- City Council minutes are available;
- Municipal Assembly minutes are available;
- Official City Council announcements are available;
- City Council plans and budgets are available.

Additionally, the number of City Council minutes, Municipal Assembly minutes, official City Council announcements and City Council plans and budgets were registered for the websites where those items were available.

In the second category, observations were made for four relevant services concerning to private building:

- Request for prior information regarding building – an optional step that allows an interested person to obtain information about building possibilities in a given property;
- Application for licensing of building plans – constitutes the first mandatory step in the building licensing process;
- Request to issue a building permit – document that must be issued before the actual construction work can start;
- Request to issue a permit authorizing use – document that must be issued before the new building can be used.

In Portugal, these services are delivered by municipalities and, together, they represent the sequential process that must be followed in order to license, build and use a new building. Municipalities are the sole responsible for providing these services and they constitute a very relevant part of their activity.

For each website and for each of the four services, the presence or absence of the following items was registered:

- Service is mentioned;
- There is information on relevant legislation;
- There is information about the documents that must accompany the request or application;
- It is possible to download the application form for manual filling;
- It is possible to fill the form online and print the completed form after;
- It is possible to complete and submit the form online;
- It is possible to carry out the complete transaction online, including payment;
- It is possible to check online the status of the process after submission.

Information relating these items was collected between February 4<sup>th</sup> and May 5<sup>th</sup>, 2010. The observations were made by ten different teams, each responsible for between 12 and 35 municipalities. A spreadsheet was filled out for each municipality. Harmonization meetings were organized with all the teams and the data collected was verified randomly by an eleventh team to ensure data quality. Data was later aggregated into a single spreadsheet in order to calculate global results.

### III. RESULTS

In this section we present the results of the study. In the first subsection the results for general website characteristics and available information are presented and, in the second subsection, results for service delivery are also presented. Finally, in the third section, an analysis is made using a maturity scale based in the first four maturity stages used by the European Commission to measure online sophistication and

full online availability of e-government services [15]. This analysis is included for comparability.

#### A. General characteristics and available information

In this subsection we present the results of the survey concerning general characteristics of the websites and the available information. The observed items in this category were addressed in the previous section. Global results are presented in Table II.

TABLE II. GLOBAL RESULTS FOR GENERAL CHARACTERISTICS AND AVAILABLE INFORMATION

<i>Observed item</i>	<i>% of municipalities</i>
Web site exists	98.3%
City Council minutes	79.9%
Official announcements	79.1%
Plans and budgets	71.1%
Municipal Assembly minutes	65.7%
Submission of complaints	60.7%
Skype / Messenger attendance	3.8%

Only four of the observed municipalities had no website or a non functional website. For over than 65% of the municipalities all information related items were present in the website. The online submission of complaints was possible for 60.7% of the municipalities and the attendance through Skype and/or MSN Messenger was a possibility for only nine of the observed municipalities.

Table III depicts the average and maximum number of City Council minutes, official City Council announcements, City Council plans and budgets and Municipal Assembly minutes that were counted for the municipal websites that had those items available. The minimum number is one for all the four types of documents. It is observable that the biggest numbers are obtained for City Council documents, excluding plans and budgets that are typically published in a yearly basis.

TABLE III. AVERAGE AND MAXIMUM NUMBER OF RELEVANT DOCUMENTS PER WEBSITE WHERE THOSE DOCUMENTS ARE AVAILABLE

<i>Document count</i>	<i>average</i>	<i>maximum</i>
City Council minutes	142	1531
Official announcements	69	1781
Plans and budgets	4.4	27
Municipal Assembly minutes	31	284

#### B. Service delivery

In this subsection we present the results of the survey concerning service delivery. Table IV presents the percentage of municipalities for which the items in this category were

observed, for each of the four services analyzed. Both items and services were explained in the previous section.

