

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

*Irina Merkuryeva<sup>1</sup>, Anastasia Golubeva<sup>2</sup>, Nikita Shulakov<sup>3</sup>*

## Abstract

The 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 using external approach reveals visible variation in accessibility and usability, implying the need of interactive elements development. Internal evaluation is suggested for strategic approach to Web sites improvement aimed at the integration of agencies' network presence.

## 1. Introduction

Digital technologies serve as a basic source of transformations in the economies and societies around the world; development of modern information communications technologies (ICT) augments the competitiveness of national economies and contributes to the global integration processes. During the last years the rapid spread of ICT lead to a visible increase in the private sector efficiency. Wide expansion of the global Internet network provided ample opportunities for the growth of electronic community. The public sector cannot stand aside of these processes. Requirements to the 21<sup>st</sup> century governments are stated in terms of "good governance" demanding for 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 public. Virtually all programs of administrative reforms are integrated with e-government concepts. People turn to on-line services seeking for 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 not an exception in this process.

Among the first signs of e-government development in Russia is a rapid growth of the number of on-line government agencies representatives. These establishments include Web portals of Federal and regional governments, sites of executive authorities, numerous informational and educational initiatives. Unfortunately, since the ongoing projects of government Internet endorsement are often at the very origin stages, most efforts are spent on projects design, and much less is done for strategy elaboration, goal setting and monitoring of these projects 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 sites 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 the visitors' 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 the government Web sites.

The remainder of this paper contains several sections. Section 2 provides background on the general trends of Russian e-government development. Section 3 describes the results of Federal and local initiatives implemented in the city of St.-Petersburg and analyses the major deficiencies of the current policies and solutions. Two approaches to the assessment of the government Web sites 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. Section 6 concludes with recommendations for further development and promotion of the city government agencies Web sites.

## 2. National Environment: Development and Implementation of Federal e-Government Programs

The need of 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 proper regulatory and legal environment for ICT, dissemination of Internet infrastructure and 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

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<sup>1</sup> Associate professor, Public Administration Department, School of Management, St.-Petersburg State University, St.-Petersburg, Russia

<sup>2</sup> Assistant professor, Public Administration Department, School of Management, St.-Petersburg State University, St.-Petersburg, Russia

<sup>3</sup> CEO, SitePattern Research, Stockholm, Sweden

government departments, and to transfer 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-department communications at various Federal, regional and local agencies were to be conducted electronically. (Skidén, 2003)

The program stimulated amazing changes at various government levels. The first stage of “E-Russia” implementation was marked by large-scale investments 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 Federal budget (76%), supplemented by external credits (4%), non-budget funds and technical aid (20%). “e-Russia” program contributes only about 15% of overall ICT investments; in relative terms this amount represents about 0,2% of GDP or 1% of Federal budget expenditures. (Shalmanov, Chachava et al., 2004)

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 departments’ Web sites is considered as one of the main achievements of “e-Russia”. Some of the Web sites developed within the last years are worth of being mentioned here, including automatic management systems introduced by the Ministry of Railway Transport, State Customs Committee and 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 investments programs a 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 case of St.-Petersburg.

The growing interest to the implementation of new electronic technologies in the country governance was further supported by Russian administrative reforms that mandated Federal agencies to provide immediate public access to the information on their activities, including legislation. Meeting these requirements inevitably leads to bringing the government Web sites to the standards of transparency and openness. However, some obstacles arise in course of this process. Although during 2003 year 14 ministries and departments increased the amount of information provide by 1,5 — 2 times, no visible changes occurred in the information contents and structure of 15 major departments Web sites. As a result, by the end of 2003 only 6 ministries and departments met openness requirement<sup>4</sup>.

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

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

\* Points were assigned based on the experts’ opinions, internal agencies’ data and other information sources. Shown numbers were determined as total ITC expenditures multiplied by expert efficiency ratio; points can take the values between 0 and 100.

*Source: CNews Analytics*

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 funding, inconsistent legislative base, absence of technological standards and information supply rules.

Vacancy and opposition to electronic solutions observed among some Federal agencies along with insufficient recourse base at regional level warn against excessive optimism in the ICT area. Even the most advanced economies often claim e-governments are 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 the countries with low Internet penetration and digital divide between different areas or population groups.

