DEVELOPMENT OF E-GOVERNMENT IN ST. PETERSBURG: EVALUATION OF WEB SITES PERFORMANCE AND USABILITY

Anastasia Golubeva\textsuperscript{1}, Irina Merkuryeva\textsuperscript{2}, Nikita Shulakov\textsuperscript{3}

Abstract

This paper analyzes functional performance, effectiveness and usability of St. Petersburg government sites. Investigation of the level of web penetration, functional advancement and user-friendliness of selected sites under external approach reveals visible variation in accessibility and usability, implying the need for development of interactive elements. Internal evaluation is suggested for a strategic approach to web sites improvement aimed at the integration of agency network presence.

1. Introduction

Digital technologies serve as a basic source of transformation in economies and societies around the world; development of modern information communications technologies (ICT) augments the competitiveness of national economies and contributes to global integration processes. During the last few years the rapid spread of ICT lead to a visible increase in private sector efficiency. The wide expansion of the internet has provided ample opportunity for the growth of the electronic community. The public sector cannot stand aside of these processes. Requirements for 21\textsuperscript{st} century governments are stated in terms of “good governance” demanding democratic, responsive, efficient, participative, inclusive and transparent policy-making. Internet-based technologies not only modify the habitual functions of public agencies, but also introduce irreversible changes to the fundamental relations between government agencies and the public. Virtually all administrative reform programs are integrated with e-government concepts. People turn to on-line services seeking information that would be too costly or time-consuming to obtain in a traditional manner. Programs and projects related to the e-government phenomena are developing worldwide, and Russia is no exception in this process.

Among the first signs of e-government development in Russia is a rapid growth of the number of online government agency representatives. These establishments include web portals for federal and regional governments, sites of executive authorities and numerous informational and educational initiatives. Unfortunately, since the ongoing projects of government internet endorsement are often at the very beginning stages, most efforts are spent on project design, and much less is done for strategy elaboration, goal setting and monitoring of these project results.

Our research is focused on the shortcomings associated with this design-based approach, which can be summarized as an overall deficiency of strategic planning in web site development and low attraction of evaluation and monitoring procedures. Although Russian authorities have little or in some cases no experience with information technologies, we already know from non-government structures that evaluation of web site performance is supposed to be done along with web design at the very beginning of the project and to be maintained continuously thereafter. Development of web sites is not self-sufficient; it is supposed to be a user-oriented approach where visitor satisfaction is a key determinant for project evaluation. For this reason, the purpose of our research is to develop a tool for efficiency and usability measurement of government web sites.

The remainder of this paper contains several sections. Section 2 provides background on the general trends in Russian e-government development. Section 3 describes the results of federal and local initiatives implemented in the city of St. Petersburg and analyzes the major deficiencies of the current policies and solutions. Two approaches to the assessment of government web site performance and usability — internal and external evaluation — are suggested in Sections 4 and 5; implementation of external evaluation procedures is demonstrated for a sample of functional executive committees’ web sites.

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sites. Section 6 concludes with recommendations for further development and promotion of the city government agency web sites.


The need for a systematic approach to the development of e-government structures was first formally recognized by Russian policy-makers in 2002, when the federal program “e-Russia, 2002-2010” was adopted. Promotion of e-government principles was one of the top priorities identified by the program along with establishment of the proper regulatory and legal environment for ICT, for the dissemination of internet infrastructure and for e-education. The major goals of the program were to increase economic efficiency in the public and private sectors, to expand the usage of information technologies in the government departments, and put most of the regular government functions online. According to the original schedule, by 2010 up to 65% of all internal and at least 40% of inter-departmental communications at various federal, regional and local agencies were to be conducted electronically (Skiden, 2003).

The program stimulated amazing changes at various government levels. The first stage of “e-Russia” implementation was marked by large-scale investment into computer equipment, establishment of intranet and G2G communications systems, first launches of e-procurements and development of internet portals for federal and regional authorities.

Annual ICT expenditures in most government departments grow steadily, although these growth rates still remain behind the overall ICT market. The major funding source for ICT introduction is the federal budget (76%), supplemented by external loans (4%), non-budget funds and technical aid (20%). The “e-Russia” program contributes only about 15% of overall ICT investments; in relative terms, this amount represents about 0.2% of the GDP or 1% of federal budget expenditures (Shalmanov, Chachava et al., 2004).

When attempting to evaluate the penetration of ICT in the country governance, one should remember that in 2001 only 20% of Russian ministries and federal departments were represented on-line. By 2004 the situation changed significantly — rapid growth of the number of department web sites is considered as one of the main achievements of “e-Russia.” Some of the web sites developed within the last few years are worthy of mention here, including automatic management systems introduced by the Ministry of Railway Transport, the State Customs Committee and the Ministry of Taxation. The government bodies reckoned as the leaders in ICT investments and efficiency are shown in Table 1. It can be readily seen from the table that the most efficient investment programs are run by the departments that perform financial or property management functions; as it follows from further analysis, the same pattern is observed on the regional level in the case of St. Petersburg.