TABLE IV. GLOBAL RESULTS FOR ONLINE SERVICE DELIVERY

Observed item	Service				
	(a)	(b)	(c)	(d)	average
Service is mentioned	53%	50%	47%	48%	50%
Information on legislation	49%	44%	42%	44%	44%
Info. on other documents	41%	36%	36%	35%	37%
Download blank form	46%	43%	41%	44%	44%
Print completed form	11%	11%	10%	11%	11%
Submit form online	3.4%	3.4%	3.8%	3.4%	3.4%
Complete transaction	0.4%	0.4%	0.4%	0.4%	0.4%
Check status online	13%	13%	13%	13%	13%

a. request for prior information regarding building;  
 b. application for licensing of building plans;  
 c. request to issue a building permit;  
 d. request to issue a permit authorizing use.

In average, in concerning online service delivery, the selected services are mentioned only in half of the municipalities' websites. Only 44% of the websites include information on relevant legislation concerning those services and only 37% mention the documents that must accompany the application. Downloadable forms are available in between 46% of the websites, for requests for information regarding building works, and 41% of the websites, for request to issue a construction permit.

The results for the other observed items are by far worst. In average, the possibility to print completed forms is available only in 11% of the websites, the possibility to submit forms online is available in only in 3.4% of the websites, the possibility to complete the full transaction online is present in only 0.4% of the websites and the possibility to check the status of a previously submitted form is available in only 13% of the observed websites.

### C. Service maturity

In this subsection we present an analysis performed using a maturity scale based on the one used by the European Commission to measure online sophistication and full online availability of e-government services [15]. This analysis is included for comparability with other studies. Four maturity stages, from Stage 1 to Stage 4, were used: information; one-way interaction; two-way interaction; and transaction. An additional Stage 0 was used to classify the absence of a web site. The fifth stage used by the European Commission – targetisation/automation – was not included because it is not directly observable with our methodology.

Table V depicts the correspondence between European Commission stages and our own observations.

TABLE V. CORRESPONDENCE BETWEEN EUROPEAN COMMISSION MATURITY LEVELS AND OBSERVED ITEMS

EC stage	EC description	Observed item
Stage 1	Information	Web site exists
Stage 2	One-way interaction	Download blank form
Stage 3	Two-way interaction	Submit form online
Stage 4	Transaction	Complete transaction
Stage 5	Targetisation/automation	---

The graph in Figure 2 depicts the percentage of municipal websites in each stage, according to the European Commission classification. Taking into consideration the average for the four services, 96.6% of the Portuguese municipalities are at Stage 2 or under: 40.6% at Stage 2, 54.7% at Stage 1 and 1.7% at Stage 0. Only 3.0% reach Stage 3 and only 0.4% reach Stage 4.

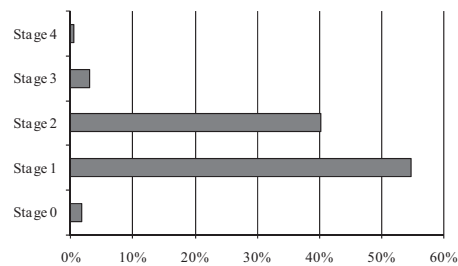


Figure 2. Service sophistication according to the EC classification

Giving weights 0, 1, 2, 3 and 4 to each of the successive maturity stages, the global maturity level of the observed municipalities computes as 1.46. This result is lower than the value of 1.86 obtained in 2007 by Santos and Amaral [38]. This difference is justifiable because of the different methodologies used, namely the slightly different maturity stages and the different services that were analyzed.

## IV. DISCUSSION

This study included 239 valid observations, representing approximately 78% of the Portuguese municipalities. Despite the dimension of the sample, results cannot be extrapolated to the entire population because the sample is not representative. This is due to the fact that the municipalities included in the sample were selected because of their previous participation in e-government development projects. This option was taken because we wanted to assess the effects of those projects in the dissemination of information and online service delivery by local government. Naturally, worst average results could be expected if all municipalities were considered.

The results of the survey seem to indicate medium level development for information dissemination through the municipalities' websites: for 65.7% of the municipalities all types of documents were available (71.1% if only City Council documents are considered). However, considering the

investment made in e-government development in the past decade, better results could have been expected. This is especially evident if we take into account that there is not much technological or organizational complexity in making available through the web documents that by definition are already accessible to the public.

Concerning the possibility to submit complaints through the web, the results are also under what could be expected: only 60.7% of the observed municipalities included this item in their website. The same is true in relation to attendance through Skype and/or MSN Messenger (only 3.8% of the municipalities), although in this case it can be argued that specialized human resources must be involved and that the demand may not always justify the offer.

