MEASURING E-GOVERNMENT:
A CASE STUDY USING RUSSIA

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ABSTRACT

Numerous studies of global electronic government adoption use the presence or absence of website functions to measure development levels and create rankings. This paper investigates whether these ratings really reflect the overall status of e-government by using a case study of the 89 regional governments in Russia. It provides the results of two waves of evaluating these websites using measures derived from prior e-government studies. These website levels are correlated to available data reflecting the status of e-government in many of these regions. It is concluded that website levels are only loosely coupled to the overall state of e-government in these regions. It is therefore hazardous to draw too many conclusions about the development of e-government in various countries using relative rankings that are only based on websites. As a case study, this paper illustrates what can and cannot be done when highly limited data are available.

Keywords: e-government, Russia, regions, websites, metrics

I. INTRODUCTION

As governments around the world raced to implement "electronic government," a substantial number of studies tracked its development. Most of these studies rely on evaluations of national-level websites as the visible tip of the iceberg of governmental computerization. But e-government is more than a website: it is the comprehensive application of the information and communication technologies (ICTs) to facilitate and restructure governmental operations. Isolated uses of computers and their precursor punch card machines go back more than a century [Beniger, 1989].[1] In 2002, the U.S. government reportedly spent 0.42% of GDP on information

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[1] In the Soviet Union, "e-government" began with the proposal in 1963 of a nationwide computer network to collect and process all the data needed by central planners to run the economy from Moscow. From 1963 to 1991, e-government consisted of a centralized, top-down program of implementing management information systems in ministries, regions, and enterprises [Conyngham, 1980]. Foremost among the reasons this program failed was the mismatch between the perverse incentives in the economic system for managers (for example, to hoard material and

technology (IT), or about $42 Trillion. Germany spent $8.4 Trillion (0.41% of GDP), while Russia spent just $650 Million (0.19% of GDP) [Peterson, 2005; Reyman, 2003]. Clearly most of these expenditures did not go for websites, leading to the following question: do the studies of e-government that rely on website measurement actually reflect the broader picture of the application of ICTs by governments? This question is of particular interest in the case of governments that may try to use their websites to promote a benign, progressive image. Katchanovski and LaPorte, for example, found evidence that some governmental websites in less democratic countries are more like "cyber Potemkin villages"[2] than real attempts to enact new ways of interacting with their populations [Katchanovski and LaPorte, 2005].

The purpose of this paper is to examine the relationship between governmental web pages—the visible manifestation of e-government—and the uses of the ICTs that accompany them.

We chose to study the "state" level in Russia for several reasons:

- all of these units, though exhibiting huge differences amongst themselves, exist in the same overall economic, political, and legal realm;

- the state of e-government in Russia is not so far developed that there are few differences to be observed; and

- besides one short survey in Russian in the Russian business press [RosBiznesKonsalting, 2003], no studies of this level of e-government in Russia were performed.[3]

This paper proceeds as follows. Section II explains the genesis of the paper and proposes a hypothesis to be investigated. Section III lays outs the rationale for the selection of measures for the Russian e-government websites, and explains the data to be used that characterize the overall levels of e-government in these regions. Section IV compares the website measures to the data characterizing levels of e-government. Finally, Section V presents the overall conclusions about the relationships we found.

II. METHODOLOGY, MODEL, AND HYPOTHESIS

This paper is an offshoot of a larger study that was oriented towards understanding how federal and regional governmental websites and a large-scale e-government program (E-Russia) were or were not contributing to the development of democracy in Russia [McHenry and Borisov, 2006]. In attempting to account for regional differences, we first considered variables that were used in similar studies across national levels such as: number of Internet users per capita (capturing the demand side), income levels, GDP, and UN Human Development Index. Any model that would

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labor resources and hide true production capacities and performance) and the "information age" imperatives of efficiency, optimization, and transparency [McHenry and Goodman, 1986]. Computerization from above could not alone reform the system in such a way as to preserve it.

[2] That is to say, structures erected to give the impression of the presence of something behind them that, in reality, does not really exist.

[3] Apparently the Ministry of Economic Development and Trade (MERT) performed a study about the presence of information on the websites about computerization initiatives in the region in Jan., 2005, but only used as the starting point the list of sites on the official server of the Russian Federation, http://www.gov.ru/main/regions/regioni-44.html. For inexplicable reasons, this webpage is woefully out of date, and the MERT study only included 56 (of 85) regions [MERT, 2005].

do so would certainly take into account legal, political, economic, and social factors.[4] In Figure 1, we sketch what an explanatory model of this sort might look like. Creating such a comprehensive model would require, at the very least, defending these (and probably other determinants) from a theoretical viewpoint, and then linking them to data that exists or can actually be collected in order to test hypotheses. It is also likely that many of these factors are interlinked, leading to a complex interaction of factors that influence each other in a "chicken and egg" fashion [King et al., 1994]. The most fruitful way to study these phenomena is probably with in-depth, qualitative field studies, which become prohibitively expensive for most researchers.
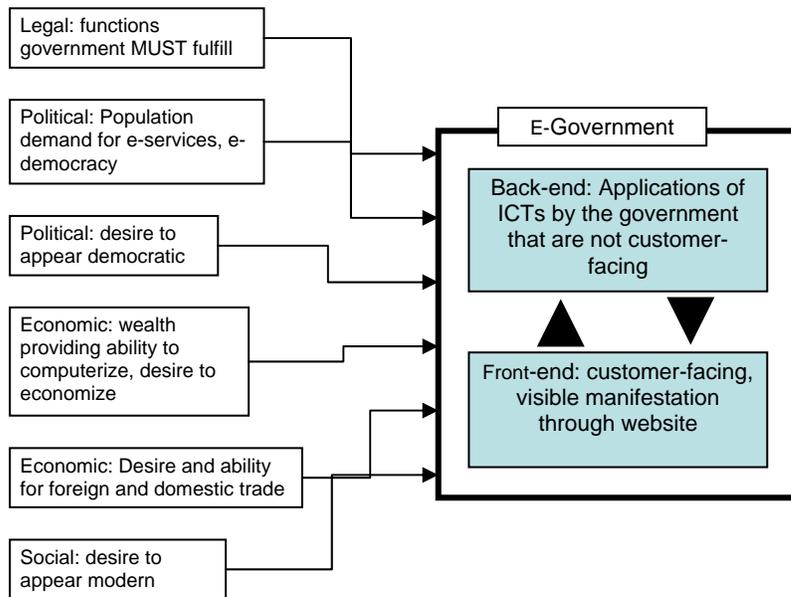

Figure 1: A Partial Model of Determinants of E-Government Levels

However, this paper is *not* attempting to propose or defend a theory about why e-government websites differ. This paper arose because of the absence of available data to test a model such as that in Figure 1. For Russia, the data deficiencies were severe: even data such as the number of Internet users in each Russian region was not publicly available. The population of each region and per capita incomes were available, as was an index of riskiness of doing business in each region, plus an index of press freedoms from the year 2000. While multiple regression found a small relationship between the latter and the website levels, this finding was not considered to be a result that had much explanatory power in and of itself. We can assume that similar severe data deficiencies exist for researchers trying to examine numerous other countries.

This paper's goal is much more modest: to examine whether or not it is possible to estimate the level of e-government as a whole by benchmarking just the level of the e-government websites.

In the course of searching for additional data for the regional level in Russia, we discovered a potential data gold mine: 2002 and 2003 surveys in which a large number of the regions

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[4] Grant and Chau addressed a similar question but from the viewpoint of the strategic intentions of e-government policymakers. In their formulation, e-Government could be characterized by four Strategic Focus Areas: Service Delivery, Citizen Empowerment, Market Enhancement and Development, and Exposure and Outreach. Service Delivery becomes a response to the population's desire for digitizing services, Citizen Empowerment becomes a response to the desire for e-democracy, and so forth [Grant and Chau, 2005].

answered extensive questionnaires about a wide range of aspects of "informatization"[5] in the region [Lisitsyn, 2002, 2003]. The reports about these surveys not only included analysis of the results, but reproduced a substantial portion of the original data. Most of the data collected in these surveys deal with the overall measures of e-government use. Some of the measures were more oriented towards ICT applications that are not customer-facing, i.e. that comprise the back-end. But in general it was not possible to distinguish clearly when an investment in a server, for example, or the hiring of a programmer, was limited to applications that cannot be seen from the website or included some work that is performed for the website-visible functions.

Our initial thinking was that regions that built up more e-government in general would be more likely to also have built up robust websites. But we could also imagine the reverse case, where a region might start by creating its website, and then add other functions operating in the background in order to beef up the website functionality. Another way of stating this question is to ask whether governments tend to develop all e-government applications, including websites, proportionally. Hence we reached the hypothesis that is examined in this paper:

(1) H_0: The visible level of e-government websites does not correspond to the level of overall level of e-government development.

In preliminary statistical analyses, it soon became apparent that the data were very messy and would not yield easy-to-interpret results. Although there were many measures, not every region provided data for every measure. Only 68 of 89 regions responded at all in 2003 (38 in 2002). Therefore, this sample could not be considered representative in a statistical sense. Because of missing values for one region in one measure, a different region in another measure, and so on, the set of regions for which all measures were present turned out to be rather small. Multiple regression on this set of regions using the website levels as the dependent variable yielded no significant results. Choosing any smaller subset of the variables left too few regions in the data set. Yet the intrinsic appeal of the conjectured relationship was so great that we decided to embark on a more exploratory examination of the data, even if it meant that the results had to be very carefully interpreted and qualified. In this paper, we perform a case by case analysis correlation analysis of the available e-government measures as they related to the measured website levels for 2003 and 2004, and then draw overall conclusions based on these results.

One concern that the reader might immediately have is whether, in trying to correlate website levels with e-government levels as a whole, we are investigating a tautology. Whatever is being done to create the websites is part of the overall e-government effort. While this statement is certainly true, the reader should bear in mind that on one side we are measuring the outcome, that is, the website level. On the other side, we use input measures (such as expenditures) or more general surrogates for the level of e-government (such as the number of computer-based information systems). So, what we are ultimately trying to do is to see if one portion of the totality of e-government, the websites, is a suitable surrogate for the whole.[6] Our results will enhance our understanding of all the studies that evaluate and rank countries and/or regions based on website analysis (major examples include: [Accenture , 2004; Cap Gemini Ernst & Young, 2003; Cyberspace Policy Research Group, 2000; Hafeez, 2003, 2004; Kaylor et al., 2001; West, 2004, 2004b, 2004c]).