Still, in case of Russia there are fierce arguments in favor of further e-government development. In a vast country Internet technology can facilitate overcoming the distances, time and communications barriers, including provision of direct access and connection to the central government agencies. Russia has a huge potential for ICT sector expansion. Internet users already represent 10% of adult population in urban areas, which is a critical penetration point — this barrier is used as an

<sup>4</sup> Ministry of Taxation, Ministry of Education, Ministry of Defense, Ministry of Nature, Federal Commission for Securities and State Nuclear Supervision Agency

indicator of mass consumption for any technology, a drastic market growth expected afterwards; this is far below the standards of the countries of Western Europe and Northern America, but the market is growing at considerable rates. In 2003 the number of Internet users increased by 25%, the traffic grew by over 180%; similar trends taking place in new domains registration (Shalmanov, Popova et al., 2004).

Based on these arguments, we believe that the key requirement to the successful and efficient e-government development is ensuring and stimulation of broad public involvement. For this reason, the paper focuses on the e-government component 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 requiring public demand for Internet technologies as a way to obtain some goods or services from the government agencies.

We consider user friendliness of the government Web sites as a key feature making citizens choose electronic communication mode with the government agencies. This property stimulates demand and justifies the investments in 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 committees on-line representatives.

#### ***3.1 Legislative and Historical Background***

There are strong prerequisites for e-government development in St.-Petersburg which is the second large city in Russia, following Moscow in the level of information technologies development. In 2003 the number of the people having experience with Internet technologies exceeded 750 thousand, and there were over 100 Internet providers operating in the city<sup>5</sup>.

The national ICT development strategy was supported enthusiastically by regional government. 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 the local co-funding of ICT development programs.

The structure of St.-Petersburg government comprises three traditional branches: legislative, executive and judicial. The City Assembly represents 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. Judicial branch incorporates the Statutory Court and magistrates. The local governance system is represented with 111 municipalities.

Above-mentioned legislative initiatives created a basis for creation of the Web sites of 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 their 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.

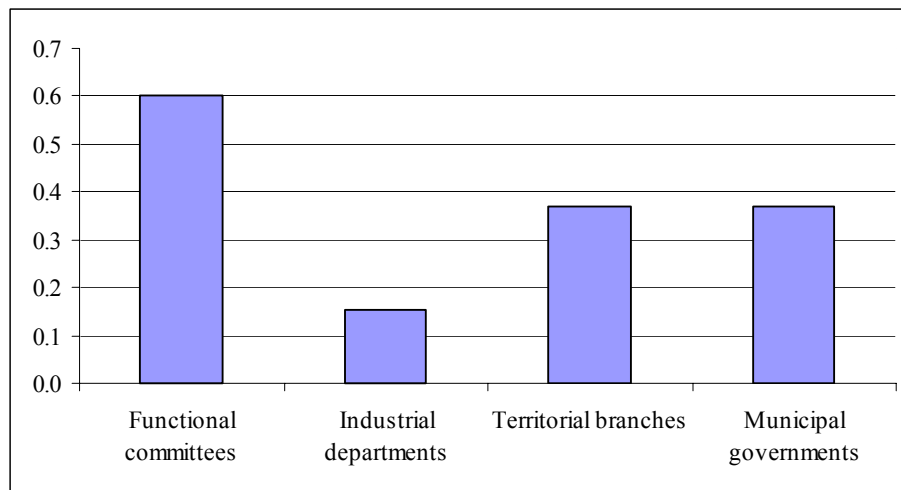
In January 2002 the official portal of St.-Petersburg government was launched ([www.gov.spb.ru](http://www.gov.spb.ru)); this establishment united all city government agencies, established new requirements to Internet projects developers on the volume of submitted information, use of modern technologies, 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 different extent represented on-line. Official city government portal provided basic uniform information on all executive authorities; in addition, there were separate Web sites of the Legislative Assembly, the Governor ([www.assembly.spb.ru](http://www.assembly.spb.ru), [www.gubernator.spb.ru](http://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 the second place (37%), and the level of industrial departments expansion remains as low as 15%. Obviously, this statistics on Web presence is closely linked to agencies resources and the range of powers and functions.

