Maturity and Evolution of E-Government Portals in Central America: A Three-year Assessment 2011-2013

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ABSTRACT
The construction, deployment and delivery of Internet citizen portals does not necessarily follow the same process in developed and developing countries and there is not enough research about less developed nations. These government-wide websites could potentially become the gateways for citizen participation and collaboration with government. This paper applies a multi-dimensional evaluation model to the national citizen portals of Central American countries in three consecutive years (2011-2013) and compares its results with demographic and economic data in order to provide some of the necessary knowledge about this phenomenon. Using a model that was first used in 2005 for evaluating Mexican state portals, a ranking is generated for the 26 Central America countries.

Categories and Subject Descriptors
B.3.4 [**Reliability, Testing, and Fault-Tolerance**]: *Diagnostics, Error-checking*; C.4 [**Performance of Systems**]: *Measurement techniques*

General Terms
Measurement, Performance, Reliability, Human Factors, Standardization, Theory, Legal Aspects, Verification

Keywords
Central America, e-government portals, metrics, e-government, assessment

1. INTRODUCTION
E-government implementation has reached all levels of government. As a way to improve public administration, the use of information and communication technologies (ICT) has become one important trend. However, the development and potential impacts of these tools and applications have not happened equally in all regions. For instance, Central American nations have lower levels of interaction with ICT and technology caused by infrastructure limitations, budget limitations or lack of knowledge about these technologies [1][2][3]. The problem of e-government implementation has been studied in several ways, from the e-readiness perspective to the ranking or evaluation of several issues – e-participation, interoperability or organizational – leading this to an e-government divide, that reflects e-government gaps among the countries of a region [4]. In addition, Central American countries are some of the nations that truly need to achieve the benefits from e-government. These technologies have the potential to help them to interact with citizens, share information, collaborate with other countries, save costs, and improve their organizational capabilities on issues such as border control, terrorism, migration, and drug dealing. This transnational information sharing is another e-government trend that will be achieved in other countries, pushing the Central America region to also overcome this challenge [5][6].

A new kind of electronic government is reaching the Latin American region and some scholars are now doing research on the institutional impact of e-government [7], as well as on the adoption of e-government [8] in some Latin American countries such as Mexico, Argentina, Dominican Republic, and Brazil, among others [9][10]. However, there is not enough research that measures and evaluates e-government in Central American nations. Practical recommendations to improve these countries' level of e-government and the functionality of their portals are also needed. This paper presents preliminary results of an ongoing research that measures the national portals of Central American countries using a multidimensional evaluation model based on the evolutionary approach and initially developed in 2005 for the Mexican e-government state portals.

We evaluated the portals of Central American countries in 2011, 2012 and 2013 and this paper presents the preliminary results of this three-year assessment effort. The paper is divided in five sections, including these introductory comments. Section two presents a review of recent literature on assessment models and presents some advantages and limitation of the evaluation model we propose. Section three describes the research design and methods for the three-year evaluation. Section four summarizes the main findings and compares the results of the three years. Finally, section five provides suggestions for future research.

2. LITERATURE REVIEW
In order to understand the assessment of e-government portals, we must consider state websites as government-citizen communication systems via an electronic device and the Internet [11]. There are different models that explain the processes of development and evolution of government Internet sites [12]. In recent years, different approaches to understand and evaluate e-government have also been proposed ([13], [14] and [15]). One of the most frequently used approaches is the evolutionary perspective, which creates stages and analyzes e-government initiatives according to the characteristics and technical features found in each of these stages (i.e., presence, information, integration).

This approach has the assumption that there is an evolution towards electronic government [16], [12], [17]. Some authors contend that each one of the stages is already electronic government. Others delimit in which phases a government can be considered truly electronic. Recent research demonstrates that evolutionary approaches are useful to understand and evaluate e-government phenomena, but they also have important limitations [14], [18], [19]. The evolutionary approach is useful for the evaluation of web portals because it attempts to measure the degree of innovation and provides clear guidance for the development and improvement of government websites.

However, evaluating e-government initiatives, including web portals, is more difficult because they can have characteristics and features identified with multiple stages and different degrees of maturity. There are several limitations identified for the evolutionary approach followed on this research. For instance, Bannister questions if the benchmark promotes the progress of e-government; or what is the purpose of the benchmarking? [20]. Goldkuhl and Persson address directly to the stage model: Are higher stages inherently better than lower stages? [21]. Finally, Kunstelj and Vintar propose a different way to assess e-government development based on reasonable holistic principles rather than a stage model [22]. However, models based on the evolutionary approach could be multidimensional and relatively comprehensive [14].The evaluation model used in this paper considers multiple elements as complementary components rather than consecutive stages, also are proposed as complementary components, table 1 explain briefly these components.