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[5] "Informatization" comes from the Russian word "informatizatsiya," which encompasses the use of the ICTs across a broad range of applications. It resembles the concept of "informating" coined by Zubov, but with a broader emphasis than on information for knowledge workers.

[6] If we could break out just those expenditures on the websites, we could ask: what levels of website development result from what levels of expenditures (which governments use resources more productively). We contend that website development is sufficiently intertwined with other e-government work that making such distinctions, even with very good accounting, will be difficult.

III. DATA FOR THE WEBSITES AND E-GOVERNMENT OVERALL

In this section we begin by laying out the basis on which we selected metrics for measuring the level of the e-government websites in Russia. We briefly introduce results of our data collection. Then we explain the available data for measuring the e-government levels as a whole.

OUR WEBSITE MEASURES

The measures we devised for measuring the developmental level of the websites are similar to measures used by many other academics and practitioners. There is not one single, accepted standard for measuring e-government websites. Further justification and a review of the literature in this area are presented in Appendix I. Since benchmarking has not yet been done of Russian regional e-government websites, we chose measures that would be sufficiently broad to encompass a wide variety of e-government applications. We included four major categories:

- Information,

- Communications/Participation,

- Action/Transaction, and

- Integration.

For each category, we recorded the presence or absence of a certain number of attributes or features on the official sites of regional governments in Russia in 2003 and 2004. As in the United Nations E-Participation index, we selected items that we were actually likely to find based on some preliminary samples of websites [Hafeez, 2003].Our measures allowed us to draw conclusions not only about the overall thrust of the websites, but the relative emphasis among the various functions.

The overall score we chose to give to a website, which we call the website level, is the sum of the percentage of features implemented for each of the four groupings of measures. For example, if a website had 7 of 14 features for Information, 3 of 9 for Communications/Participation, and no others, it would be scored as .5 + .33 + 0 + 0 = .83. Thus, the website level ranges from zero to four, since in each area the range could be from zero to one. We have not scored a missing website as "zero," as if there is such a thing as a null website, but have left it out of the analysis entirely.

We performed the data collection in two waves. The first wave was performed in Oct-Nov. 2003, and the second wave roughly one year later. Each researcher was responsible for doing a set of evaluations. Each researcher spoke Russian or English as a first language and was fluent in the second. Cross-sampling was used to test the level of agreement in assessments in Wave 1, where the average agreement rate was about 90%. Grey areas were discussed and a consensus reached. Any discrepancies between Wave 1 and Wave 2 where the rating went down were thoroughly investigated, with about 3% of all measures being corrected.[7]

One additional check partially validated our measurements. We found a significant correspondence between our Wave 1 ratings and those of RosBusinessConsulting (RBK) in Dec., 2002 [RosBiznesKonsalting, 2003] (n=80, Kendall's tau_b = .810).[8]

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[7] Similar descriptions about the data collection procedures and measures, etc. also appear in [McHenry and Borisov, 2006].

[8] The RBK survey found sites for 83 regions. The regions not found by [RosBiznesKonsalting, 2003] that we also did not find were: Aginskiy Buryatskiy Autonomous Okrug (AO), Kamchatskaya Oblast', Koryakskiy AO, Nenetskiy AO, and Taimyrskiy AO. We found a site for

We only evaluated websites that were labeled as the official sites of the regional governments. The Russian regions, called "subjects of the federation" or just "subjects" in Russian, comprise four types, with special status for two cities:

- Cities with Federal status (Moscow, St. Petersburg)

- Oblast' (49) – closest to a typical "state" structure

- Kray (6) – similar to Oblast', populations in millions

- Republic (21) – formed around a major ethnic group in the region

- Autonomous Oblast' (AO) (10) and Autonomous Okrug (1) – formed around an ethnic

    group within a much larger entity that is more diverse

Many of these websites proved to be quite deep in their structures, including links, pages, and linked sites for most or all of the executive branch ministries, departments, and other administrative units. We evaluated these bodies as part of the site, even if the link took us to another server. Sites for parliaments, individual sites for regional governors, sites for federal organizations with regional representative offices, and municipal sites were not included. In Wave 1 we found sites for 80 of 89 regions; in Wave 2 we found 85 (Appendix II).

Figure 2 shows the frequencies for the distributions of website level found in 2003 and 2004. The mean rose from 0.99 in 2003 (n=80) to 1.36 in 2004 (n=85). As Figure 2 also illustrates, the dispersion of values was greater in 2004 than in 2003, with the standard deviation in 2003 of 0.34 and of 0.55 in 2004.
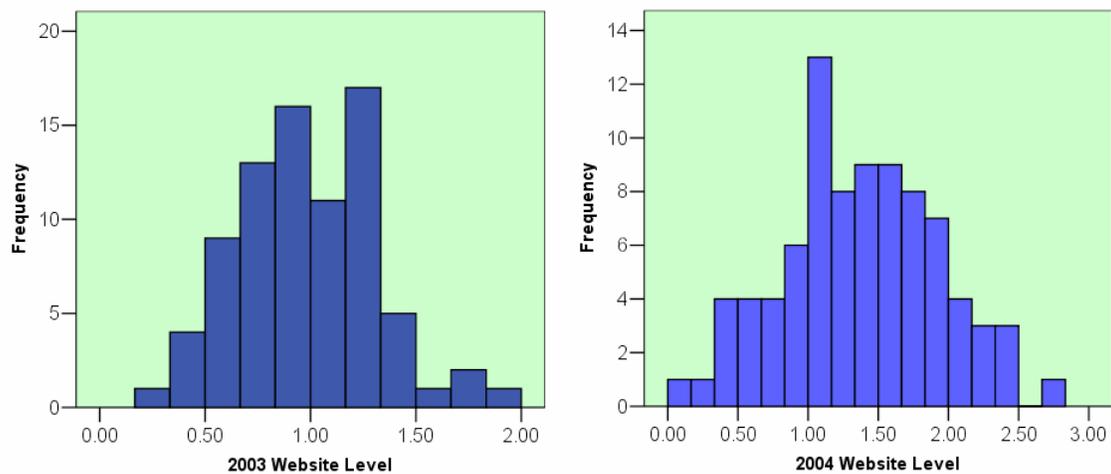

Figure 2: Frequency of Website Levels Values, 2003 and 2004

Kurskaya Republic whereas [RosBiznesKonsalting, 2003] did not. The sites [RosBiznesKonsalting, 2003] found that we did not find were Kabardino-Balkarskaya Republic, Krasnoyarskiy Kray (not accessible), Ust'-Ordynskiy Buryatskiy AO, and Yamalo-Nenetskiy AO (under construction). Their summary results were only reported as groupings by levels of high, medium high, medium low, and low – hence we adopt a nonparametric comparison. Significance is not reported because we are analyzing the entire population.

For readers who want a more in-depth sense of what we found about Russian regional e-government, we present a short analysis of our results in Appendix III.

DATA SOURCES FOR MEASURING OVERALL E-GOVERNMENT LEVELS

As noted in Section II, the main source of data about the state of e-government in the Russian regions comes from 2002 and 2003 reports issued by the Center for Regional Informatization of the All-Russian Scientific Research Institute of Problems of Computing and Informatics (VNIIPVTI), which has been tasked for a number of years by the Russian government to carry out large scale surveys [Lisitsyn, 2002, 2003]. The 39-question survey form used in 2003 covered an extensive range of issues about regional informatization. Most of the questions dealt with governmental policies and use of computers both by regional governmental organizations and the regional branch offices of federal organizations within the regions. Two-thirds of the 377-page 2003 report was devoted to appendices in which a great deal of raw data was presented for 68 participating regions (75% of 89).[9] Because they collected data for several years from the same regions, this organization's great advantage is its ability to investigate and resolve inconsistent (inflated) answers through follow-up contacts with regional officials [Lisitsyn, 2003, p. 66]. The 2002 survey comprised somewhat fewer questions; 38 regions (44%) responded. (Using the Russian word "Otchet" (Report) from the titles of these surveys, we will henceforth refer to them as the 2003 Otchet and 2002 Otchet respectively.)

In Table 1 we present the relevant measures that could be culled from the two Otchets. They ask four overall questions about e-government.

1. Does the region have a specific conception of regional informatization (a set of general principles), is there a specific program that the government passed for this conceptualization, is a conception or program now in the works, or is there none?

2 and 3. How much is expended on e-government, including outright expenditures or their reflection in personnel, hardware, and networks (here represented by number of users of the networks).

4. The outcome of some of these expenditures, the number of application-specific computer-based information systems (CBIS) in the government, the number of support CBIS, and agencies using them.

The 2002 and 2003 Otchets do not constitute random samples. The survey was sent to the entire population of regions, and so the potential for non-response bias must be considered carefully. Table 2 shows that there are similar percentages of regions represented in the 2003 survey when categorized by their geographical location. (The biggest exception here is the absence of Moscow in 2003.) The 2002 Otchet overrepresents regions in the Central Federal Okrug[10] and underrepresents those in the Far East Federal Okrug. There are reasonably similar numbers of participants in the 2003 Otchet by administrative type (Table 3). The 2002 Otchet probably overrepresents Republics and underrepresents Autonomous Oblasts. While the 2003 Otchet authors consider the sample to be "sufficiently representative" [Lisitsyn, 2003, pg. 28], they also note three types of regions that did not participate: those in which there was little informatization

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[9] We considered the possibility of trying to contact a wide range of regional officials to obtain direct information for this research, but concluded that the likelihood of getting usable responses was small. Although the USSR broke up in 1991, many governmental officials have remained the same (cf. [Chazan, 2005]). The overarching attitude towards giving information, especially to foreigners, when it is not required, is one of extreme caution. See [McHenry et al., 1990] for a description of data gathering problems with respect to the USSR.