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<sup>5</sup> New Economy Foundation, URL: <http://www.neweco.ru/main.html?r=124&id=1047544970>

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



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

### **3.2 Functional Advancement of Executive Committees Web Sites**

At the starting point of evaluation we attempted to describe the level of e-government functional development in the executive committees. The purpose of this research was to locate selected agencies on the functional development stages. The theory commonly identifies few stages of e-government evolution, such as initial presence, informative stage, transactions 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 committees Web sites:

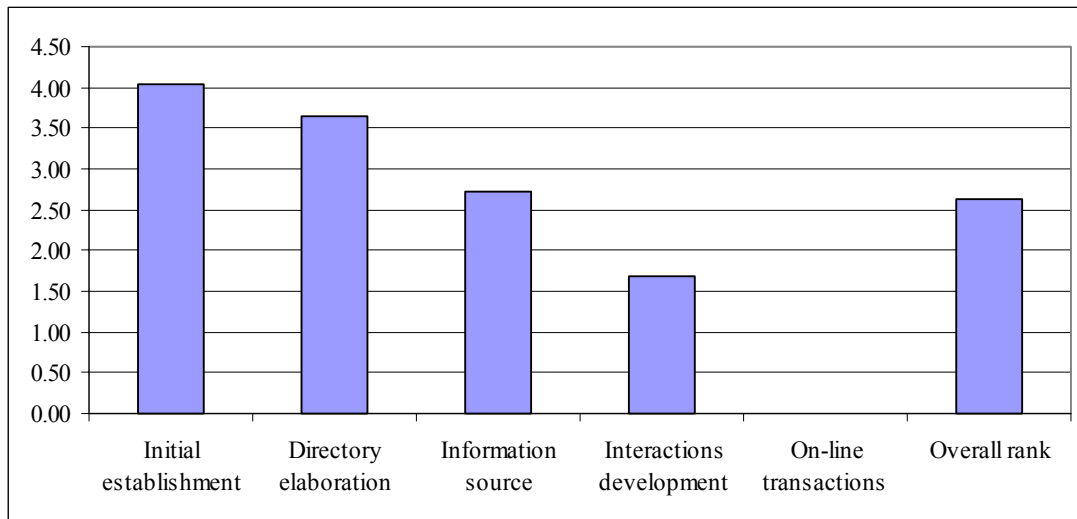
1. *Initial establishment.* This stage corresponds to the original placement of an agency on-line; first-stage representatives of this type contain the most essential agency-specific information. At the very basic level it could assume a single home page creation; further developments might include provision of contact information and links to the physical government structure, visiting rules and hours, agency descriptions (information on the performed functions, history, organization structure). Further opportunities are presentation of strategic vision, including agency mission and goal setting, information on the leaders and key figures;
2. *Directory elaboration.* This is the second logical development stage for an agency that have 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. Complete agency directory would include full-scale information on agency subdivisions, performed functions and contacts, relevant links to other Federal and local government agencies, affiliated structures, mass media and cooperating organizations from public and private sector. It oftens contain 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 the downloadable forms, applications or instructions for using agency-specific services. This stage presumes development of the network representatives oriented to the transition to 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 appointments scheduling, elaboration of discussion forums, on-line conferences, addition of live effects, availability of on-line services using electronic forms;
5. *On-line transactions.* The ultimate development stage assumes complete integration of electronic functions and services where all agency functions can be performed through on-line systems or even incorporation of additional on-line functions that are not available in the traditional mode. It includes possibility of on-line purchases and payments via electronic system, forms and reports submission and proceeding, and 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 developments can occur to the detriment of earlier ones. We used suggested scale to evaluate all 14 Web sites of functional executive committees. Each site was evaluated by an expert on a 10-points scale — this was a maximum score agency could get on each of the 5 development stages. 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 development stage is “completed” after it reached a 5 points benchmark. In this section we did not attempt to evaluate the quality of provided services or information; the fact of certain option being present at the web site was enough to earn points. We further proceed to the detailed qualitative analysis of offered Web site options.

Suggested evaluation technique allowed to locate 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 the interactivity. Formal evaluation confirms this hypothesis; Figure 2 summarizes the result of executive committees functional evaluation.