Table 1: Federal Agencies ICT Investments and Efficiency, 2001-2003

<table>
<thead>
<tr>
<th>Rank</th>
<th>Department</th>
<th>Points*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ministry of Taxation</td>
<td>76</td>
</tr>
<tr>
<td>2</td>
<td>State Committee on Customs</td>
<td>76</td>
</tr>
<tr>
<td>3</td>
<td>Ministry of Railway Transport</td>
<td>72</td>
</tr>
<tr>
<td>4</td>
<td>Ministry of Finance/Treasury</td>
<td>60</td>
</tr>
<tr>
<td>5</td>
<td>Ministry of Education</td>
<td>54</td>
</tr>
<tr>
<td>6</td>
<td>Ministry of Property</td>
<td>48</td>
</tr>
<tr>
<td>7</td>
<td>Ministry of Communications/ Ministry of Economic Development and Trade</td>
<td>44</td>
</tr>
</tbody>
</table>

* Points were assigned based on expert opinion, internal agency data and other information sources. The numbers shown were determined as total ITC expenditures multiplied by an expert efficiency ratio; points range from 0 to 100.

Source: CNews Analytics

The growing interest in implementing new electronic technologies into the governance of the country was further supported by Russian administrative reforms that mandated federal agencies to provide immediate public access to information on their activities, including legislation. Meeting these requirements inevitably leads to bringing the government web sites to the standards of transparency and
However, some obstacles arise in the course of this process. Although, during 2003, 14 ministries and departments increased the amount of information provided by 1.5 - 2 times, no visible changes occurred in the information content and structure of 15 major department websites. As a result, by the end of 2003, only 6 ministries and departments met openness requirements.

The federal e-Russia program was supported by the corresponding regional-level legislative initiatives. An experimental network of regional internet portals was run in 7 regions: Kaliningrad, Novgorod, Perm, Tula, Cheliabinsk, Khanty-Mansiysk and St. Petersburg. Yet, the regional initiatives develop slower due to additional obstacles such as lack of funding, an inconsistent legislative base and the absence of technological standards and information supply rules.

Vacancy and opposition to electronic solutions observed in some federal agencies along with an insufficient recourse base at the regional level warn against excessive optimism in the ICT area. Even the most advanced economies often claim e-governments as inefficient due to high costs. These programs require enormous initial investments that might never be paid back. Bringing public-government relations on-line might not be demanded, especially in countries with low internet penetration and a digital divide between different areas or population groups.

Still, in the case of Russia, there are fierce arguments in favor of further e-government development. In a vast country, internet technology can facilitate overcoming distances, time and communications barriers, including provision of direct access and connection to central government agencies. Russia has a huge potential for ICT sector expansion. Internet users already represent 10% of the adult population in urban areas, which is a critical penetration point — this barrier is used as an indicator of mass consumption for any technology and drastic market growth expected afterwards. This is far below the standards of the countries of Western Europe and Northern America, but the market is expanding at considerable rates. In 2003, the number of internet users increased by 25% while internet traffic grew by over 180%; similar trends are taking place in the registration of new domains (Shalmanov, Popova, et al., 2004).

Based on these arguments, we believe that the key requirement for successful and efficient e-government development is ensuring and stimulating broad public involvement. For this reason, this paper focuses on the e-government components classified as government-to-consumer (G2C) and government-to-business (G2B) relations. These are the components working beyond the scope of internal government operations and which require public demand for internet technologies as a way to obtain certain goods or services from government agencies.

We consider user friendliness of government web sites as a key feature making citizens choose the electronic communication mode with government agencies. This property stimulates demand and justifies investments into ICT. We restrict further considerations to the case of St. Petersburg to illustrate the opportunities of regional e-governments and to investigate the efficiency of the recent undertakings.

3. Regional e-Government Developments: the Case of St. Petersburg

In this section, we describe the developments that federal initiatives get at the regional level taking St. Petersburg as an example. We outline the legislative infrastructure and historical trends of e-government achievements in the city, give a sketch of different agencies on-line presence and evaluate functional performance of regional executive committee web representatives.

3.1 Legislative and Historical Background

There are strong prerequisites for e-government development in St. Petersburg, the second largest city in Russia, following Moscow in the level of information technology development. In 2003, the number of people dealing with the internet exceeded 750 thousand, and there were over 100 internet providers operating in the city.

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4 The Ministry of Taxation, the Ministry of Education, the Ministry of Defense, the Ministry of Nature, the Federal Commission for Securities and the State Nuclear Supervision Agency

5 New Economy Foundation, URL: http://www.neweco.ru/main.html?r=124&id=1047544970
The national ICT development strategy was supported enthusiastically by regional governments. The principal legislative initiatives aimed at the development of e-government in the city included the regional target program "Electronic St. Petersburg" and the strategy of transition to the information society. It is remarkable that St. Petersburg is one of the leading regions in local co-funding of ICT programs.

The structure of the St. Petersburg government comprises three traditional branches: legislative, executive and judicial. The City Assembly represents the legislative branch. The City Government headed by the Governor and Administration, which consists of 25 functional committees, 13 industrial departments and 19 territorial branches, realizes executive functions. The judicial branch incorporates the Statutory Court and magistrates. The local governance system is represented with 111 municipalities.

The above-mentioned legislative initiatives created a basis for creation of the web sites for St. Petersburg government agencies. However, prior to 2002, there was no central information resource, or an official web representative of executive authorities. Dispersed individual establishments did not follow any uniform strategy in information sharing; records for over 60% of government agencies were not listed on the web at all; the existing representatives in many cases did not carry official status.