[10] Russia is divided into seven large regions, called Federal Okrugs. The term "Okrug" itself means region, and is also applied to one smaller subdivision called an Autonomous Okrug.

to report, those in which the process of informatization was scattered across many agencies without one central place through which data could be compiled, and those that answered in 2002 and for which not much had changed.[11]

Table 1: Selected Measures of E-Government Levels in Russian Regions

Category	Measure
Presence of Informatization Programs in the Regions	Four possibilities: Conception, Program, Design, None
IT Spending in the Regional Government	2001 Rubles Per Capita spent on IT
	2002 Planned Rubles Per Capita for IT
	2002 Rubles Per Capita spent on IT
	2003 Planned Rubles Per Capita for IT
IT Personnel, Equipment, Networks in the Regional Government	Total number of IT Personnel in the Regional and Municipal Governments, 2003
	Number of Servers in the Regional Government (all branches), 2002
	Number of PCs in the Regional Government (all branches), 2002
	Number of Work Stations in the Regional Government (all branches), 2002
	Number of Users of Central Administration Network, if it exists, 2003
Computer-Based Information Systems (CBIS) in Regional Government	Total reported Functional CBIS's in Regional Government, 2003
	Total reported Support CBIS's in Regional Government, 2003
	Number of Regional Agencies with Functional CBIS, 2003
	Number of Regional Agencies with Support CBIS, 2003

Given the response patterns shown in Table 2 and Table 3, we know that these surveys do not leave out wide swaths of territory or exclude one or another type of administrative organization. At a basic level, there is probably not too much non-response bias, although the 2003 sample may be skewed somewhat towards better-performing regions. Hence, we report significance statistics in Section V as "for orientation purposes only" since we cannot investigate non-response bias on our particular measures. If we could be more confident about the randomness of the Otchet samples, we could give the significance statistics more credence, but as it is, they give us qualified insights about how likely it is that the correlations we found actually exist in the whole

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[11] They are: Moscow, Nizhegorodskaya Oblast', Orenburgskaya Oblast', Novosibirskaya Oblast', and the Republic of Kalmykia. Since not all respondent regions answered every survey question, we treated any case of absent data as a missing case rather than assuming the absence of an answer could be interpreted as not having something, zero, etc.

population. The closer N is to the total number of regions with websites (80 in 2003, 85 in 2004), the more likely that we are finding the true correlations.

In Appendix IV, we present the results of testing for correlations among all of the variables from the two Otchets. It is not surprising that many significant correlations exist. Indeed, we would be surprised if they did not exist, because they are all measuring part of the same process. Among the four variables related to IT spending, the highest correlations exist between closer or same year data. Four of the seven pairs are significantly correlated.[12] Among the five variables related to personnel, network users, and PCs, Servers, and Workstations, almost every pair is highly correlated. Similarly, the number of correlations across these three categories are fewer, but still plentiful. The 2002 expenditures are particularly correlated with PCs, servers, workstations,

Table 2. Otchet Participation by Year and Geographical Representation

Administrative District (Federal Okrug)	2002 Otchet			2003 Otchet		
	YES	NO	Percent YES	YES	NO	Percent YES
Central	10	7	59%	16	1	94%
Ural	2	4	33%	5	1	83%
Volga	8	7	53%	12	3	80%
NorthWest	4	6	40%	8	2	80%
Southern	6	7	46%	10	3	77%
Siberia	5	11	31%	10	6	63%
Far East	2	8	20%	6	4	60%
Federal Cities	2	0	100%	1	1	50%

Table 3. Otchet Participation by Year and Administrative Type

Administrative Type	2002 Otchet			2003 Otchet		
	YES	NO	Percent YES	YES	NO	Percent YES
Republic	15	6	71%	18	3	86%
Kray	3	3	50%	5	1	83%
Oblast'	18	31	37%	37	12	76%
Autonomous Okrug	1	10	9%	7	4	64%
City	2	0	100%	1	1	50%

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[12] In Appendix D, we mark which values are significant at $p<0.01$, and which at $p<0.05$. Here we will just call them significant.

network users and IT personnel. The planned expenditures for 2003 follow the same pattern, except they are not correlated with the IT personnel in 2002. Expenditures are generally correlated with the functional CBIS, but not with the support (infrastructure) systems, which is also not unexpected. PCs, servers, and workstations are similarly only correlated to functional CBIS. These correlations roughly tell the story that IT expenditures lead to the acquisition of resources, and resources are used to create information systems.[13] We can be reasonably confidant that, as a whole, they do represent the level of e-government in these regions.

The existence of many strong, significant correlations within these measures would ordinarily require that one or two be selected for subsequent analysis, since they seem to be measuring similar things. Our purpose, however, is different. Each of the correlations we will perform is like taking a slightly different snapshot of the same phenomenon. When we superimpose all the snapshots, we can see how coherent the emergent picture is.[14]

IV. CORRELATING WEBSITES LEVELS AND E-GOVERNMENT

As outlined in Section III, we begin with informatization programs in the regions. We then consider the IT spending and concrete artifacts such as servers and workstations. Finally, we consider the presence of CBIS.

INFORMATIZATION PROGRAMS IN THE REGIONS

By 2003, most regions (about which we have data) had created either a Conception of Informatization, a Program of Informatization, were in the processing of developing either of these, or had no conception or plan. The mean website levels were higher for regions with conceptions or programs, with the biggest differences between regions with no plan, regions designing plans, and regions with either conceptions or programs (Table 4).

Table 4. Website Levels by Informatization Program Presence

Informatization Program Type	2003 Websites			2004 Websites		
	No. of Regions	Mean	Std. Deviation	No. of Regions	Mean	Std. Deviation
Conception	14	1.105	0.315	14	1.584	0.521
Program	36	1.018	0.374	38	1.446	0.561
Design	13	0.862	0.270	13	1.273	0.561
None	6	0.750	0.261	7	0.858	0.419

Analysis of Variation (Table 5) suggests that, if we could consider our data to be a random sample of regions, we could be confident that variations in website development levels for 2004

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[13] This is reminiscent of Soh and Markus's process model of how IT creates business value [Soh and Markus, 1995]. While we can shed light on IT Expenditures and Assets, our data do not allow us to look beyond this to actual impacts.

[14] Since the data do not constitute a random sample, and the significance numbers we report are "for orientation purposes only," we do not run into the problem of increasing likelihood of errors as the number of tests increases. Our ability to generalize is reduced, which is why this analysis is exploratory in nature.

were related to the presence or absence of these policies. 2003 does not show such a pattern, but it makes sense that the programs would have more of an effect going forward as the plans are realized.[15]

Table 5. One-Way ANOVA for Websites and Informatization Plans

ANOVA		Sum of Squares	Df	Mean Square	F	Sig.[a]
2003 Websites	Between Groups	0.768	3	0.256	2.246	0.091
	Within Groups	7.409	65	0.114		
	Total	8.177	68			
2004 Websites	Between Groups	2.800	3	0.933	3.174	0.030[b]
	Within Groups	19.998	68	0.294		
	Total	22.798	71			

Notes: a. "Significance" is reported for orientation purposes only, since the sample of regions in the 2003 Otchet data was not random. b. "Significant" at p<.05

We performed a qualitative content analysis of informatization programs in some of the leading regions to gain further insight into the relationship between plans and websites. We examined the following regions' plans as they existed in late 2003: Moscow, The Republic of Chuvashiya, the Khanty-Mansiyskiy Autonomous Okrug, the Yaroslavskaya Oblast', the Republic of Sakha (Yakutiya), and the Primorskiy Kray. These plans dealt mainly with computerization of internal functions of the government, with strong emphases on the creation of databases of various kinds, systems for automating document flows, and means for sharing data with other levels of government in a "unified information space." They also included plans for automated support for regional services, support for decision-making, telecommunications development in the region, information security, and adjustments in relevant laws and regulations. Provision of information to citizens, e.g. news, legal, and upcoming events, also appeared as part of the plans, but the major emphasis was on internal processes. Nevertheless, four of five of these regions have top 10 websites. For these regions, we saw good qualitative evidence that high website levels reflect high underlying overall levels of e-government.

IT SPENDING IN THE REGIONAL GOVERNMENT

The level of IT spending per person should be a fairly good indicator of how committed a regional government is to making the government (and the region) "electronic." The authors of the 2003 Otchet state that, "It is not by chance that the highest levels of the development of informatization take place in those regions where the per capita expenditures are the highest in Russia" [Lisitsyn, 2003, p. 60]. The relationship between this measure and the website levels is not particularly strong (Table 6).

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[15] A post-hoc test to see which group means might differ from one another was performed. The Levene Statistic for 2004 Websites (.387) is not significant (p=.763) and therefore we can assume homogeneity of variances. With unequal sample sizes, the Hochberg T2 post-hoc statistic gives a good measure of the pairwise differences in means with tight control over Type I errors [Field, 2000]. This measure only finds a significant difference between the top and bottom groups, "Conception" and "None" (p<.05).

Table 6. Relationship of Regional Government IT Spending and Website Levels

Regional Government IT Spending (all sources)	2003 Website Levels				2004 Website Levels		
	N	Pearson's Correlation Coefficient	2-tailed Sig.[a]		N	Pearson's Correlation Coefficient	2-tailed Sig.[a]
2001 Rubles Per Capita spent on IT	29	0.529	0.003[b]		29	0.323	0.088
2002 Planned Rubles Per Capita for IT	30	0.371	0.043[c]		30	0.426	0.019[c]
2002 Rubles Per Capita spent on IT	42	0.341	0.027[c]		41	0.295	0.061
2003 Planned Rubles Per Capita for IT	47	0.228	0.123		48	0.217	0.139

Notes: 2001 and 2002 data from [Lisitsyn, 2002], other data from [Lisitsyn, 2003]. a. "Significance" is reported for orientation purposes only, since the samples of regions in the 2002 and 2003 Otchet were not random. b. "Significant" at p<.01 c. "Significant" at p<.05

The strongest relationship is between spending in 2001 and websites in 2003, explaining 28% of the variation. 2002 planned levels of expenditures are correlated with both the 2003 and 2004 websites, indicating that the intentions for informatization may be more consistent with realized website plans than the actual IT expenditures.[16] However, the absence of a relationship between 2003 planned levels and 2004 website results belies this supposition.

PRESENCE OF IT PERSONNEL, EQUIPMENT AND NETWORKS

The most characteristic measures of the degree of governmental use of IT in the regional governments are concrete: number of personnel, number of PCs, servers and workstations, and number of network users (Table 7). The strongest relationship found was between Servers (2002) and Websites (2003), with a Pearson's correlation coefficient of 0.574, indicating that about one-third (32.9%) of the variance is accounted for.