**Figure 2: Functional Evaluation of Executive Committees Web Sites: Overall Results**



An overall agencies rating shows that the current usage of e-government potential stays at the level of about 25%. Keeping in mind 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 origin stage with a rank of 1.70, and on-line transactions opportunities are not exploited at all. Hence, the overall picture suggests that there is no stage, even initial establishment, that can be considered as a conquered one by all agencies.

Analysis of agency-specific estimates shows that there is 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 it follows from the table, the three leading agencies are Accomplishment and Roads Committee, Building and Architecture Committee and Dwelling 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 closed to this line. A group of comparatively underdeveloped agencies sites include Culture, Transport and Physical training and Sports Committees.

The question to be asked is about performance level of those functions represented at agencies sites: what is the general situation, which are the most developed areas? The results of discussion in this section can partly be used to evaluate how close on-line representatives try to get to the users; however, this is merely an intention, and the fact of offers in itself does not prove that public is actually using these options. Figure 3 shows the frequencies 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 figures and performed functions. Information development stage is mostly represented by billboards, agency-related city information, legislation databases and news publications.

**Table 2: Functional Evaluation of Executive Committees Web Sites: Individual Results**

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

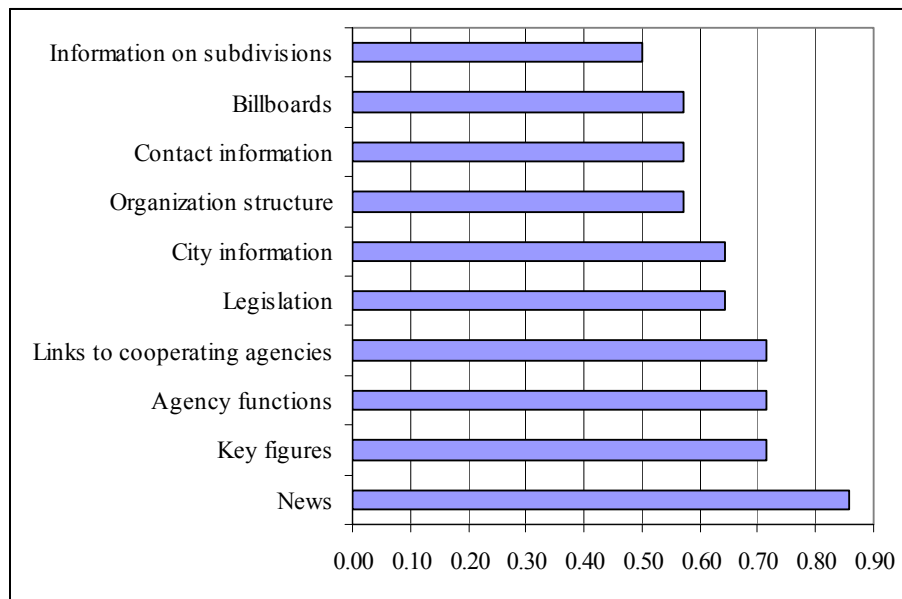
However, this approach based on the analysis of agencies' Web sites in terms of functions and development stages has serious limitations. The features offered by Web masters alone have low or even no meaning for the target audience if they are not user-oriented. The quality of suggested features can 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 identified and their prospective should be considered in the very beginning of Web site development process; this is one of the key aspect in making provided information and services demanded and meaningful.

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

#### 4. External Evaluation Methods

The previous sections allowed to conclude that many governments have already established the net presence; they are gradually extending the range of functional opportunities climbing identified development stages. However, Web sites 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 agencies representatives show that in most cases these results are not analyzed and used properly to improve sites performance.

**Figure 3: Popular Features Offered at Executive Committees Web Sites (Frequencies)**



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 users' experience and attitudes with a Web site, including 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 methods assumes preliminary establishment of relevant evaluation criteria and later application of those criteria to the evaluated site; in this case an independent expert acts as a user attempting to interact on-line with a government agency.