In January, 2002, the official portal of the St. Petersburg government was launched (www.gov.spb.ru); this establishment united all city government agencies and established new requirements to internet projects developers on the volume of submitted information, use of modern technologies, and quantity of services offered on-line.

As a result of both centrally coordinated program and numerous private initiatives, by 2004 all branches and local governance were, to a varied degree, represented on-line. The official city government portal provided basic uniform information on all executive authorities; in addition, there were separate web sites for the Legislative Assembly and the Governor (www.assembly.spb.ru, www.gubernator.spb.ru). Individual executive authorities are represented on-line to a different extent with a general positive trend in the number of establishments. Figure 1 illustrates the ratio of different type agencies present on-line at the moment of the study. The highest web presence (60%) is observed among executive functional committees; territorial branches and municipal governments share second place (37%) and the level of industrial department expansion remains as low as 15%. Obviously, these statistics on web presence are closely linked to agency resources and the range of powers and functions.

Figure 1: On-Line Presence of St. Petersburg Regional and Local Government Agencies, 2004
(Ratio of the total number of agencies in the category)

Taking into consideration the fact that the highest penetration rate is observed among functional executive committees, we limit further considerations to this type of agency, keeping in mind that all evaluation techniques described below can easily be transferred to other government structures. Apart from high web presence, the nature of executive committee functions provides the broadest
opportunities for development of on-line interactions with the public, making them especially interesting for thorough investigation. We proceed further with description and assessment of the functional opportunities provided on executive committee web sites.

3.2 Functional Advancement of Executive Committees Web Sites

At the start of our evaluation, we attempted to describe the level of e-government functional development in executive committees. The purpose of this research was to locate selected agencies in the functional development stages. The theory commonly identifies a few stages of e-government evolution such as initial presence, informative stage, transaction development and complete integration (Drozhzhinov, Serikov et al., 2002). For the purpose of this paper we used the following 5-step scale to describe functional advancements of executive committee web sites:

1. Initial establishment. This stage corresponds to the original placement of an agency on-line; first-stage representatives of this type contain the most essential agency-specific information. At the very basic level it could assume a single home page creation; further developments might include provision of contact information and links to the physical government structure, visiting rules and hours, agency descriptions (information on the performed functions, history, and organization structure). Further opportunities are presentation of strategic vision, including agency mission and goal setting, information on the leaders and key persons;

2. Directory elaboration. This is the second logical development stage for an agency that has already established an initial representative when web sites are used as a “directory” providing contact information, links to the physical government divisions, descriptions of agency functions and provided services. By gradual and consistent extension of the information provided at the initial establishment stage, web sites climb to the next development level. A complete agency directory would include full-scale information on agency subdivisions, functions performed and contacts, relevant links to other federal and local government agencies, affiliated structures, mass media and cooperating organizations from the public and private sector. It often contains useful city information in the area of agency competence or even a complete phone directory;

3. Information source. Further extension of information provided forces the government agencies to offer unique data not available or problematic to obtain from other sources, such as statistical databases, legislation, official or other relevant publications. Apart from reader-oriented materials, an informative e-government gives access to downloadable forms, applications or instructions for using agency-specific services. This stage presumes development of the network representatives oriented to a transition towards continuous information updates on the web sites. To achieve this goal, agencies normally start to issue regular news and press releases; they also utilize web sites as billboards announcing calls for ongoing competitions, grants, target programs and tenders, publishing job offers and social programs reviews. Announcements are further supplemented by the results, schedules and reports on agency activity. In addition, sections for comments on hot political issues from agency officials and experts along with the answers to frequently asked questions can be published at this stage;

4. Interactions development. At this stage further development is hampered without availability of external feedback and active involvement of site users. Some solutions aimed at development of site interactivity include e-mail service, subscriptions to agency news, bulletins and site updates, organization of direct enquiries to policy-makers and appointment scheduling, elaboration of discussion forums, on-line conferences, addition of live effects, availability of on-line services using electronic forms; and

5. On-line transactions. The ultimate development stage assumes complete integration of electronic services where all agency functions can be performed through on-line systems or even incorporation of additional on-line features that are not available in the traditional mode. This includes the possibility for on-line purchases and payments via electronic system, forms and reports submission and proceeding, registration for services, participation in tenders and e-procurements.

Development stages listed above generally take place in the listed order; however, it is not exceptional that the later stages can occur to the detriment of the earlier ones. We used the suggested scale to
evaluate all 14 web sites of functional executive committees. Each site was ranked by an expert on a 10-point scale — this was the maximum score any agency could get on each of the 5 development stages. A development stage earned the highest rank of 10 if virtually all originally listed features were present on the web site at the moment of investigation. A minimal 0 score was assigned if there were no signs of relevant functions at all. Since no agency could be expected to maintain all possible features, we conclude that the development stage is “complete” if it reached the 5 point benchmark. In this section, we did not attempt to evaluate the quality of provided services or information; the fact of certain options being present on the web site was enough to earn points. We further proceed to the detailed qualitative analysis of web site options offered.