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[16] Planned expenditures for 2002 are available in the 2002 Otchet, and comparing them with the reported actual levels in the 2003 report—where the same regions reported—shows that 13 regions spent less, 7 more, and one the same, with an average deviation of almost 23%. However, these numbers are reported without adjustments for inflation.

Table 7. Correlation of Website Levels to Internal Measures of IT Use

Measure of Internal Government IT Use	2003 Website Levels				2004 Website Levels		
	N	Pearson's Correlation Coefficient	2-tailed Sig.[a]		N	Pearson's Correlation Coefficient	2-tailed Sig.[a]
Total number of IT Personnel in the Regional and Municipal Governments, 2003	57	0.366	0.005[b]		60	0.435	0.000[b]
Number of Users of Central Administration Network, if it exists, 2003	26	0.553	0.003[b]		27	0.511	0.006[b]
Number of Servers in the Regional Government (all branches), 2002	30	0.574	0.001[b]		30	0.543	0.002[b]
Number of PCs in the Regional Government (all branches), 2002	31	0.547	0.001[b]		31	0.484	0.006[b]
Number of Work Stations in the Regional Government (all branches), 2002	25	0.447	0.025[c]		25	0.475	0.016[c]

Notes:
 a. "Significance" is reported for orientation purposes only, since the sample of regions in the 2003 and 2002 Otchet data was not random.
b. "Significant" at $p<.01$ c. "Significant" at $p<.05$

CBIS IN REGIONAL GOVERNMENT

The Otchets distinguish between "functional" and "support" applications of IT. "Support" applications concern office automation and document flows, accounting, databases of laws and regulations, and Internet applications. "Functional" applications encompass a much wider range of issues, including OLAP and statistical analysis, and systems for processing taxes or the equivalent of social security. In the 2003 Otchet, regions were invited to list all of the IT systems they were using. The raw data were published; we extracted it and aggregated it for use in this analysis.

Table 8 suggests that regions that invested in more internal CBIS are likely to offer better developed e-government websites. However, the maximum variance explained is only about

Table 8. Correlation of IS in Regional Government to Website Levels

Measure of Internal Government IT Use – Information Systems	2003 Website Levels				2004 Website Levels		
	N	Pearson's Correlation Coefficient	2-tailed Sig.[a]		N	Pearson's Correlation Coefficient	2-tailed Sig.[a]
Total reported Functional CBIS's in Regional Government, 2003	39	0.401	0.011[c]		42	0.345	0.025[c]
Total reported Support CBIS's in Regional Government, 2003	29	0.381	0.041[c]		32	0.384	0.030[c]
Number of Regional Agencies with Functional CBIS, 2003	39	0.325	0.043[c]		42	0.292	0.060
Number of Regional Agencies with Support CBIS, 2003	29	0.391	0.036[c]		32	0.333	0.062

Notes: a. "Significance" is reported for orientation purposes only, since the sample of regions in the 2003 Otchet data was not random. b. "Significant" at $p<.01$ c. "Significant" at $p<.05$

16%. When a similar correlation analysis is performed for the number of CBIS in the representative offices in the regions of federal bodies, the correlation coefficients are extremely small and without "significance" as we are interpreting it here. This finding suggests that website development is a regionally determined policy and that the federal agencies played little role so far in determining the nature of the regional websites.

Among the categories included in the 2003 Otchet for CBIS was support software for keeping track of laws and regulations in databases. Such software could easily become the back end for query functionality offered to citizens on the regional government website. We tracked whether or not laws and regulations were available on the site, and whether they could be queried in a database (Appendix I, Table 14, measures 10-11). If the website is an extension of what is being done within the regional administration, then we would expect to see most regions either providing the combination of no website and no internal legal information systems, or providing both. The cells highlighted in Table 9 are for concordant pairs meeting this expectation. Almost 61% of the regions for which data were available do show concordance, providing limited support for the proposition. In addition, we conjecture that providing limited legal information on the website would not necessarily require an internal database.[17]

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[17] The presence of databases on the website without backend databases is harder to explain. Although we cannot check the status of the databases as they existed at the end of 2003, a check in March, 2005 of the three regions in which this was the case showed that two of three outsourced this function.

Table 9. Presence of Front- and Backend Legal Information / Databases, 2003

BackEnd \ Website	No Legal Info on Website		Limited Legal Info on Website		Full Legal Info/Database on Website	
	Number	Percentage (row)	Number	Percentage (row)	Number	Percentage (row)
No BackEnd System for Legal Information Reported	23	53.5%	17	39.5%	3	7.0%
BackEnd System(s) for Legal Information Reported	5	23.8%	10	47.6%	6	28.6%

A Chi-square analysis of these data tests the null hypothesis that the existence of (a) backend legal system(s) does not correspond to the presence of front-end legal systems. Here the null hypothesis is rejected with n=64, df=2, Pearson's Chi-Square = 7.738, $p<.05$. Furthermore, Cramer's V, a measure of the strength of the relationship [Field, 2000], is 0.386 ($p<.05$), which is quite consistent with relationship strengths reported elsewhere.

V. DISCUSSION AND CONCLUSIONS

In this paper we measured website levels of Russian "state level" official websites for 2003 and 2004, and attempted to correlate those levels with the overall level of e-government in these regions. Our hope was to be able to add to our understanding of whether or not website measurements alone can be a surrogate for overall e-government levels.

Evidence to confirm or reject Hypothesis (1) in Section II is quite mixed. Table 10 shows that the most variance explained ranged from 16% to 33%, with an average of about 24%. The N's (number of regions) varied from 29 to 72. Although the percentage of variance explained is relatively low, what commands attention is the consistency of the results across so many measures. We can go no further than to say that our website level measures of e-government reflect something like one quarter of the overall differences in the regions we were able to study. We believe that the best way to interpret these results is to say that e-government websites are *loosely coupled* to the overall degree of e-government development. The looseness of the coupling is expressed by using a two-tailed test, i.e. in not presuming whether website levels are a consequence of overall e-government levels or vice versa. Furthermore, it is expressed in a lack of certainty about the lag effects of e-government policies. For example, spending in a 2002 budget might find its expression only in the 2004 website levels.

Thus, we reach the following conclusions about the relationship between assessments of e-government websites and the overall level of e-government development:

- We found moderate evidence to reject Hypothesis (1) in Section II that no relationship exists. We believe that for Russian regions, roughly speaking, about one-quarter of the variation in website levels is explained by variations in the overall levels of e-government and vice versa. Further research will be needed to see how well our qualitative evaluation of this evidence holds in other countries and regions.

Table 10. Final Summary of Correlation Results

Measure of Informatization in Regions	Most variance explained	Number of "significant" relationships	Lowest N	Highest N
Informatization programs in the Regions	Website level means rise as expected across categories from no plans to either conceptions or programs		69	72
IT Spending in the Regional Government	28%	4 of 8	47	48
Presence of IT Personnel, Equipment and Networks in the Regional Government	33%	10 of 10	25	60
CBIS in Regional Government	16%	6 of 8	29	42

- Although not emphasized in this paper, Appendix III shows that very few of the Russian websites currently provide services. One would expect that once services come into the picture, coupling with other e-government developments would need to become stronger. We saw some evidence to support this view with the legal databases. The absence of services on the website, however, does not necessarily imply the absence of CBIS to implement them internally.
- For countries and regions at earlier stages of the development of e-government (i.e., like Russia, the large majority in the world at present), the state of the websites may, paradoxically, not be as indicative of the overall state of e-government as one might think. Governmental entities may be able to create websites that look very good, and are well populated, without necessarily putting in a lot of other e-government investment or systems. On the other hand, governments that are investing heavily in internal functions may not have sufficient resources (or may choose not) to provide interfaces to those functions via the web.
- Thus, E-government ratings or rankings that are based exclusively on evaluations of websites will not correctly portray the exact relative relationship of the entities in question with respect to the overall development of e-government. *It is hazardous to draw too many conclusions about e-government from relative rankings based only on the websites.*

Finally, this paper underscores the need to seek other explanations for why the websites may vary as much as they do. Our content analysis of a small sample of the informatization programs found that developing websites in these Russian regions was only one of a number of priorities. Regions may be in no hurry to invest in websites when a small proportion of the populace uses the Internet. These and other explanations, including the idea that the websites may exist only to give a (false) impression of democracy in a region [Katchanovski and LaPorte, 2005], remain to be investigated—if and when suitable data for doing so can be obtained.

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REFERENCES

EDITOR'S NOTE: The following reference list contains hyperlinks to World Wide Web pages. Readers who have the ability to access the Web directly from their word processor or are reading the paper on the Web, can gain direct access to these linked references. Readers are warned, however, that

1. these links existed as of the date of publication but are not guaranteed to be working thereafter.
2. the contents of Web pages may change over time. Where version information is provided in the References, different versions may not contain the information or the conclusions referenced.
3. the author(s) of the Web pages, not AIS, is (are) responsible for the accuracy of their content.
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Accenture (2004) *eGovernment Leadership: High Performance, Maximum Value. E-Government Executive Series*, May, http://www.accenture.com/xdoc/en/industries/government/gove_egov_value.pdf (Current Jan. 12, 2005)

Azrael, J. R., and D. J. Peterson (2002) "Russia and the Information Revolution," *RAND Corp. Issue Paper IP-229-CRE*, http://www.rand.org/publications/IP/IP229/IP229.pdf (Current Feb. 27, 2005)

Baum, C. and A. Di Maio (2000), *Research Note: Gartner's Four Phases of E-Government Model*, Tutorials, TU-12-6113, Nov. 21, aln.hha.dk/IFI/Hdi/2001/ITstrat/Download/Gartner_eGovernment.pdf (Current Jan. 10, 2005)

Beniger, J. (1989) *The Control Revolution: Technological and Economic Origins of the Information Society*, Cambridge, MA: Harvard University Press.