We suggest the following key 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. 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 - functionality, accessibility and usability. Each feature is represented by at least 2 criteria; criteria are further broken into concrete 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 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 with the site content. It measures the range of completeness and relevancy of services and databases offered on-site, sufficiency of provided full-text information, depth of coverage for news and current political issues. In terms of functional development stage outlined in section 3 this criteria assesses the quality of directory and information provision;
- *Information currency and accuracy* analyses whether the site content is relevant and up-to-date; it considers indications of last pages updates, responsibility for separate pages, lack of spelling mistakes. This criterion is of primary importance to those users looking for a proof of reliability;
- *Interactivity* evaluates the quality of available on-line transactions and interactions, including performance of e-mail service, declaration of turnout times and services limitations, quality of communications beyond e-mail and

opportunities for open public discussions (such as on-line 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**

Features	Criteria	Evaluated options
Functionality	1. Audience orientation	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)
	2. Coverage	Description of services, quality of databases (publications, legislature, statistics), downloadable documents, news, billboards, reports on current activity, comments from officials, phone directories
	3. Information currency and accuracy	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 constructions
	4. Interactivity	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, tenders participation, forms and reports submissions, products purchases)
Accessibility	1. Access to the site	Accessibility via city government portal and searching engines, reflection of agency name in URL, descriptiveness of documents titles, site retrieval time, availability at different moments
	2. Access to site content	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
Usability	1. Architecture, design and layout	Logical user-oriented content organization, readability, use of symbols, aesthetics, consistency of format, layout (organization, pages length, typography, frames), advanced display features
	2. Links	Relevancy of provided links, absence of dead end links, descriptive comments, frequent user options
	3. Navigability	Exploitation of conventional navigation models, clear identification of navigation elements, identifiable self-location, site map, distance between site points, local search engines
	4. Metadata	Appropriate metatags and section headings, phrasement and clearness of in-body text, descriptive pages titles

*Accessibility* shows the extent to which the site and its contents are available to a wide range of users with varying level 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 accessibility and of the site from outside via the main searching engines and from other government agencies sites. It includes the speed of response and availability of site at different time. A special feature is availability of back-link to the central government portal which identifies the degree of ICT policy unification and increases the opportunities to find relevant information from different government agencies.
- *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, length and layout of pages. An important option is logical rather than functional organization of content around users’ needs; a typical example of contrast between functional and user-oriented approach to Web site development occurs when a user is expected to be familiar with agency structure in order to use 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 to avoid inefficient wondering in irrelevant areas, highlights of links to the new sources of information, availability of user-tailored options, such as special opportunities for frequent users, offers to subscribe to agency news and information updates, minimization of dead ends and pages under construction;
- *Navigability* characterizes how easy it is to operate the site; it includes keeping users aware of their location on site, involvement of conventional navigation models, presence of navigation links on all pages, availability of site map, availability of built-in search engines and basic searching 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 committees Web sites. Comparing to 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 semi-private initiative, recognized as the best one in course of functional evaluation.

The resulting sample is shown in Table 4; it does carry any statistical properties, but rather provides basement for further comparisons. For the purpose of this research we assigned equal weights to all three features and conducted evaluation of eight selected functional executive committees Web sites. Each relevant option offered at 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, 3 — option functions on average/normal level, 4 — option scores excellent at above average level). Criteria rank was calculated as sum of individual option ranks and than normalized on a 10-point scale; feature estimate was obtained by averaging three criterion ranks.

**Table 4: Functional Executive Committees: Sample for External Evaluation**

Agency name	URL	Rank on functional scale	ID number
Building and architecture committee	<a href="http://www.kga.neva.ru">www.kga.neva.ru</a>	3.75	BA
Dwelling policy committee	<a href="http://www.kgp-estate.spb.ru">www.kgp-estate.spb.ru</a>	3.54	Dw
Public property management committee	<a href="http://www.commim.spb.ru">www.commim.spb.ru</a>	3.33	PP
Land use committee	<a href="http://www.kzr.spb.ru">www.kzr.spb.ru</a>	3.33	LU
External affairs committee	<a href="http://www.kvs.spb.ru">www.kvs.spb.ru</a>	3.13	EA
Education committee	<a href="http://www.kobr.spb.ru">www.kobr.spb.ru</a>	3.13	Edu
Economic development, industrial policy and trade committee	<a href="http://www.cedipt.spb.ru">www.cedipt.spb.ru</a>	2.29	Econ
Finance committee	<a href="http://www.fincom.spb.ru">www.fincom.spb.ru</a>	2.08	Fin