3. METHOD

Based on seven years of experience using and refining an assessment model for government portals, we evaluated the Central American countries in 2011 [23]. For this paper, we evaluated the portals again in 2012 and 2013 in order to compare differences and similarities between the three years. In this way, the 26 Central American national web portals were evaluated on August 2011, February-March 2012 and May 2013. Following the original assessment tool, the features and content of the portals were measured using 143 questions clustered into five components, and an additional component, Style and Design, which was not considered for the ranking. Each government portal was evaluated in a 60-minute session. We made a pilot review of potential portals, collecting different URL's, and make sure that for each country we obtained the official government website and not a tourism-related or other kind of website. Also we collected socio-demographic data from 2009 to 2011 in order to make comparable data for the 26 Central American countries analyzed here [24]. Table 1 briefly describes these components and gives an example of the questions used to assess each one of them.

4. PRELIMINARY FINDINGS

This section describes the main findings and a comparison of the results of the evaluation performed to the Central American countries.

Table 1. Components of the Evaluation Model

Component	Description
Information	Greater number of web pages: Statewide portal as the entry point with links to most of the state pages. More dynamic information (frequent updates).
	Example: The portal can be showed in multiple languages (foreign or native).

Interaction	Forms that can be downloaded. Use of search engines. Two-way communication through electronic mail Use of chats, forums or other forms of interactive communication (service related).
	Example: It shows a search engine (internal or external).
Transaction	On-line services (secure and completely online), including electronic payments (e.g., credit cards). Portal organized according to people's needs instead of government structures.
	Example: It clearly distinguishes complete and incomplete online services.
Integration	Portal with a single point of checkout (multiple agencies, different functions, different levels of government).
	Example: Services are available for mobile devices similar to those offered directly in the portal.
Political Participation	Electronic Vote, online participation.
	Example: The electronic voting space allows authentication.
Style and Design	Format, usability, downloading speed, etc.
	Example: It indicates the location or hierarchical tree of internal pages (breadcrumbs).

There are some clear changes in the evaluation when comparing the results from the last three years. Same than 2012, the websites of Jamaica and Turks and Caicos Islands could not be measured because they were not available during the time this research took place. Only one country kept about the same level of functionality (El Salvador). In 2012 sixteen countries (61.5%) obtained a lower score in comparison to 2011 and seven countries (27%) increased their score in 2012. This year, fifteen countries (58%) increased their score, nine countries (35%) decreased and two countries (8%) were not assessed (see Table 2).

Most of the changes from 2012 to 2013 are important. For example Puerto Rico now in the first place climbs with more than ten points compared to the previous year; Cayman Islands – second place – achieved 18 points more on his assessment compared to the previous year. Also Nicaragua and Cuba, usually in the last position, have an important increase of four points average compared to 2012. An interesting case is Barbados, which reaches 21.36 points in the scale for 2013, an increase of three times the value of the previous assessment (in 2012 Barbados got only 6.79 points).

Table 2. Ranking of Central American Countries

#	COUNTRY	2011	2012	2013
1	Puerto Rico	29.03	23.65	34.72
2	Cayman Islands	16.93	10.64	28.26
3	Dominica	17.76	17.49	26.23
4	Guadaloupe	31.74	14.19	24.59
5	Grenada	22.99	17.64	23.59
6	Martinique	11.76	23.42	22.36
7	Bahamas	19.85	31.19	22.35
8	Dominican Republic	16.83	11.88	22.03
9	Barbados	15.21	6.79	21.95
10	Honduras	13.39	22.1	21.82
11	Guatemala	12.25	15.88	21.36
12	St. Kittis and Nevis	19.52	9.6	19.31
13	Costa Rica	14.78	21.58	18.84
14	Panama	24.72	21.63	17.44
15	El Salvador	18.49	18.41	17.27
16	Belize	13.88	10.78	17.18

17	Aruba	14.92	12.65	15.93
18	Antigua y Barbuda	17.75	17.06	15.49
19	Trinidad and Tobago	21.79	22.86	15.19
20	St. Vincent and the Grenadines	17.35	12.6	14.61
21	Cuba	12.24	7.65	13.11
22	Nicaragua	4.98	8.19	12.93
23	Virgin Islands	8.11	8.99	12.28
24	Saint Lucia	12.6	11.38	10.51
25	Jamaica	11.89	0	0.00
26	Turks and Caicos Islands	11.9	0	0.00