The results of the survey also indicate that online service delivery remains substantially underdeveloped in Portuguese municipalities. Indeed, only half of the observed websites had mentions to the analyzed services and only 44% of the websites had downloadable forms for those same services. More important, only 3.4% of the websites offered the possibility to submit the forms online and only 0.4% offered the possibility to conclude the full procedure online. As a consequence, the global maturity level of the observed municipalities computes as 1.46 in a maximum score of 4. This cannot be considered a good result if we take into account the investment made in the past decade and the fact that Portugal obtained the maximum achievable sophistication score for the 20 public services considered in the 2009 benchmark measurement performed by the European Commission [15].

It is also important to note that the results for online service delivery were obtained for only four out of the tens of different types of applications that citizens and businesses can request through Portuguese municipalities. Different results could be obtained if all services or different services were considered. Nevertheless, it is also true that the set of services that were analyzed represent one of the most important fields of activity of the Portuguese municipalities.

Although the results obtained for online service delivery are well below what could be expected, it can be argued that good results in this category are far more difficult to obtain than for the other items included in this study. In order to be effective, fully transactional delivery of services through the web depends upon the existence of a fully dematerialized back office and upon the availability of qualified human resources. It also depends upon the availability of adequate software solutions, since the average size and budget of the Portuguese municipalities does not favor in-house development. This is obviously much more complex and expensive than simply uploading documents to the web.

Finally, it is important to note that the survey presented in this article accesses local e-government from the supply side, i.e. the availability of local government information and services through the web. The demand side of local e-government was not considered.

## V. CONCLUSIONS

In this article we presented new data concerning the offer of local government information and services by Portuguese municipalities through the web. The survey included the observation of 239 municipal websites. The results indicate that, despite the investment made in the last decades in the modernization of local government and e-government development, Portuguese municipalities still exhibit medium level development in what relates information dissemination through the web and remain substantially underdeveloped concerning online service delivery.

These results are especially relevant since Portugal is well-known for having very good classifications in international e-government benchmarks, when national level services are considered. This suggests that investment in local e-government development should be rethought so it can produce better results, at least as seen from the client's point of view.

Although the subject could be further studied, the results also suggest that a cultural breakthrough is needed in order to take full advantage of new technologies in government-to-citizen interactions at the local level in Portugal. In effect, it seems that raising the awareness of both local level politics and civil servants is essential to redirect investments and actual development to achieve more client observable results in terms of e-government.

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## REFERENCES

- [1] D. Holms, *E-gov: e-business strategies for government*. London: Nicholas Brealey Publishing, 2001.
- [2] R. Silcock, "What is e-government?" *Parliamentary affairs*, vol. 54, pp. 88-101, 2001.
- [3] H. C. Relyea, "E-gov: introduction and overview," *Government Information Quarterly*, vol. 19, pp. 9-35, 2002.
- [4] C. Codagnone and A. Wimmer, Eds., *Roadmapping eGovernment research: visions and measures towards innovative governments in 2020*, IST Project eGovRTD2020. Clusone: eGovRTD2020 Project Consortium, 2007. Available in <http://www.egovrtd2020.org/EGOVRTD2020/FinalBook.pdf>, last accessed February 11, 2011.
- [5] Delloit Research, *At the dawn of e-government, the citizen as a customer*. New York: Delloit Consulting, 2000. Available in <http://www.egov.vic.gov.au/pdfs/e-government.pdf>, last accessed February 5, 2011.
- [6] C. H. Baum and A. Di Maio, *Gartner's four phases of e-government model*. Gartner Group, 2001.
- [7] J. S. Hiller and F. Bélanger, *Privacy strategies for electronic government*. Arlington: PricewaterhouseCoopers, 2001. Available in <http://www.businessofgovernment.org/sites/default/files/PrivacyStrategies.pdf>, last accessed February 5, 2011.
- [8] K. Layne and J. Lee, "Developing fully functional e-government: a four stage model," *Government Information Quarterly*, vol. 18, pp. 122-136, 2001.