The suggested evaluation technique allowed us to place agencies according to their global network penetration degree. Given a short history of city e-government undertakings, we would expect the agencies to be approaching the third development stage serving as an information source with a slow expansion to interactivity. Formal evaluation confirms this hypothesis; Figure 2 summarizes the result of executive committee functional evaluations.

![Figure 2: Functional Evaluation of Executive Committees Web Sites: Overall Results](image)

An overall agency rating shows that the current usage of e-government potential stays at the level of about 25%. Keeping in mind a high variation between web establishments of different committees, the general picture clearly shows that there is a sufficient field for improvement even in the most developed area of initial establishment (rank 4.05), followed closely by directory elaboration (3.65) and information sources (2.72). Interactions development are at the very beginning stage with a rank of 1.70, and on-line transaction opportunities are not exploited at all. Hence, the overall picture suggests that there is no stage, even initial establishment, that can be considered as one conquered by all agencies.

Analysis of agency-specific estimates shows that there are a number of agencies that left the initial establishment stage far behind; some are done with the directory elaboration and even completing information sources development (Table 2). As follows from the table, the three leading agencies are the Accomplishment and Roads Committee, the Building and Architecture Committee and the Housing Committee. Six agencies are beyond the stage of initial establishment (ranks highlighted in bold), two are done with directory elaboration with six more being very close to this line. A group of comparatively low developed agencies sites include the Culture, Transport and Physical Training and Sports Committees.

The question to be asked is about the performance level of those functions represented at agencies sites: what is the general situation concerning which are areas most developed? The results of discussion in this section can partly be used to evaluate how close on-line representitives try to get to the users; however, this is merely an intention, and the fact that there is an offer itself does not prove that the public is actually using these options. Figure 3 shows the frequency distribution for the most popular
on-line features. In accordance with the initial development stages, the most popular options include contact information on the main body and subdivisions, extended agency descriptions in terms of organization structure, key persons and performed functions. The information development stage is mostly represented by billboards, agency-related city information, legislation databases and news publications.

Table 2: Functional Evaluation of Executive Committee Web Sites: Individual Results

<table>
<thead>
<tr>
<th>Agency</th>
<th>Initial establishment</th>
<th>Directory elaboration</th>
<th>Information source</th>
<th>Interactions development</th>
<th>On-line transactions</th>
<th>Overall rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accomplishment and roads committee</td>
<td>5.56</td>
<td>4.44</td>
<td>3.75</td>
<td>3.75</td>
<td>0.00</td>
<td>3.75</td>
</tr>
<tr>
<td>Building and architecture committee</td>
<td>7.78</td>
<td>2.22</td>
<td>4.38</td>
<td>2.50</td>
<td>0.00</td>
<td>3.75</td>
</tr>
<tr>
<td>Housing policy committee</td>
<td>4.44</td>
<td>4.44</td>
<td>3.75</td>
<td>3.75</td>
<td>0.00</td>
<td>3.54</td>
</tr>
<tr>
<td>Land use committee</td>
<td>5.56</td>
<td>4.44</td>
<td>3.13</td>
<td>2.50</td>
<td>0.00</td>
<td>3.33</td>
</tr>
<tr>
<td>Public property management committee</td>
<td>7.78</td>
<td>4.44</td>
<td>2.50</td>
<td>1.25</td>
<td>0.00</td>
<td>3.33</td>
</tr>
<tr>
<td>External affairs committee</td>
<td>4.44</td>
<td>4.44</td>
<td>3.75</td>
<td>1.25</td>
<td>0.00</td>
<td>3.13</td>
</tr>
<tr>
<td>Education committee</td>
<td>5.56</td>
<td>7.78</td>
<td>1.88</td>
<td>0.00</td>
<td>0.00</td>
<td>3.13</td>
</tr>
<tr>
<td>Economic development, industrial policy and trade committee</td>
<td>4.44</td>
<td>2.22</td>
<td>3.13</td>
<td>0.00</td>
<td>0.00</td>
<td>2.29</td>
</tr>
<tr>
<td>Information and communications committee</td>
<td>4.44</td>
<td>2.22</td>
<td>3.13</td>
<td>0.00</td>
<td>0.00</td>
<td>2.29</td>
</tr>
<tr>
<td>Physical training and sports committee</td>
<td>0.00</td>
<td>4.44</td>
<td>1.88</td>
<td>3.75</td>
<td>0.00</td>
<td>2.08</td>
</tr>
<tr>
<td>Finance committee</td>
<td>5.56</td>
<td>0.00</td>
<td>2.50</td>
<td>1.25</td>
<td>0.00</td>
<td>2.08</td>
</tr>
<tr>
<td>Culture committee</td>
<td>0.00</td>
<td>5.56</td>
<td>2.50</td>
<td>0.00</td>
<td>0.00</td>
<td>1.88</td>
</tr>
<tr>
<td>Transport committee</td>
<td>1.11</td>
<td>2.22</td>
<td>1.25</td>
<td>1.25</td>
<td>0.00</td>
<td>1.25</td>
</tr>
<tr>
<td>Tourism and resorts development committee</td>
<td>0.00</td>
<td>2.22</td>
<td>0.63</td>
<td>2.50</td>
<td>0.00</td>
<td>1.04</td>
</tr>
</tbody>
</table>

However, this approach, based on the analysis of agency web sites in terms of functions and development stages, has serious limitations. The features offered by web masters alone have low or even no meaning for the target audience if they are not user-oriented. The quality of suggested features can vary greatly limiting or extending the possibilities of actual use. At the same time, if the visitors do not want or are not ready to use the government web sites, little utility can be extracted from electronic service delivery. The users needs have to be identified and the user’s perspective should be considered at the very beginning of the web site development process; this is one of the key aspects in making information provided and services demanded meaningful.