A different case is Martinique, Bahamas, Saint Lucia, Costa Rica and Panama that lost points – more than ten points – from the previous assessment to this one.
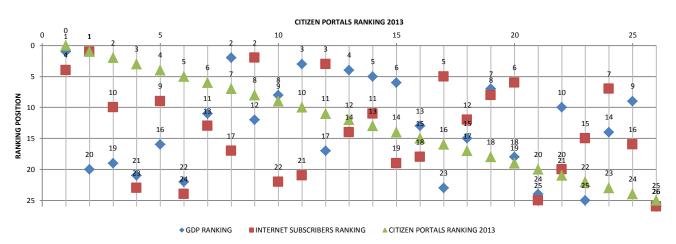
The global average of the ranking 2013 is 18.05 points, four points more than 2012 (14.55) and two points more than the previous ranking in 2011 (16.64 points). As a general fact, some portals had virtually no changes from 2012 to 2013; this lack of dynamism could influence the citizens' perception of e-government and lower the possibilities for the current portal to

quality of government portals. In contrast, Jamaica and Turks and Caicos's low or none increase of Internet subscribers probably reflects the non-existence of an internet portal for their governments.

On the other hand, we considered the GDP at purchaser's prices, which is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. This indicator gave us the idea of development in terms of economic growth; in this case Puerto Rico is the most developed nation within the 26 countries assessed (See Graph 1) and the first place of this ranking. However, Dominican Republic and Guatemala, both with a relatively high GDP and population, they still have a medium score in their portals (8th and 11th place in the 2013 ranking).

Overall, Guatemala is an interesting case, because it has relatively high numbers in population, phone lines, Internet users and GDP, but its portal is ranked on 11th place in the 2013 ranking. It is also clear that the three countries with the highest percentage of communications, computers and other services, Aruba, Jamaica and Bahamas, as touristic destinations, are not guiding their

Figure 1. Citizen portals ranking 2013, GDP ranking (2009-2011) and Fixed broadband internet subscribers ranking (2009-2011).

have a good score for the subsequent years.

This year, to provide and in-depth analysis and comparison among countries; we collected statistic data that could influence the portals level of maturity. To get a clear trend on the indicators, we compared data from 2009 to 2011. Variables were: Total Population, Communications and technology, Mobile phones, Phone lines, Internet subscriptions, Internet users and GDP. Also countries with no data available were not included in the analysis. Puerto Rico and Caiman Islands appear with the highest amount of subscribers, within the top five, similar situation to the 2013 assessment ranking. However, St. Kittis and Nevis, Barbados and Aruba, countries with a considerable amount of Internet subscribers, have not achieved yet a higher level of scores in the portal evaluation.

The case of Barbados that increased the number of internet subscribers and also the position on the portals ranking could be an indicator that more internet users could promote or impulse the

efforts to improve their national portals to communicate to their citizens, but to provide touristic information. This is to a certain degree expected, but improvements to their services to citizens and other stakeholders are also expected.

5. FINAL COMMENTS

The purpose of this paper is to report preliminary results. A multi-dimensional evaluation instrument was applied to 26 Central American countries for the last three years. This year assessment shows progress and changes in all components among the different countries. There is a clear maturity in some the portals, but also important loses in others. However, most of the components included in the evaluation obtained higher average scores than in 2012. In addition, countries in high position in the ranking are the ones that have more internet subscribers and/or a high GDP.

To be more specific on the importance of economic and social analysis compared to the evolutionary approach of the portals, Cuba is a country with one of the highest total populations, but

low Internet users and communications technology, which could explain why the national portal has suffered minimum changes and continues to be at the lowest levels of the raking. Due to the nature of the methodology used for this assessment, there were several issues experienced when ranking the countries. Certain questions might have had different interpretations according to the citizen's experience, for example, the presence of a visual tool cannot guarantee the quality of the service offered or the usefulness of the portal. The questionnaire could be reviewed and revised to cover these issues in further studies.

These preliminary findings are part of an ongoing research effort that attempts to understand e-government implementation in the Central America region. Further research is needed to understand the potential causes of the differences and similarities identified in these variables. A correlation study among variables and countries is our next step on this analysis, to understand more clearly the relationships among technological variables and socio-economic variables. Also a quantitative approach that correlates multiple organizational, institutional and contextual variables with the general score and each individual component of the ranking could be a next step to understand the different realities of these countries. In depth case studies, using a qualitative approach could also help to understand some details of the countries that improved or obtained a lower score in 2013 like Barbados or Costa Rica.

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