- [9] C. G. Wescott, "E-Government in the Asia-Pacific Region," *Asian Journal of Political Science*, vol. 9, pp. 1-24, 2001.
- [10] M. J. Moon, "The evolution of e-government among municipalities: rhetoric or reality?" *Public Administration Review*, vol. 62, 424-433, 2002.
- [11] S. A. Ronaghan, *Benchmarking e-government: a global perspective*. New York: UNDPEPA-ASPA, 2002. Available in <http://unpan1.un.org/intradoc/groups/public/documents/UN/UNPAN021547.pdf>, last accessed February 5, 2011.
- [12] D. M. West, "E-Government and the transformation of service delivery and citizen attitudes," *Public Administration Review*, vol. 64, pp. 15-26, 2004.
- [13] K. Siau and Y. Long, "Synthesizing e-government stage models, a meta-synthesis based on meta-ethnography approach," *Industrial Management & data Systems*, vol. 105, pp. 443-458, 2005.
- [14] K. V. Andersen and H. Z. Henriksen, "E-government maturity models: extension of the Layne and Lee model," *Government Information Quarterly*, vol. 23, pp. 236-248, 2006.
- [15] Smarter, Faster, Better eGovernment, 8th Benchmark Measurement. Brussels: D. G. Information Society and Media, November 2009. Available in [http://ec.europa.eu/information\\_society/europe/i2010/docs/benchmarking/egov\\_benchmark\\_2009.pdf](http://ec.europa.eu/information_society/europe/i2010/docs/benchmarking/egov_benchmark_2009.pdf), last accessed February 5, 2011.
- [16] United Nations e-government survey 2010, leveraging e-government at a time of financial and economic crisis. New York: UN Publishing Section, 2010. Available in <http://unpan1.un.org/intradoc/groups/public/documents/un/unpan038851.pdf>, last accessed February 5, 2011.
- [17] M. Holzer, M. B. You, A. Manoharan, *Municipalities Worldwide (2009), A Longitudinal Assessment of Municipal Websites Throughout the World*. Newark: Rutgers, 2009.
- [18] D. J. Calista, J. Melitski, M. Holzer, and A. Manoharan, "Digitized government in worldwide municipalities between 2003 and 2007", *International Journal of Public Administration*, vol. 33, pp. 588- 600, 2010.
- [19] G. P. Dias and J. A. Rafael, "Proposal for a platform for the integration into public administration," in *Proceedings of the 1<sup>st</sup> Iberian Conference on Information Systems and Technologies*, vol. 1, M. M. Cunha, A. Rocha, Eds. Barcelos: IPCA, 2006, pp. 179-194.
- [20] J. Pascoe, H. Rodrigues, C. Ariza, "An investigation into a universal context model to support context-aware applications," in *On the Move to Meaningful Internet Systems 2006: OTM 2006 Workshops, Lecture Notes in Computer Science*, vol. 4278. Springer, 2006, pp. 1884-1893.
- [21] G. P. Dias and J. A. Rafael, "A simple model and a distributed architecture for realizing one-stop e-government," *Electronic Commerce Research and Applications*, vol. 6, pp. 81-90, 2007.
- [22] R. Gomes and J. Ribeiro, "Use of Web Services in e-government information systems, a case study," in *Proceedings of the 2009 International Conference on Information Management and Engineering*. IEEE, 2009, pp. 475-480.
- [23] H. Gomes, A. Zúquete, and G.P. Dias, "Citizen Controlled Exchange of Information in E-government," in *WEBIST 2011, Proceedings of 7th International Conference on Web Information Systems and Technologies*, in press.
- [24] F. Marques, G. P. Dias, and A. Zuquete, "Security concerns in eGovernment agent-based interoperability," in *Electronic Government: Proceedings of ongoing research and projects of EGOV 09, 8th International Conference, EGOV 2009*, H. J. Scholl, M. Janssen, R. Traunmüller, M. A. Wimmer, Eds. Linz: Trauner Druck, Schriftenreihe Informatik # 30, 2009, pp. 197-204.
- [25] N. Teodoro and C. Serrão, "Web applications security assessment in the Portuguese world wide web panorama," *Web Application Security, Communications in Computer and Information Science*, vol. 72. Springer Verlag, 2010, Pages 63-73.