Since the primary problems associated with e-government development is lack of consideration and strategic planning about built-in user-friendliness evaluation techniques, the following sections discuss two approaches to the evaluation of government site performance and usability based on external and internal performance measurements.

4. External Evaluation Methods

The previous sections allowed us to conclude that many government agencies have already established a net presence; they are gradually extending the range of functional opportunities as they climb identified development stages. However, web site development can not be restricted to the introduction of new functional opportunities. Only properly constructed and maintained sites would provide a visible increase in the efficiency of agency performance; in this section we are facing “doing it” versus “doing it well” prospective. The general need for tracking site quality is recognized at least by the web managers of government agencies sites; most sites exploit standard monitoring systems, such as built-in counters and visitors tracking systems from SpyLOG and HotLog, yet interviews with agency
representatives show that, in most cases, these results are not analyzed and used properly to improve site performance.

**Figure 3: Popular Features Offered on Executive Committee Web Sites (Frequencies)**

![Bar chart showing popular features offered on executive committee web sites.]

The most straightforward method that can be suggested to analyze user-orientation of the government sites is to explore open information readily available from the site itself. The basic idea of this approach is to model user experience and attitudes with a web site, including a test of services. There is some previous research developing external evaluation methods to assess user-friendliness of the government web sites (Performance Audit Report, 2002). This method assumes preliminary establishment of relevant evaluation criteria and later application of those criteria to the evaluated sites; in this case an independent expert acts as a user attempting to interact on-line with a government agency.

We suggest the following three features to be considered in order to evaluate web site user-orientation: functionality, accessibility and usability. For each feature we define a set of criteria that can be modified or used with proper weights depending on the type of government agency under consideration. When formulating criteria, we tried to avoid questions that are not easily quantifiable and can not be cleared from personal attitudes, involvement and tastes such as direct questions about design, etc. Identified criteria are examined in section 4.1.

### 4.1 Evaluation Criteria

External evaluation criteria are structured around the main features of functionality, accessibility and usability. Each feature is represented by at least 2 criteria; criteria are further broken into separate evaluated options. Table 3 outlines the entire evaluation system.

**Functionality** is the closest feature to the overall functional descriptions provided in section 3; however, in this case we go beyond just the recording of a function being present at the web site and try to give a quantifiable expert evaluation to the function performance. Functionality is measured by four criteria: audience orientation, coverage, information currency and accuracy, and interactivity. Functionality shows the extent to which a web site provides consistent, comprehensive, reliable information and opportunities for interactions between agencies and users. Criteria for functionality measurement are:

- **Audience orientation** shows how clearly an agency defines the target audience for a web site, its strategic goals, links to the physical structure and provision of initial instructions for site usage. This criterion is important, since failure to provide adequate initial audience orientation results in ongoing difficulties with further navigation;
Coverage relates stated purposes to site content. It measures the range of completeness and relevancy of services and databases offered on-site, sufficiency of full-text information provided and depth of coverage for news and current political issues. In terms of functional development stages outlined in section 3, this criteria assesses the quality of directory and information provision;

Information currency and accuracy analyzes whether the site content is relevant and up-to-date; it considers indications of last page updates, responsibility for separate pages and spelling and grammar mistakes. This criterion is of primary importance to those users looking for proof of reliability; and

Interactivity evaluates the quality of available on-line transactions and interactions, including performance of e-mail service, declaration of site downtimes and service limitations, quality of communications beyond e-mail and opportunities for open public discussions (such as online forums, conferences or message boards). Corresponding functional stages are “interactions development” and “on-line transactions.”