Cap Gemini Ernst & Young (2003) *Online Availability of Public Services: How Does Europe Progress*, January, http://www.capgemini.com/news/2003/egovfull.zip (Current Apr. 15, 2005)

Chazan, G. (2005, April 27) "In Putin's Russia, Business Struggles for a Foothold," *The Wall Street Journal*, pg. A1

Conyngham, W. J. (1980) "Technology and Decision Making: Some Aspects of the Development of OGAS," *Slavic Review*, Sept., 39(3), pp. 426-445

Cullen, R. and C. Houghton (2000) "Democracy Online: An Assessment of New Zealand Government Web Sites," *Government Information Quarterly*, 17(3), pp. 243–267

Cyberspace Policy Research Group (2000) Website Attribute Evaluation System, http://www.cyprg.arizona.edu/waes.html (Current April 26, 2005)

Deloitte and Touche (2001) "The Citizen as Customer," *CMA Management* 74(10), Dec.-Jan., p. 58

Field, A. (2000) *Discovering Statistics using SPSS for Windows*, London: Sage

Flak, L.S., D.H. Olsen, and P. Wolcott (2005) "Local E-Government in Norway: Current Status and Emerging Issues," *Scandinavian Journal of Information Systems* 17(2), pp 41-84.

Grant, G. and D. Chau (2005) "Developing a Generic Framework for E-Government," *Journal of Global Information Management*, Jan-Mar., 13(1), pp. 1-30

Hafeez, S. (2003) *United Nations Global E-government Survey 2003*, http://unpan1.un.org/intradoc/groups/public/documents/un/unpan016066.pdf (Current Feb. 22, 2005)

Hafeez, S. (2004) United *Nations Global E-Government Readiness Report 2004*, http://unpan1.un.org/intradoc/groups/public/documents/un/unpan019207.pdf (Current Jan. 10, 2005)

Hale, M., J. Musso, and C. Weare (1999) "Developing Digital Democracy: Evidence from Californian Municipal Web Pages," in Hague, B. N. and B. D. Loader, eds., *Digital Democracy: Discourse and Decision Making in the Information Age*, New York: Routledge, pp. 96-115

Heeks, R. (1999) "Reinventing government in the information age," Heeks, R., Ed., *Reinventing Government in the Information Age*, London and New York: Routledge, pp. 9-12

Hiller, J. S. and F. Bélanger (2001) *Privacy Strategies for Electronic Government*, http://www.businessofgovernment.org/pdfs/HillerReport.pdf (Current Jan. 10, 2005)

Ho, A. T. (2002) "Reinventing Local Governments and the E-Government Initiative," *Public Administration Review*, July/August, 62(4), pp. 434-444

Katchanovski, I. and T. LaPorte (2005) "Cyberdemocracy Or Potemkin E-Villages: Electronic Governments In OECD and Post-Communist Countries," Forthcoming, *International Journal of Public Administration*, 28 (7-8) pp. 665-681

Kaylor, C., R. Deshazo, and D. Van Eck (2001) "Gauging e-government: A Report on Implementing Services Among American Cities," *Government Information Quarterly*, (18)4, pp. 293-307

King, J. L. et al. (1994) "Institutional Factors in Information Technology Innovation," *Information Systems Research* 5(2), pp. 139-169.

Koh, C. E. and V. R. Prybutok (2003) "The Three Ring Model and Development of an Instrument for Measuring Dimensions of E-government Functions," *Journal of Computer Information Systems*, 43(3), pp. 34-39

Kubicek, H., H. Westholm, and R. Winkler (2003) "eDemocracy," *Prisma Strategic Guideline 9, Information Societies Technologies (IST) Programme*, April, http://www.prisma-eu.net/deliverables/sg9democracy.pdf (Current Feb. 20, 2005)

Layne, K. and J. Lee (2001) "Developing Fully Functional E-government: A Four Stage Model," *Government Information Quarterly* 18(2), pp. 122-136.

Lisitsyn, V. G. (2002) *State of Informatization of the Regions of the Russian Federation* [in Russian], Moscow, Dec., http://www.vniipvti.ru/irrf/irrf.htm (Current April 9, 2005)

Lisitsyn, V. G. (2003) *Basic Results of Monitoring the State of Work on Informatization of the Regions*, Book 1 [in Russian], Moscow, Dec., http://www.vniipvti.ru/irrf/irrf.htm (Current April 9, 2005)

McHenry, W. and A. Borisov (2006) "E-Government and Democracy in Russia," *Communications of the Association for Information Systems* 17(48), pp. 1064-1123.

McHenry, W. K. and S. E. Goodman (1986) "MIS in Soviet Industrial Enterprises: The Limits of Reform from Above," *Communications of the ACM*, 29(11), pp. 1034-1043

McHenry, W. K., K. J. Lynch, and J. M. Snyder (1990) "Cross-Cultural Information Technologies Research: The Case of Eastern Europe and the USSR," in DeGross, J., M. Alavi, and H. Oppelland, eds. (1990) *Proceedings of the Eleventh International Conference on Information Systems, Dec. 16-19, 1990, Copenhagen, Denmark*, Baltimore, Maryland: ACM Press, pp. 73-86

MERT (Ministry of Economic Development and Trade of the Russian Federation) (2004) "Contest 'Best Region in the Sphere of IT' [in Russian]," Website, http://www.region2003.ru/ (Current April 14, 2005)

MERT (2005) Review of the State of the Sections on Informatization on Portals of the Regions of the Russian Federal, prepared by the Minekeonomrazvitiya Rossii (as of January, 2005) [in Russian], http://www.elrussia.ru/36421 (Current May 3, 2005).

Moon, J. M. (2002) "The Evolution of E-Government among Municipalities: Rhetoric or Reality?" *Public Administration Review* (62:4), July/August, pp. 424-433

Perfil'yev, Yu. Yu. (2003) *Russian Internet Space - Development and Structure* [in Russian], Moscow: Gardariki.

Peterson, D. J. (2005) "Russia and the Information Revolution," RAND Corporation Report MG-422, http://www.rand.org/pubs/monographs/MG422/ (Current April 3, 2006)

Public Opinion Foundation (2003) 'Internet in Russia' Polls [in Russian], The Public Opinion Foundation, No. 4, Summer, http://bd.fom.ru/report/map/o030401 (Current Nov. 16, 2003)

Reyman, L. (2003) Information Technologies in the Work of the Federal Governmental Agencies [in Russian], *Vestnik Svyazi International*, No. 9(3), http://www.vestnik-sviazy.ru/inter/arch/0903/info.html, pp. 1-8 (Current Dec. 11, 2003)

RosBiznesKonsalting (2003) "Does Electronic Government in the Regions Govern?" [in Russian], *Cnews Analytics*, Jan. 20, http://www.cnews.ru/newcom/index.shtml?2003/01/20/139947 (Current Nov. 20, 2003)

Russian Federation Government (2002) *Appendix to RF Decree No. 65 of Jan. 28, 2002 Measures of FTsP 'Electronic Russia' (2002-2010)*, http://www.internet-law.ru/law/erus/fcp/003.htm (Current April 29, 2005)

Siau, K., and Y. Long (2004) "Factors Impacting E-Government Development," in Agarwal, R., L. Kirsch and J. DeGross, Eds., *Proceedings of the Twenty-Fifth International Conference on Information Systems, Dec. 12-15, 2004, Washington, D.C.*, 221-234

Soh, Christina and M. Lynne Markus (1995) "How IT Creates Business Value: A Process Theory Synthesis," *Proceedings of the Sixteenth International Conference on Information Systems, Amsterdam, The Netherlands*, pp. 29-41

Wescott, C. G. (2002) E-Government in the Asia-Pacific Region, http://www.adb.org/Documents/Papers/E_Government/egovernment.pdf (Current April 26, 2005)

West, D. M. (2004) "E-Government and the Transformation of Service Delivery and Citizen Attitudes," *Public Administration Review* (64:1), pp. 15-27

West, D. M. (2004b) Global E-Government, http://www.insidepolitics.org/egovt04int.pdf (Current Jan. 10, 2005)

West, D. M. (2004c) State and Federal E-Government in the United States, http://www.insidepolitics.org/egovt04us.pdf (Current April 23, 2005)

APPENDIX I: MEASURES SELECTED FOR THIS STUDY

In this Appendix, we examine prior benchmarking studies of e-government to provide the rationale for why we chose the measures that we chose for this study. Then we present the tables of measures themselves.[18]

A large number of studies have now been performed that have attempted to categorize e-government developments from the supply side. A number of authors assigned functions to stages (Table 11) and then characterized or proposed characterizing countries or governments by the extent to which their efforts fall into these various stages. The stage model authors generally assume some path dependence in functionality—certainly without the initial automation of certain functions and the creation of the infrastructure, further integration cannot take place. They foresee the highest or final stage as the provision of "one-stop shopping" for citizens where different levels of governments and different departments work together to provide a single, transparent portal through which all citizen business can be transacted.

However, while the beginning and end points may be clear, the path in between is not. The 2003 United Nations E-Government survey of 191 countries found no strict path dependency:

> "Whereas the majority of countries could be considered well within stage II (enhanced presence) the stages of e-government were not additive beyond a certain threshold. Whereas countries at the initial stages of an emerging presence or enhanced presence could be said to be at stage I or II, they could - and do - quickly proceed to a level where they incorporate features of stage IV (transactional presence) or even stage V (networked presence)" [Hafeez, 2003, p. 40]

Moon also acknowledges that stages are an analytical convenience that may not reflect actual technology diffusion paths [Moon, 2002].

Only some of the models suggest an additional stage of "digital democracy." Steven Clift asserts that putting digital democracy as a final stage is detrimental, taking resources away from efforts to create greater citizen participation during earlier stages [Kubicek et al., 2003]. Accenture includes "e-democracy" as one of twelve "sectors" it studies, e.g. education; human services, etc. [Accenture, 2004].

Hence, we did not adopt a specific "stage" orientation in our measures, and examined various scales that have been proposed and used over the past decade. Some of these are academic, and openly available, while others remain within the realm of consulting firms. As one might expect, each scale is weighted more or less heavily towards a given set of functions, a certain strategic focus, or a certain conception of e-government stages—which is understandable given the evolving capabilities and roles of IT and e-government. (Indeed, would we try to characterize the state of the use of IT by a single firm, let alone all the firms in a country, using a single set of measures?)

Three types of measures have been devised and used for evaluating e-government website content:

- Binary – tracks the presence or absence of a certain well-defined feature, characteristic, service, etc.
- Count – counts the number of a certain type of feature or service without explicitly recording what it is

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[18] Since this study was performed using the same dataset as [McHenry and Borisov, 2006], some paragraphs describing the measures are reproduced from that work.