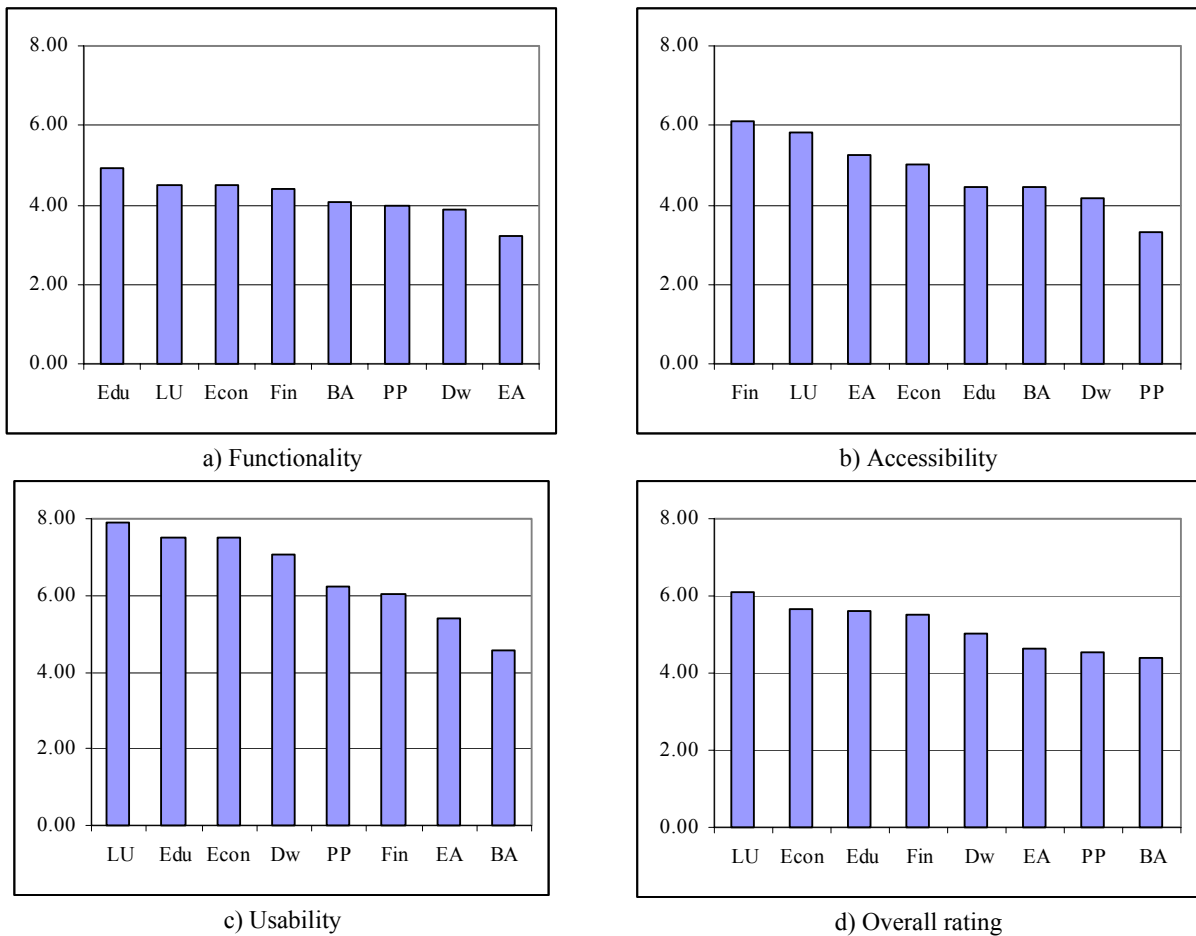
Estimation results are presented on Figure 4. Sections a, b and c provide separate diagrams for the three features — functionality, accessibility and usability, — and section d shows overall sites ranking. The lowest variation in ranks is observed for sites functionality; this result shows that the Web sites of executive committees are almost equally developed in terms of performed functions and their quality. On the opposite, accessibility and especially usability varies significantly being the key source for the overall agency-specific differences. The first 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 the 10-point scale this is 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 sufficiently high level of legislative databases development, this achievement apparently due to the 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 on the 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 improvements include lack of 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 presentation form. To give some examples, Building and Architecture Committee does not give news headings; Dwelling Policy Committee provide 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, mailing options are difficult to find at some sites (e.g., Finance Committee). City portal misses some relevant links to agencies Web sites, and the sites names are often difficult for perception and memorizing. Economic development committee showed very long retrieval time, and many other agencies were often unavailable in course of analysis.