Table 3: External Evaluation System: Features, Criteria and Evaluated Options

<table>
<thead>
<tr>
<th>Features</th>
<th>Criteria</th>
<th>Evaluated options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Functionality</td>
<td>1. Audience orientation</td>
<td>Contact information, physical location, key persons, departments directory, visiting rules and hours, agency description (history, functions, organization structure), statement of purpose (mission, goals, target audience)</td>
</tr>
<tr>
<td></td>
<td>2. Coverage</td>
<td>Description of services, quality of databases (publications, legislature, statistics), downloadable documents, news, billboards, reports on current activity, comments from officials, phone directories</td>
</tr>
<tr>
<td></td>
<td>3. Information currency and accuracy</td>
<td>Timeliness of information updates and reviews, relevancy and consistency of content, assigned responsibility for pages, absence of grammar and spelling errors, number of pages under construction</td>
</tr>
<tr>
<td></td>
<td>4. Interactivity</td>
<td>Performance of e-mail and subscription service, intensity of interactive functions employment (inquiries to policy-makers, discussion forums, message boards, conferences), live effects, completeness of transactions (bills payments, service orders, tender participation, form and report submissions, product purchases)</td>
</tr>
<tr>
<td>Accessibility</td>
<td>1. Access to the site</td>
<td>Accessibility via city government portal and search engines, reflection of agency name in URL, descriptiveness of document titles, site retrieval time, availability at different moments</td>
</tr>
<tr>
<td></td>
<td>2. Access to site content</td>
<td>Availability of instructions for site usage, provision of alternative technologies and formats for downloadable documents, options offered to users (text vs. graphical mode, etc.), special software requirements and supply of free downloads, friendly printing options, foreign languages</td>
</tr>
<tr>
<td>Usability</td>
<td>1. Architecture, design and layout</td>
<td>Logical user-oriented content organization, readability, use of symbols, aesthetics, consistency of format, layout (organization, page length, typography, frames), advanced display features</td>
</tr>
<tr>
<td></td>
<td>2. Links</td>
<td>Relevancy of provided links, absence of dead links, descriptive comments, frequent user options</td>
</tr>
<tr>
<td></td>
<td>3. Navigability</td>
<td>Exploitation of conventional navigation models, clear identification of navigation elements, identifiable self-location, site map, distance between site points, local search engines</td>
</tr>
<tr>
<td></td>
<td>4. Metadata</td>
<td>Appropriate metatags and section headings, structure and clearness of in-body text, descriptive page titles</td>
</tr>
</tbody>
</table>
Accessibility shows the extent to which the site and its contents are available to a wide range of users with varying levels of skills and technology. Two sets of criteria used to evaluate this feature are access to the site and access to site content.

- **Access to the site** estimates the accessibility of the site from outside via the main search engines and from other government agency sites. It includes the speed of response and availability of the site at different times. A special feature is availability of back-link to the central government portal which identifies the degree of ICT policy unification and increases opportunities to find relevant information from different government agencies; and

- **Access to site content** shows how operational a site can be after being initially found and whether all sections can be easily accessed by different types of users. The relevant characteristics here are compatibility with popular web-browsers, supply of alternative operational modes for higher technologies, options for slow connection and turning off the graphics, elimination of printing problems, availability of downloadable non-standard software and provision of alternative formats for downloadable documents. Language selection also falls within this category, since lack of this option complicates the access to information for foreign or non-resident users.

Usability shows the ease and enjoyment with which users can make their way around the site looking for necessary information, products, services or communications. Four relevant criteria are listed below:

- **Architecture, design and layout** evaluate readability of pages, appropriate use of semantics and advanced display features, aesthetics and length and layout of pages. An important option is logical rather than functional organization of content around user needs; a typical example of contrast between a functional and a user-oriented approach to web site development occurs when a user is expected to be familiar with agency structure in order to use the site efficiently;

- **Links** include availability, relevance and quality of external links to other government agencies and relevant organizations such as non-government agencies, affiliated structures and mass media. It should envisage informative descriptive comments for links allowing the user to avoid inefficient wandering in irrelevant areas. It should highlight links to the new sources of information and the availability of user-tailored options such as special opportunities for frequent users, offers to subscribe to agency news and information updates, minimization of dead links and pages under construction;

- **Navigability** characterizes how easy it is to operate the site; it includes keeping users aware of their location on the site, involvement of conventional navigation models, presence of navigation links on all pages, availability of a site map, availability of built-in search engines and basic search options;

- **Metadata** and metatags provide the search engines with information about web site contents and help to find information source. We evaluated presence of metatags, availability and descriptiveness of sections headings and pages titles.

### 4.2 Evaluation Results

Evaluation criteria described in section 4.1 were applied to eight executive committee web sites. When looking at the original list of web representatives (Table 2), we omitted those sites that ranked below 2 on the functional development scale (Culture, Transport and Tourism and Resorts Development Committee). We also excluded three sites that, although maintained at agency information support, did not carry official status or only represented a very limited area of agency activities (Accomplishment and Roads, Information and Communications and Physical Training and Sports Committees). Among those mentioned, Accomplishment and Roads Committee serves as a bright example of a semi-private initiative, recognized as the best one in the course of functional evaluation.

The resulting sample is shown in Table 4; it does not carry any statistical properties, but rather provides a base for further comparisons. For the purpose of this research, we assigned equal weight to all three features when we conducted the evaluation of eight selected functional executive committee web sites. Each relevant option offered on the web site was evaluated using a 4-point scale (0 — an option is absent or its performance is not acceptable; 1 — option performance is poor or below average level,
Estimation results are presented in Figure 4. Sections a, b and c provide separate diagrams for the three features — functionality, accessibility and usability, — and section d shows overall site ranking. The lowest variation in rank is observed for site functionality; this result shows that executive committee web sites are almost equally developed in terms of quality and functions performed. On the contrary, accessibility and especially usability vary significantly serving as the major source for the overall agency-specific differences. The top ranking site for the selected type of agencies belongs to the Land Use Committee followed by Economic Development, Education and Finance Committees. The highest overall user-friendliness rank exceeds 6; on a 10-point scale this is a much better result than the one observed for functional development. This outcome is encouraging from the standpoint of strategic vision of e-government development — it is much easier to add new functions to the user-oriented web site than to fill unclaimed resource with inflated information.