- [26] G. P. Dias and T. Narciso, "Analysis of the potential for organizational interoperability improvement in local government," in *Systems and Information Technologies, Proceedings of the 5<sup>th</sup> Iberian Conference on Information Systems and Technologies*, vol. 1, A. Rocha, C. F. Sexto, L. P. Reis, M. P. Cota, Eds. Rio Tinto: AIST, 2010, pp. 167-172.
- [27] R.P.C.do Nascimento, J.A.C. Martins, J.M.S. Pinto, "XML family skills used by FLOWPASS," *WSEAS Transactions on Computers*, vol. 4, pp. 591-596, 2005.
- [28] L. V. Tavares, P. Silva, "An electronic social network to market topics of public interest: Net@INA", *Proceedings of the 2006 international conference on digital government research, ACM International Conference Proceeding Series*, vol. 151. New York: ACM, 2006, pp. 458-459.
- [29] M. Tavares, "The use of cybergenres as a communication and knowledge management process in local government", *Proceedings of the 26th annual ACM international conference on Design of communication*. New York: ACM, 2008, pp. 283-284.
- [30] G. P. Dias and J. M. Moreira, "Transparency, Corruption and ICT," in *Transparency, and Information and Communication Technology: Social Responsibility and Accountability in Business and Education*, A. Vaccaro, H. Horta and P. Madsen, Eds. Charlottesville: Philosophy Documentation Center, 2008, pp. 151-160.
- [31] M. Rodrigues, G. P. Dias, and A. Teixeira, "Human language technologies for e-gov", in *WEBIST 2010, Proceedings of the 6th International Conference on Web Information Systems and Technology*, vol. 2. INSTICC, 2010, pp. 400-403.
- [32] M. Rodrigues, G. P. Dias, and A. Teixeira, "Automatic Extraction and Representation of Geographic Entities in eGovernment," in *Systems and Information Technologies, Proceedings of the 5<sup>th</sup> Iberian Conference on Information Systems and Technologies*, vol. 2, A. Rocha, C. F. Sexto, L. P. Reis, M. P. Cota, Eds. Rio Tinto: AIST, 2010, pp. 160-163.
- [33] M. Rodrigues, G. P. Dias, and A. Teixeira, "Knowledge Extraction from Minutes of Portuguese Municipalities Meetings", in *Fala 2010, Conference on Speech Technology & II Iberian SLTech, Speech and Language Technologies for Iberian Languages*, C. G. Mateo, F. C. Diaz, F. M. Pázó, Eds. Vigo: Universidade de Vigo, 2010, pp. 51-54.
- [34] L.V. Lapão, R. S. Santos, M. Góis, P. D. Silva, "Healthcare internet marketing: Developing a communication strategy for a broad healthcare network," *ICEGOV, ACM International Conference Proceeding Series*, vol. 232, T. Janowski, T. A. Pardo, Eds. New York: ACM, 2007, pp. 291-295.
- [35] N. Rodousakis and A. M. dos Santos, "The development of inclusive e-Government in Austria and Portugal: A comparison of two success stories," *Innovation*, vol. 21, pp. 283-316, 2008.
- [36] A.C. Sanz, J.C. Neves, J. N. Valente, "A conceptual model of e-Local Government," in *Systems and Information Technologies, Proceedings of the 5<sup>th</sup> Iberian Conference on Information Systems and Technologies*, vol. 2, A. Rocha, C. F. Sexto, L. P. Reis, M. P. Cota, Eds. Rio Tinto: AIST, 2010, pp. 123-127.
- [37] P. Costa, A. Vasconcelos, and J. Tribolet, "SIMPLEXIS: Evaluating eGov Measures Using an Information System Architecture Approach," in *Proceedings of the 4th European Conference on Information Management and Evaluation*. Kidmore End: Academic Conferences, 2010, pp. 462-466.
- [38] L. Santos and L. Amaral, *Presença na Internet das câmaras municipais portuguesas em 2007, estudo sobre local e-government em Portugal*. Guimarães: Gávea, Universidade do Minho, 2007. Available in <http://repositorium.sdum.uminho.pt/bitstream/1822/8443/1/EstudoCamaras2007.pdf>, last accessed February 10, 2011.