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

**Figure 4: External Evaluation Results**



### 5. Internal Evaluation Methods

External evaluation method presented in the previous section still carries important problems within itself. It allows to obtain expert information sufficient to give single-time site evaluation. Experts are acting based on the preliminary judgment about visitors' qualities and preferences; however, this approach would be meaningless if the original assumptions about site visitors' behaviour 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 in 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, 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 the answers that poorly represent reality).

Another option is to avoid surveying errors making use of the key Internet property: on the Web we can partly track attitudes and behaviour of the actual audience without need of sampling. This section presents a visitor-oriented evaluation approach elaborated by SitePattern research and successfully implemented for the 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.

### **5.1 The Visitor Universe**

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 throughout 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.

The most common way to evaluate the Web site is to look at the amount of visitors it attracts, it’s popularity. If we follow this logic, the government Web sites are hardly popular at all. If compared with information portals or search engines, the traffic is minimal. The driving force does not bring millions of visitors to read about things like law, rules and regulations, and this is what mostly 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 delivery of 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 Public Property Management Committee ([www.commim.spb.ru](http://www.commim.spb.ru)). Site is purely informational in nature, presenting narrow field of knowledge, connected with real estate, laws and regulations with some historic backgrounds. The traffic on 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 the traffic on such site, if proper creativity is used in the banner campaigns and printed materials. Let us imagine that the population of site grew to thousands visits a day. The traditional evaluation of site popularity can be as considered 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, its objective 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;
- areas of activities information;
- information about new regulations;
- 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, Property Management Committee is interesting mostly to those visitors who have some academic or practical background in the field of government property. Average visitor would not be interested in such 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 succeed in getting visitors to 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 than 30 seconds. The 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 due to the special interest in the given objective areas. In fact, the majority of the small and medium business Web sites have similar pattern: narrow and special information sector with limited target group. The population of such sites is often very low, below hundred 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 totally different quality to the visit and it is *these* visits that should be carefully analysed in order to evaluate the site effectiveness.

It is very important to get as much feedback from the visitors as possible. Every visitor is an important recipient of information, and the amount and quality of perception is the best performance indicator for such site. Behaviour tracking and its interpretation through a specially conducted visitor surveying 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 on the demand for information and improve the content of 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 possibility to understand the visitors on personal level, or tools are just too expensive to be applied to minor traffic sites.

Addressing low traffic sites, we collect and analyze visitor intelligence data from the view-through tracker. Along with browser-based behaviour tracker this approach gives an opportunity to make precise conclusions about effectiveness of site and formulate suggestions on its improvements. 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 behaviour tracking are discussed below.

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

- *Web behaviour 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;
- *Visitors' 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;
- *Interactions promotion*: responses and origins of Web-inspired e-mails and electronic forms, requested on-line transactions.

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

### **5.4 How Good is Your Helping Hand?**

How the population of narrow and special information sector sites can be increased? After all, the quality of the visits is only important if there are any. Of course, the search engines and correct keywords are of importance, but it 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 to the 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, forming large portals. These portals attract visitor by the versatile information in different sectors, creating a network of resources that generate cross-interest and boost the traffic on all resources involved.

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

So-called "view-through" tracking technologies can reveal the population 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**

The 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 course of the 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 sites performance and user-friendliness with external evaluation technique.

The range of on-line services provided by executive committees is generally consistent with agencies 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 studied Web-sites 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 proper purpose statement, irregular content updates, malfunctioning of certain functions.

Common practical problems of the 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 lack of strategic approach to the development of agencies Web resources. Numerous private undertakings, such as the Web site maintained under informational support of Accomplishment and roads committee, can be considered as an evidence of public readiness to get involved into e-communications; however, the government agencies are a few steps behind failing to satisfy the existing supply. Gradual introduction of interactive and transaction elements should change the situation.

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

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