Other positive aspects uncovered during detailed external examination include a sufficiently high level of legislative database development; this achievement is apparently due to mandatory openness requirements. Basic contact information is generally representative of the real situation, and most sites are accurate in terms of content consistency and lack of spelling errors. Description of agency functions and provided services is also at a high level on virtually all sites. Turning to individual comments, Education Committee can be noted for remarkably comprehensive news coverage.

The most frequent problems and corresponding directions for improvement include the lack of an explicit purpose statement by some agencies. Currency of the content often needs more attention: although news sections are among the most developed option, some agencies need to improve their presentation form. To give some examples, the Building and Architecture Committee does not give news headings; the Housing Policy Committee provides only occasional news updates. A number of agencies foresee more advanced interactive mechanisms, such as discussion forums, but these features often do not function properly and mailing options are difficult to find at certain sites (e.g., Finance Committee). City portals lack some relevant links to agency web sites and a few site names are difficult for perception and to memorize. The Economic Development Committee had a very long retrieval time and many other agencies were often unavailable in the course of the study.

In general, external usability analysis shows that the content of the web sites is relevant to the specifics and functions of the agencies considered; despite the uniform functional distribution, a high variation exists in site usability. The next section continues this discussion taking into consideration the visitor perspective on site performance.

5. Internal Evaluation Methods

The external evaluation method presented in the previous section still carries important problems in and of itself. It allows us to obtain expert information sufficient to give single-time site evaluation. Experts are acting based on the preliminary judgment about visitor qualities and preferences; however, this approach would be meaningless if the original assumptions about site visitor behavior were violated.
Ideally, a wise policy maker would like to obtain information about “real” visitors, the popular ways they make around agency site, problems and positive emotions they get during the course of G2C interactions. There are different methods used to collect information on users; the most traditional are polls and surveys (Larsen, Rainie, 2002). However, the traditional approach tends to be pricey and often provides poor results due to selection bias, high non-response rates and systematic observation errors (for example, questions about session durations would inevitably lead to answers that poorly represent reality).

Another option is to avoid surveying errors and make use of the crucial internet property: on the web we can partly track attitudes and behavior of the actual audience without the need for sampling. This section presents a visitor-oriented evaluation approach elaborated by SitePattern research and successfully implemented for private sector studies. We provide our vision of visitor values, identify the sources and parameters of government site effectiveness, discuss traditional approaches to increase effectiveness, identify typical government-specific web sites features and suggest possible solutions.

**Figure 4: External Evaluation Results**

![External Evaluation Results](image)

a) Functionality

b) Accessibility

c) Usability

d) Overall rating

**5.1 The Visitor Universe**

The web has become a place where visitors have all kinds of preferences. Some surf for mere fun, some surf for earnings, some surf to satisfy curiosity. Still, for any visitor, there is a driving force that makes them follow links, read content and interact with the web sites. This force has many faces; it is versatile and its nature is changing even within a single day. The interest for business-related sites is substituted by chats and leisure portals as the working hours are over. Some sites gain visitors, some sites lose them and some never even manage to attract visitors at all. But does this mean that some sites are more effective than others? In order to answer this question, we need to define “effectiveness” as such.

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The most common way to evaluate a web site is to look at the amount of visitors it attracts, i.e., its popularity. If we follow this logic, the government web sites are hardly popular at all. Compared with information portals or search engines, traffic is minimal. The driving force does not bring millions of visitors to read about things like law, rules and regulations, and this is mostly what the government web sites are all about. But some visitors come, those who are interested in that rather special field of knowledge. And the goal is to increase that amount of interested visitors, along with effectively delivering the information they are looking for. These two parameters in combination can be regarded as a measure of governmental web site effectiveness.

5.2 Low-Traffic Sites: Personal Approach

Let us consider the web site of some specific sector of city administration, such as the Public Property Management Committee (www.commim.spb.ru). The site is purely informational in nature, presenting a narrow field of knowledge connected with real estate, laws and regulations and it has some historic background information. The traffic on this site is rather low, so let us consider improving this parameter using traditional methods of web site promotion.

Using the traditional methods it is possible to generate traffic for such a site, if proper creativity is used in the banner campaigns and printed materials. Let us imagine that the population of the site grew to thousands of visits a day. The traditional evaluation of site popularity can be considered as high, but does it make the site more effective? In order to answer this question we need to step back a little and formulate the purpose of our site, and see what its objective is in communication with visitors. Of those, some can be mentioned:

- Delivering government property-related real estate events;
- Deliver history briefs and structure of committee;
- Easy access to contact information to authorities;
- Area of activities information;
- Information about new regulations; and
- Feedback from visitors.

So, in order to measure the success of a visit, the delivery of the information in those areas needs to be confirmed. Unlike news portals and other wide-field informational sites, the Property Management Committee is mostly interesting to those visitors who have some academic or practical background in the field of government property. The average visitor would not be interested in the special narrow information sector that is presented on site. So the campaign for attracting more visitors would probably fail, giving too low CTR. But even if it succeeded in getting visitors to the site by having a flashy creative, they will not read the information which is not interesting to them, so that the time spent on site will not be longer then 30 seconds. Direct campaigns are not effective in the case of narrow information sector area web sites.