- Threshold – establishes level of completeness or intensity for a certain well-defined feature, characteristic, etc.

Table 11. Various Stage Models of Online E-Government Development

Stages					Source
Presence/ Information	Communication/ Transactions		Integration	Digital Democracy	
(1) Presence	(2) Interaction	(3) Transaction	(4) Transformation			[Baum and Di Maio, 2000]
(1) Internal Systems, (2) Inter-organizational and public access to information	(3) 2-way communi-cation	(4) Exchange of value	(6) Joined-up government		(5) Digital Democracy	[Wescott, 2002]
(1) Information publishing/ dissemi-nation	(2) Official two-way transaction	(3) Multipurpose portals	(4) Portal personal-ization	(5) Clustering of common services, (6) Full integration and enterprise transaction		[Deloitte and Touche, 2001]
(1) Information	(2) Two-way communi-cation	(3) Transaction	(4) Integration		(5) Political participa-tion	[Hiller and Bélanger, 2001]
(1) Cataloguing	(2) Transaction		(3) Vertical Integration	(4) Horizontal Integration		[Layne and Lee, 2001]
(1) Information	(2) Two-way communi-cation	(3) Service and financial transaction	(4) Vertical and horizontal transaction		(5) Political participation	[Moon, 2002]
(1) The Billboard Stage	(2) The Partial-Service-Delivery		(3) The Portal Stage		(4) Interactive Democracy	[West, 2004]
(1) Emerging presence, (2) Enhanced presence	(3) Interactive presence	(4) Transactional presence	(5) Networked presence			[Hafeez, 2004]

Source: Adapted and Expanded from [Siau and Long, 2004]

The United Nations Web Measure Index (WMI) and most of the measures in Darryl West's studies at Brown University illustrate binary measures. The West studies avoid any arbitrariness

in judgment by counting the presence or absence of features on a binary scale, considering a transactional capability to be present only if it can be fully completed online [West, 2004b].

The Municipality eGovernment Assessment Project (MeGAP) methodology, created by Kaylor et al. for U.S. municipal governments[19] [Kaylor et al., 2001], also uses threshold measures, as do Accenture [Accenture, 2004] and Cap Gemini Ernst and Young [Cap Gemini Ernst & Young, 2003] (Table 2). Both West [West, 2004b] and the Cyberspace Policy Research Group (CyPRG) [Cyberspace Policy Research Group, 2000] have used counting measures; West counted the number of complete services present, and CyPRG counted number of downloadable forms, among others. The United Nations uses a separate threshold scale (called the Participation Index) to track intensity or completeness of features, with a scale of zero=never; 1 = sometimes; 2 = frequently; 3 = mostly; and 4 = always [Hafeez, 2004].[20]

All three types of measures have minuses. Binary scales can lead to equivocation about what is yes and what is no (if just a little is present, does it qualify?).[21] Creating a comprehensive and discrete taxonomy of all features and services is a difficult task, especially as websites can change frequently. Counting alleviates this problem but then precludes exact comparisons. A comprehensive list may be over-fitted to current conditions. It is clear from Table 12 that threshold scales are generally used only in conjunction with a limited number of indicators, countries, or both.

In our view the best solution is to pick a central set of indicators that 1) represent range of e-government issues of interest; 2) are reasonably consistent with and applicable to the websites under analysis (permitting reasonable distinctions to be made); and 3) reflect the general consensus about stages that emerges from Table 1 without necessarily assuming these areas will be ordered this way. The four central areas/stages are information, communications / participation, action / transactions, and integration.[22] Following the lead of Clift [Kubicek et al., 2003], we do not assume digital democracy is separate from these four areas, but consider it to be integrated with them. Binary scales are best, but when this would obscure important qualitative differences, the indicator is be divided by thresholds into two or more indicators that will then be binary in nature.

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[19] This scale has recently been applied to Norwegian municipal governments [Flak et. al, 2005].

[20] Cullen and Houghton, studying New Zealand government websites, focused on information content and ease of use. They evaluated the sites using a five point scale: 5 meets all criteria in exemplary manner; 4 meets all criteria in a basic manner; 3 meets most criteria (some extremely well); 2 meets some criteria in a basic form; 1 meets a few of the criteria; 0 meets none of the criteria [Cullen and Houghton, 2000]. Distinguishing between a "5" and a "4" cannot be easy.

[21] One can easily see how classifications can proliferate. For example, as soon as the category "elected official biographies" is established, should one check it off if there are press releases on the site with biographical information about the official? Or should one simply create a category called "information about officials" and check it off if a single instance of information is found?

[22] Koh and Prybutok grouped 31 categories from the MeGAP framework into three categories: informational, transactional, and operational uses. Although they verified the distinctness of these three categories using a survey of government employees and factor analysis, their "Operational-Online Customer Service" category covers two areas that most authors divide: services, on the one hand, and communications means such as forums and discussions, on the other. It is also hard to see why some items are transactions but others, such as renewing a permit, are just operations [Koh and Prybutok, 2003]. Ho examined 52 municipal government websites in 2000, categorizing them as having an administrative, informational, or user orientation [Ho, 2002]; however, he did not explicitly identify the factors he used in his analysis.

Table 12. Threshold Measures Adopted in E-Government Studies

Source / Measure	MeGAP	Accenture	Cap Gemini Ernst & Young
Information	1. information about a given topic exists at the website	"Publish" level indicates no communication either way besides what is published	Just information available
Contact	2. link to relevant contact (either a phone number or email address) exists at the website	"Interact" level includes C2G but not necessarily G2C communication	One-way interaction
Form	3. downloadable forms available online on a given topic		
Transaction	4. transaction or other interaction can take place completely online	"Transact" includes C2G and G2C communication	Two-way interaction
			Full-completion of the service

Sources: [Kaylor et al., 2001], [Accenture, 2004], [Cap Gemini Ernst & Young, 2003]. For each service or feature evaluated, these systems assign either point values for different levels or characterize them in words.

Table 13. Scope and Scale of Selected E-Government Website Content Studies

Source	Scope	Type of Scale	Number of Indicators	Related to Stages
UN Web Measurement Index [Hafeez, 2003 and 2004]	191 countries; limited number of top sites	binary	288	Not explicit
[West, 2004b]	198 countries; top-level governmental	binary/counting	21	Not explicit
[Cyberspace Policy Research Group, 2000]	191 countries; mostly national sites	binary/counting	46	No; grouped in categories
UN E-Participation Index [Hafeez, 2003 and 2004]	191 countries; limited number of top sites	threshold	21	No; grouped in categories

MeGAP [Kaylor et al., 2001]	224 U.S. Municipalities	threshold	55	No; grouped in categories
[Cap Gemini Ernst & Young, 2003]	18 European countries	threshold	20	No
[Accenture, 2004]	22 countries; national agencies	threshold	206	Maturity related to thresholds
[Hale et al., 1999]	214 California cities represented by 270 sites	all three	125	No; grouped in categories

In the following four tables, we list all of the measures that we used for the Wave 1 and Wave 2 data collection in late 2003 and late 2004, respectively.[23]

Table 14. Information Measures Selected for this Study

No.	General Description	Assignment Criteria for One Point	Type of Measure
1	Electronic presence	Existence of an official site for the administration of the region	Binary
2	General information about the region	Information about history, geographic situation, religions, population	threshold: sometimes
3		Information about economic situation, economic development, branches of industry, investment activity	threshold: sometimes
12	Presence of additional information about the life of the region	Information about news of the region, wire service of events	threshold: sometimes
13		Information about events and activities in areas such as leisure, culture, calendar of events	threshold: sometimes
4	Information about the upper level of the administration of the regional organs of power	Information about the governor, his/her deputies, the head of the administration and his/her deputies, and information about a few heads of ministries and departments	threshold: frequently, mostly
5		Information about all regional ministries and departments	threshold: always

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[23] The reader will please forgive the No. column, which does not show the measures in order. After collecting the data we reorganized their presentation slightly, but chose to keep these numbers so as not to inadvertently mix up the results.

No.	General Description	Assignment Criteria for One Point	Type of Measure
6	Information about the middle level of management, about functions and contact information of the subdivisions	Information about bureaucrats of a lower level (deputy ministers, heads of departments, executives).	threshold: frequently, mostly
7		Information for all ministries and departments to the level of the heads of departments and lower, with functions, tasks, and responsibilities of subdivisions	threshold: always
8	Information about the work of the regional authority	Presence on the site of reports of the government about past budget, programs, and plans.	threshold: frequently
9		Future & present regional plans, programs, directions of governmental activities.	threshold: frequently
10	Legal and normative information	Presence on the site of texts of regional laws, resolutions, and declarations of the regional leader/government.	threshold: sometimes
11		Broad listing of regional laws, resolutions, and declarations with texts, data base of regional jurisprudence	threshold: always
14	Possibility to perform a search on the site	Search functions present based on a part of the materials (news division)	threshold: sometimes
15		Search functions for all the material on the site	threshold: always
33	Freshness of Information on the Site	Freshness of News	threshold: sometimes
34		Freshness of Documents in Other Sections of the Site	threshold: sometimes

Table 15. Selected Communications / Participation Measures

No.	General Description	Assignment Criteria for One Point	Type of Measure
17	Presence on the site of elements of feedback	Existence of a means to contact the government, be it email or form	Binary
18		Structured form that has choices for any of these things: topics and/or destinations	Binary
21	Interactions with officials using electronic mail	Presence of email addresses for government officials, for a number of executives	threshold: frequently, mostly
22		Presence of email addresses for the large majority of bureaucrats, information about which is present on the site	threshold: always

19	Presence of forums for interaction with citizens	Presence of a forum or guestbook on which the citizens can write their comments for other citizens to see	Binary
20		Answers are posted from responsible officials as well as the questions	Binary