The only important visitors of such sites are those who found the site themselves because of a special interest in the given objective areas. In fact, the majority of the small and medium business web sites have a similar pattern of being a narrow and special information sector with limited target group. The population of such sites is often very low, below 100 visits a day, but every such visit should be cherished: these visitors were looking for the site and deliberately entered it. This thoughtful choice brings a totally different quality to the visit and it is these visits that should be carefully analyzed in order to evaluate site effectiveness.

It is very important to get as much feedback from the visitor as possible. Every visitor is an important recipient of information, and the amount and quality of perception is the best performance indicator for such a site. Behavior tracking and its interpretation through a specially conducted visitor survey are the tools that can be applied here, but with one significant difference: the analysis can be even performed for every single individual or unique visitor due to the fact that the population of the site is not measured in millions. Besides, by surveying the visitors it will be possible to find information on demand to improve the content of the site.
5.3 Measure-Tweak-Measure

Although the majority of the millions of web sites are devoted to narrow and specific areas of information and have low traffic, there are no tools that are specifically designed to analyze the traffic on such sites. The modern tools use high levels of aggregation without the possibility of understanding the visitors on a personal level, or tools are just too expensive to be applied to minor traffic sites.

When addressing low traffic sites, we collect and analyze visitor intelligence data from the view-through tracker. Along with browser-based behavior trackers, this approach gives an opportunity to make precise conclusions about site effectiveness and formulate suggestions for improvement. Repeated measurements can help to optimize the frequency of updates, introduce new content on demand and bring the effectiveness and population reach to a new level. Options provided by visitor behavior tracking are discussed below.

In order to improve agency understanding of visitor behavior and make competent conclusions about site effectiveness and existing problems, it is important to know exactly what visitors did during their web site sessions. Some visitor related questions that can be answered from collected data analysis include the following:

- **Web behavior statistics**: popular paths, exit moment and points, frequencies, traffic, length of sessions, repeated visits and frequency distributions, regular visits to different sections; origins of the visits; information on requested documents;
- **Visitor electronic distribution**: the number of visits and platforms which visitors use, including browsers, connection speed and screen resolution, geographical and socio-demographic spread of users;
- **Site structure review**: recognition and understanding of site structure by the visitors, review of navigation system (identification of bad exits and orphaned pages), life cycle of the site, content wear off, identification of most popular contents and site features; and
- **Interactions promotion**: responses and origins of web-inspired e-mails and electronic forms, requested on-line transactions.

Hence, the suggested approach can be viewed as a permanent built-in monitoring system serving as a helping hand for strategic development of government agency web sites.

5.4 How Good is Your Helping Hand?

How can the visitor traffic of narrow and special information sector sites be increased? After all, the quality of the visits is only important if there are any. Of course, search engines and correct keywords are of importance, but there is another area that is of a higher interest: partner web sites and portals.

In Sweden, where the internet infrastructure is one of the most advanced in the world, and penetration of the internet in households is over 60%, about five years ago all governmental web sites had different addresses, designs and webmasters. Now the tendency is clear: all related web sites are merging and forming large portals. These portals attract visitors with versatile information in different sectors, creating a network of resources that generate cross-interest and boost traffic on all resources involved.

The effect behind such partnerships is connected to the widening of the range of subjects covered by the sites involved. One subject raises interest in another and this chain can lead to a traffic exchange across all partnerships, giving an increase in traffic to all sites involved.

“View-through” tracking technologies can reveal the traffic exchange between sites and help to make critical decisions about the content relevance: where the links work best, how much traffic they generate and what is the quality of the visits generated by the link exchange.

6. Conclusions and Recommendations

This paper analyzed development of e-government in Russia in the case of St. Petersburg. Investigation of functional advancement of city government agencies showed visible expansion of on-line penetration in the course of recent years. Yet, government agencies realize only about a quarter of internet opportunities in the improvement of G2C relations. Since the highest web presence was
observed among functional executive committees, these agencies were selected for evaluation of site performance and user-friendliness using the external evaluation technique.

The range of on-line services provided by executive committees is generally consistent with agency functions; the most popular features commonly include contact information, agency descriptions, billboards, agency-related city information, legislation databases and news publications. However, accessibility and usability of web-sites studied vary visibly. Factors that serve as an obstacle to efficient and user-friendly visits to the web sites, sometimes making them time consuming, costly or frustrating, include failure to provide a proper purpose statement, irregular content updates and the malfunctioning of certain features.

Common practical problems of government web sites comprise low traffic and unawareness of the traffic level or any other aspects of site performance by key agency representatives; immediate switches from the key figures to “technical people” suggest that there is often a lack of a strategic approach to the development of agency web resources. Numerous private undertakings, such as the web site maintained under informational support of the Accomplishment and Roads Committee can be considered as evidence of public readiness to get involved in e-communications; however, government agencies are a few steps behind, failing to satisfy the existing supply. Gradual introduction of interactive and transaction elements should change the situation.

Policy makers should further promote adoption of best practices in the field of e-government and design and develop web sites that efficiently serve user needs. Special emphasis should be placed on systematic communication with current and potential users, analysis of user behavior, and assessment of the site’s user-friendliness by the agencies as well as effective communication of key information to users. In order to follow these recommendations, we suggest an internal web site evaluation approach that can explore web site visits and the nature of these visits, in the end affecting user attitude towards the government. A need for an integrated web presence for all government agencies is identified as an ultimate purpose of government on-line integration.

7. References