Table 16. Action / Transaction Measures Selected for this Study

No.	General Description	Assignment Criteria for One Point	Type of Measure
16	Presence on the site of electronic forms of documents	Presence on site of possibility to download forms to be filled out and submitted "off-line."	threshold: sometimes
23	Possibility to fill out electronic forms	Possibility to fill out forms to request information about previously submitted documents and inquiries	threshold: sometimes
24		Presence of the possibility of filling out forms on the site that can be submitted, transmission of information	threshold: sometimes
25	Possibility to carry out electronic payments	Payment of municipal, transport expenditures, taxes and so forth, etc. using the Internet	threshold: sometimes
26	Business license application process	Possibility to obtain / to renew a regional and state license from the regional site	threshold: sometimes
27	Filling out of tax declarations	Possibility for citizens / organizations to solve tax problems of all levels from one regional site	threshold: sometimes

Table 17. Integration Measures Selected for this Study

No.	General Description	Assignment Criteria for One Point	Type of Measure
31	Upwards and downwards links	Links to/addresses of federal ministries representative offices in this subject	threshold: sometimes
32		Links to lower level municipalities/officials (contact or hyperlinks)	threshold: sometimes
28	Appearance of regional level databases	Unification of regional level information resources	threshold: sometimes
29	Simultaneous availability of an integrated set of services	Ability for citizens / organizations to obtain a whole set of state services from one electronic place	threshold: sometimes
30	Databases across different functional areas	Unification of databases of various different functional areas with the possibility to submit single queries	threshold: sometimes

APPENDIX II: WEBSITES EVALUATED FOR THIS STUDY

Region	Website (late 2004)
Adygeya Republic	http://www.adygheya.ru
Aginskiy Buryatskiy Autonomous Okrug	http://www.aginskoe.ru
Altay Republic	http://www.altai-republic.com
Altayskiy Kray	http://www.altairegion.ru
Amurskaya Oblast'	http://www.amurobl.ru
Arkhangel'skaya Oblast'	http://www.dvinaland.ru
Astrakhanskaya Oblast'	http://www.astrobl.ru
Bashkortostan Republic	http://www.bashkortostan.ru
Belgorodskaya Oblast'	http://beladm.bel.ru
Bryanskaya Oblast'	http://www.admin.debryansk.ru
Buryatiya Republic	http://egov-buryatia.ru
Chechenskaya Republic	http://chechnya.dada.ru/officials/admin.html
Chelyabinskaya Oblast'	http://www.ural-chel.ru
Chitinskaya Oblast'	http://obladm.chita.ru
Chukotskiy Autonomous Okrug	http://www.chukotka.org
Chuvashskaya Republic	http://www.cap.ru
Dagestan Republic	http://www.e-dag.ru
Evenkiyskiy Autonomous Okrug	http://www.evenkya.ru
Ingushetiya Republic	http://ingushetia.ru
Irkutskaya Oblast'	http://www.admirk.ru
Ivanovskaya Oblast'	http://ivadm.ivanovo.ru
Kabardino-Balkarskaya Republic	http://www.nalnet.ru
Kaliningradskaya Oblast'	http://www.gov.kaliningrad.ru
Kalmykiya Republic	http://kalm.ru/ru
Kaluzhskaya Oblast'	http://admobl.kaluga.ru
Kamchatskaya Oblast'	no site
Karachaevo-Cherkesskaya Republic	http://www.kchr.info
Kareliya Republic	http://gov.karelia.ru

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Region	Website (late 2004)
Kemerovskaya Oblast'	http://www.kemerovo.su
Khabarovskiy Kray	http://www.adm.khv.ru
Khakasiya Republic	http://www.gov.khakassia.ru
Khanty-Mansiyskiy Autonomous Okrug	http://www.hmao.wsnet.ru
Kirovskaya Oblast'	http://www.gov-vyatka.ru
Komi Republic	http://www.rkomi.ru
Komi-Permyatskiy Autonomous Okrug	no site
Koryakskiy Autonomous Okrug	no site
Kostromskaya Oblast'	http://kos-obl.kmtn.ru
Krasnodarskiy Kray	http://admkrai.kuban.ru
Krasnoyarskiy Kray	http://www.krskstate.ru
Kurganskaya Oblast'	http://admobl.kurgan.ru
Kurskaya Oblast'	http://region.kursk.ru
Leningradskaya Oblast'	http://www.lenobl.ru
Lipetskaya Oblast'	http://www.admlr.lipetsk.ru
Magadanskaya Oblast'	http://www.magadan.ru
Mariy El Republic	http://gov.mari.ru
Mordoviya Republic	http://whrm.moris.ru
Moscow	http://www.mos.ru
Moskovskaya Oblast'	http://www.mosreg.ru
Murmanskaya Oblast'	http://gov.murman.ru
Nenetskiy Autonomous Okrug	no site
Nizhegorodskaya Oblast'	http://www.government.nnov.ru
Novgorodskaya Oblast'	http://region.adm.nov.ru
Novosibirskaya Oblast'	http://www3.adm.nso.ru
Omskaya Oblast'	http://www.omskportal.ru/default.asp
Orenburgskaya Oblast'	http://www.orb.ru
Orlovskaya Oblast'	http://www.adm.orel.ru
Penzenskaya Oblast'	http://www.obl.penza.net

Region	Website (late 2004)
Permskaya Oblast'	http://www.perm.ru
Primorskiy Kray	http://www.primorsky.ru
Pskovskaya Oblast'	http://www.pskov.ru
Republic of Sakha (Yakutiya)	http://www.sakha.gov.ru
Rostovskaya Oblast'	http://www.donland.ru
Ryazanskaya Oblast'	http://www.gov.ryazan.ru
Sakhalinskaya Oblast'	http://www.adm.sakhalin.ru
Samarskaya Oblast'	http://www.adm.samara.ru
Saratovskaya Oblast'	http://www.gov.saratov.ru
Severnaya Osetiya - Alaniya Republic	http://president.osetia.ru/resp.htm
Smolenskaya Oblast'	http://admin.smolensk.ru
St. Petersburg	http://www.gov.spb.ru
Stavropol'skiy Kray	http://www.stavKray.ru
Sverdlovskaya Oblast'	http://www.midural.ru/midural-new
Tambovskaya Oblast'	http://www.regadm.tambov.ru
Tatarstan Republic	http://www.tatar.ru
Taymyrskiy (Dolgano-Nenetskiy) Autonomous Okrug	http://www.taimyr.ru
Tomskaya Oblast'	http://www.tomsk.gov.ru
Tul'skaya Oblast'	http://www.region.tula.ru
Tuva Republic	http://gov.tuva.ru
Tverskaya Oblast'	http://www.region.tver.ru
Tyumenskaya Oblast'	http://admtyumen.ru
Udmurtskaya Republic	http://www.udmurt.ru
Ul'yanovskaya Oblast'	http://www.ulyanovsk-adm.ru
Ust'-Ordynskiy Buryatskiy Autonomous Okrug	http://www.ust-orda.ru
Vladimirskaya Oblast'	http://avo.ru
Volgogradskaya Oblast'	http://www.volganet.ru
Vologodskaya Oblast'	http://www.vologda-Oblast'.ru
Voronezhskaya Oblast'	http://admin.vrn.ru

Region	Website (late 2004)
Yamalo-Nenetskiy Autonomous Okrug	http://www.dispi.ru
Yaroslavskaya Oblast'	http://www.adm.yar.ru
Yevreyskaya Autonomous Oblast'	http://www.eao.ru

APPENDIX III: SPECIFIC WEBSITE FUNCTIONS FOUND

Since the main purpose of this paper is to examine the relationship between the website levels as a whole and other back-end metrics, we have relegated the specifics about what functions are present on the websites to this appendix. Given the difficulties of using the website levels as a whole, we have not tried analysis with summaries of functions for each of the four areas of Information, Communication / Participation, Action / Transaction, or Integration. We include these results for readers who want a better idea of what is happening with these websites.

The 2002 RBK survey served as a baseline on the status of official regional sites.[24] It was performed as part of a contest to nominate and award the best regional e-governmental portals [RosBiznesKonsalting, 2003]. The sites were characterized in general as follows:

> "Many web-presences of administrations are of the so-called 'nominal' type, if only because the sites enumerate the heads of the administration and governmental departments. The remaining portions of such sites look like news wire service sites for the region or like an entertainment-information portal with a description of local attractions, entertainment-event posters, and cultural life announcements."

The report continues, "In Russia at the current time the transition from the stage of establishment to the stage of interaction of citizens with government is taking place" [RosBiznesKonsalting, 2003].

Our Wave 1 and Wave 2 surveys do nothing to dispel the idea that the governmental websites are oriented more towards dissemination of information than anything else. Table 18 shows the number of regions with various information features; in 2003 more than one-half of the regional sites had at least some aspects of all the information features we tracked, while by 2004 that percentage had grown to three-fifths. Nevertheless, in each paired category (e.g., 4-5, 6-7, 8-9, 10-11, 12-13, 14-15, 33-34) where the second item in each pair may be considered to have a higher threshold than the first, the percentage of regions with that characteristic drops. This drop is most precipitous for three categories that reveal a great deal about the structure, activities, and outcomes of government: information about structure and functions for all ministries and departments (20.0% of regions), a wide selection of laws and regulations available in a searchable database (21.2% of regions), and future and present plans for governmental activities (44.7% of regions). There has been improvement in virtually all categories from 2003 to 2004, but only 50% of the sites in 2004 had comprehensive search functions to help users find needed information.

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[24] A prior baseline is provided by Perfil'yev. By March, 2000, 65 regions had sites, in Jan. 2001, 69 had sites, and in May, 2002, as RBK found, 83 had sites [Perfil'yev, 2003]. Perfil'yev reported that the information on the servers was limited to information about the regional administration ("with the mandatory biography of the governor"), information about the region, a small selection of laws and administrative acts, and "in the best of cases a selection of news that is far from being of prime freshness" [Perfil'yev, 2003, p. 160]

In the area of communication and participation (Table 19), the same pattern can be observed with respect to depth. Most sites have a means to contact officials via email or form (almost 79%), but only about 15% have extensive listings of email addresses for officials up and down the hierarchy. On about 35% of the sites, answers by responsible official to citizen questions are posted, and this category showed a large jump from 2003.

While it can be concluded that most regions have a least some form of communications / participation present on their sites, the extent to which services have been implemented is strikingly less (Table 20). The number of regions that are at least providing a small number of downloadable forms (we usually had to look far and wide even to find a few) jumped from 10% in 2003 to about 32% in 2004. Other than a couple of options in St. Petersburg and Moscow, we found no examples of electronic transactions that can be carried out on any of these websites.

Table 18. Regional Websites with Information Features

No.	Categories for Information		2003			2004		
			0	1	%-1	0	1	%-1
1	Electronic presence	Found websites	9	80	89.9%	4	85	95.5%
2	General information about the region	Information about history, geographic situation, religions, population	4	76	95.0%	6	79	92.9%
3		Information about economic situation, economic development, branches of industry, investment activity	7	73	91.3%	6	79	92.9%
4	Information about the upper level of the administration of the regional organs of power	Information about the governor, his/her deputies, the head of the administration and his/her deputies, and information about a few heads of ministries and departments	3	77	96.3%	4	81	95.3%
5		Information about all regional ministries and departments	22	58	72.5%	26	59	69.4%
6	Information about the middle level of management, about functions and contact information of the subdivisions	Information about bureaucrats of a lower level (deputy ministers, heads of departments, executives).	35	45	56.3%	32	53	62.4%
7		Information for all ministries and departments to the level of the heads of departments and lower, with functions, tasks, and responsibilities of subdivisions	73	7	8.8%	68	17	20.0%
8	Information about the work of the regional authority	Presence on the site of reports of the government about past budget, programs, and plans.	27	53	66.3%	22	63	74.1%
9		Future & present regional plans, programs, directions of governmental activities.	60	20	25.0%	47	38	44.7%
10	Legal and normative information	Presence on the site of texts of regional laws, resolutions, and declarations of the regional leader/government.	32	48	60.0%	28	57	67.1%
11		Broad listing of regional laws, resolutions, and declarations with texts, data base of regional jurisprudence	61	19	23.8%	67	18	21.2%

12	Presence of additional information about the life of the region	Information about news of the region, wire service of events	1	79	98.8%	2	83	97.6%
13		Information about events and activities in areas such as leisure, culture, calendar of events	31	49	61.3%	27	58	68.2%
14	Possibility to perform a search on the site	Search functions present based on a part of the materials (news division)	32	48	60.0%	29	56	65.9%
15		Search functions for all the material on the site	33	47	58.8%	42	43	50.6%
33	Freshness of Information on the site	Freshness of News	Not tracked			4	81	95.3%
34		Freshness of Documents in Other Sections of the Site				18	67	78.8%

Finally, these sites are showing only the most rudimentary level of integration (Table 21). In 2004 more than half the sites did provide links to municipal sites or information about municipalities and sub-regions within the region, and about 35% provided links to federal ministry representative offices in the region. There were no signs of "one-stop shopping," "joined-up government," joint databases, or anything of that nature.

Table 19. Regional Websites with Communication / Participation Features

No.	Categories for Contact / Participation		2003			2004		
			0	1	%-1	0	1	%-1
17	Presence on the site of elements of feedback	Existence of a means to contact the government, be it email or form	14	66	82.5%	18	67	78.8%
18		Structured form that has choices for any of these things: topics and/or destinations	66	14	17.5%	67	18	21.2%
19	Presence of forums for interaction with citizens	Presence of a forum or guestbook on which the citizens can write their comments for other citizens to see	56	24	30.0%	51	34	40.0%
20		Answers are posted from responsible officials as well as the questions	74	6	7.5%	55	30	35.3%
21	Interactions with officials using electronic mail	Presence of email addresses for government officials, for a number of executives	40	40	50.0%	33	52	61.2%
22		Presence of email addresses for the large majority of bureaucrats, information about which is present on the site	78	2	2.5%	72	13	15.3%

Table 20. Regional Websites with Actions / Transactions Features

No.	Categories for Action / Transaction		2003			2004		
			0	1	%-1	0	1	%-1
16	Presence on the site of electronic forms of documents	Presence on site of possibility to download forms to be filled out and submitted "off-line."	72	8	10.0%	58	27	31.8%
23	Possibility to fill out electronic forms	Possibility to fill out forms to request information about previously submitted documents and inquiries	78	2	2.5%	83	2	2.4%
24		Presence of the possibility of filling out forms on the site that can be submitted, transmission of information	80	0	0.0%	84	1	1.2%
25	Possibility to carry out electronic payments	Payment of municipal, transport expenditures, taxes and so forth, etc. using the Internet	80	0	0.0%	85	0	0.0%
26	Business license application process	Possibility to obtain / to renew a regional and state license from the regional site	80	0	0.0%	85	0	0.0%
27	Filling out of tax declarations	Possibility for citizens / organizations to solve tax problems of all levels from one regional site	80	0	0.0%	85	0	0.0%

Table 21. Regional Websites with Integration Features

No.	Categories for Integration		2003			2004		
			0	1	%-1	0	1	%-1
28	Appearance of regional level databases	Unification of regional level information resources	80	0	0.0%	85	0	0.0%
29	Simultaneous availability of an integrated set of services	Ability for citizens / organizations to obtain a whole set of state services from one electronic place	80	0	0.0%	85	0	0.0%
30	Databases across different functional areas	Unification of databases of various different functional areas with the possibility to submit single queries	80	0	0.0%	85	0	0.0%
31	Upwards and downwards links	Links to/addresses of federal ministries representative offices in this subject	Not tracked			55	30	35.3%
32	Upwards and downwards links	Links to lower level municipalities/officials (contact or hyperlinks)				40	45	52.9%

To summarize this initial survey of the sites, most sites are fulfilling basic functions of providing a wide range of information about the region and the regional government, but many lack depth. Similarly, possibilities for communication with governmental entities are quite widespread, but more extensive features, such as on-site forums, are fairly rare. Only the slightest moves have been made towards implementing services on these sites, and integration is not particularly visible.

APPENDIX IV: CORRELATIONS AMONG E-GOVERNMENT MEASURES

		2002 Planned Rubles Per Capita for IT	2002 Rubles Per Capita spent on IT	2003 Planned Rubles Per Capita for IT	Total number of IT Personnel in the Regional and Municipal Governments, 2003	Number of Users of Central Administration Network, if it exists, 2003	Number of PCs in the Regional Government (all branches), 2002	Number of Servers in the Regional Government (all branches), 2002	Number of Work Stations in the Regional Government (all branches), 2002	Total reported Functional CBIS's in Regional Government, 2003	Total reported Support CBIS's in Regional Government, 2003	Number of Regional Agencies with Functional CBIS, 2003	Number of Regional Agencies with Support CBIS, 2003
2001 Rubles Per Capita spent on IT	Pearson Cor.	0.83	0.38	0.20	0.44	0.35	0.54	0.56	0.35	0.73	0.06	0.60	0.43
	Sig. (2-tailed)	0.000	0.099	0.343	0.098	0.218	0.006	0.004	0.136	0.001	0.842	0.015	0.121
	N	27	20	24	15	14	25	24	20	16	14	16	14
2002 Planned Rubles Per Capita for IT	Pearson Cor.		0.49	0.42	0.50	0.54	0.55	0.58	0.42	0.67	-0.03	0.60	0.41
	Sig. (2-tailed)		0.021	0.041	0.067	0.059	0.004	0.002	0.056	0.005	0.929	0.013	0.169
	N		22	24	14	13	26	25	21	16	13	16	13
2002 Rubles Per Capita spent on IT	Pearson Cor.			0.95	0.47	0.68	0.79	0.83	0.75	0.46	0.57	0.42	0.30
	Sig. (2-tailed)			0.000	0.023	0.001	0.000	0.000	0.001	0.021	0.014	0.036	0.231
	N			40	23	20	20	19	16	25	18	25	18
2003 Planned Rubles Per Capita for IT	Pearson Cor.				0.61	0.30	0.55	0.53	0.48	0.31	0.40	0.27	0.19
	Sig. (2-tailed)				0.000	0.161	0.008	0.011	0.042	0.087	0.055	0.148	0.370
	N				30	24	22	22	18	31	24	31	24
Total number of IT Personnel in the Regional and Municipal Governments, 2003	Pearson Cor.					0.54	0.75	0.56	0.77	0.63	0.49	0.59	0.49
	Sig. (2-tailed)					0.021	0.003	0.061	0.009	0.005	0.087	0.010	0.093
	N					18	13	12	10	18	13	18	13
Number of Users of Central Administration Network, if it exists, 2003	Pearson Cor.						0.97	0.99	0.98	0.69	0.34	0.30	0.52
	Sig. (2-tailed)						0.000	0.000	0.000	0.006	0.272	0.297	0.083
	N						13	12	10	14	12	14	12

		2002 Planned Rubles Per Capita for IT	2002 Rubles Per Capita spent on IT	2003 Planned Rubles Per Capita for IT	Total number of IT Personnel in the Regional and Municipal Governments, 2003	Number of Users of Central Administration Network, if it exists, 2003	Number of PCs in the Regional Government (all branches), 2002	Number of Servers in the Regional Government (all branches), 2002	Number of Work Stations in the Regional Government (all branches), 2002	Total reported Functional CBIS's in Regional Government, 2003	Total reported Support CBIS's in Regional Government, 2003	Number of Regional Agencies with Functional CBIS, 2003	Number of Regional Agencies with Support CBIS, 2003
Number of PCs in the Regional Government (all branches), 2002	Pearson Cor.							0.98	0.99	0.67	0.30	0.29	0.44
	Sig. (2-tailed)							0.000	0.000	0.005	0.341	0.268	0.153
	N							28	23	16	12	16	12
Number of Servers in the Regional Government (all branches), 2002	Pearson Cor.								0.99	0.68	0.35	0.33	0.50
	Sig. (2-tailed)								0.000	0.006	0.287	0.232	0.121
	N								23	15	11	15	11
Number of Work Stations in the Regional Government (all branches), 2002	Pearson Cor.									0.69	0.33	0.30	0.45
	Sig. (2-tailed)									0.009	0.352	0.319	0.190
	N									13	10	13	10
Total reported Functional CBIS's in Regional Government, 2003	Pearson Cor.										0.61	0.84	0.76
	Sig. (2-tailed)										0.000	0.000	0.000
	N										32	42	32
Total reported Support CBIS's in Regional Government, 2003	Pearson Cor.											0.47	0.79
	Sig. (2-tailed)											0.007	0.000
	N											32	32
Number of Regional Agencies with Functional CBIS, 2003	Pearson Cor.												0.64
	Sig. (2-tailed)												0.000
	N												32

Key: Green (darker) cells show relationships significant at $p<.01$

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