

Instruments and Criteria for Research and Analysis of the Internet Visibility of Bulgarian Judicial Institutions WEB-Space*

Nayden Valkov Nenkov

Faculty of Mathematics and Informatics
University of Shumen "Episkop Konstantin Preslavsky"
Shumen, Bulgaria

Mariana Mateeva Petrova

Faculty of Mathematics and Informatics
St. Cyril and St. Methodius University of Veliko Turnovo,
Bulgaria

Abstract—e-Justice has been under discussion at European level since 2007. The article describes some tools and displays objective criteria for evaluating the WEB-pages of judicial institutions in Bulgaria. A methodology is offered in order to improve the organization and functioning of the judicial institutions. It is used to conduct experimental tests for analysis and assessment of the main characteristics of the Bulgaria courts' WEB-sites. The results provide grounds for findings and recommendations leading to improved communication and the presence of these institutions in the WEB.

Keywords—judicial institution; WEB-page; SEO (search engine optimization); evaluation criteria; court

I. INTRODUCTION

The evaluation of the judicial WEB-sites is an important task in the context of the radical reform made in this area. This evaluation must be consistent with the overall vision and the project to build an e-government with the EC requirements and the standards which exist for e-administration and e-services to the population in Bulgaria [1, 3].

On 18 December 2008 The European Parliament adopted a Resolution on e-Justice, on 22 October 2013 it adopted a Resolution on e-Justice calling for the use of electronic applications, the electronic provision of documents, the use of videoconferencing and the interconnection of judicial and administrative registers to be increased, in order to further reduce the cost of judicial and out-of-court proceedings [4, 7].

The existing European roadmap covers the objectives for the European projects in the field of e-Justice up until 2013. Some of the existing projects will only bear visible results after that period since the development of European-wide IT projects of preliminary groundwork.

Along with the many administrative, organizational, social and aesthetic requirements [6, 10, 11], there are also technical ones. They have been largely set in a number of tools to evaluate the WEB-content of the sites. The existence of a web-site is not enough. The questions, related to the Internet visibility of the web-site, are also of importance.

The official list of all courts is published on the website of the Supreme Judicial Council. Links to the websites of all

courts are available on the website of the Supreme Cassation Court in the section "Useful links".

The first stage of the study was implemented in January 2013 between 07 and 14. The survey covered all courts by type: 7 Appellate courts; 28 District courts; 113 Regional courts; 5 Military courts; 28 Administrative courts and the Specialized Criminal Court [5, 6].

II. EXPOSITION

The subject of the study is to improve the presence of judicial institutions on the WEB in order to provide the necessary services citizens and the transparency of their activities. Part of the reviewed tools is used for SEO-optimization, but it is not the focus here and goes beyond the scope of issues discussed.

Before evaluating a WEB-site of an administrative unit of the judicial system, we should establish the criteria and their weight in the overall assessment. The analyzed sources [2, 3, 8, 12] offer various criteria that show different quantitative and qualitative characteristics of the sites.

There are numerous tools that facilitate both WEB-designers and experts in the creation of this type of software, as well as the experts and managers responsible for them.

Therefore are need to validate the WEB-sites and their codes according to the standard of WWW [2, 12] and evaluate to various characteristics such as site rating, and more.

In order to meet the set requirements and criteria for accessibility level, set by the European Commission about the websites of public administration, and also to meet the requirements of the current Internet technologies, the Web-sites of the institutions must adhere to the standards of WCAG 2.0 and the level of compliance "Double-A". Web sites of the institutions should cover the accessibility level Double-A according to the latest standards of the World Wide Web Consortium - Web Content Accessibility Guidelines 2.0 (WCAG 2.0) by the using best practices and techniques.

III. TOOLS

Here are discussed some of the most commonly used tools in practice, which give an idea of the types of tests and WEB-sites' inspection procedures.

* The research is financed by project № 08-306/12.03.2015, Research on intelligent methods and applications of simulators for neural networks and optimal methods of learning process of University of Shumen

A. The validator of W3C - Markup Validation Service

Markup Validation Service <http://validator.w3.org/> - checks the validity of WEB-documents by using the scripting languages: HTML, XHTML, SMIL, MathML and checking whether the site carries out the ISO / IEC standard 15445: 2000 Information technology - Document description and processing languages - HyperText Markup Language (HTML) [2, 11]. For the validation a specific content such as RSS / Atom feeds or CSS styles, MobileOK content, or to find broken links is which there are other varieties of that validator are used for.

B. SEO-optimization Tool

"SEO-optimization Tool" [11, 12] also deserves attention, but only some of its functions can be used for free: check site ranking, loading speed and coding URL, while others like the automatic SEO analysis and analysis of external links are to be paid for.

C. Open Site Explorer Tool

The tool „Open Site Explorer“ (fig.1) is powerful and multi-functional [9], gives an option for complex optimization. It allows to evaluate the rating of the domain, the WEB-site, the link metrics, the social metrics (not available in trial version), and the quantitative assessment of the sanctioned spam and inbound links to the site.

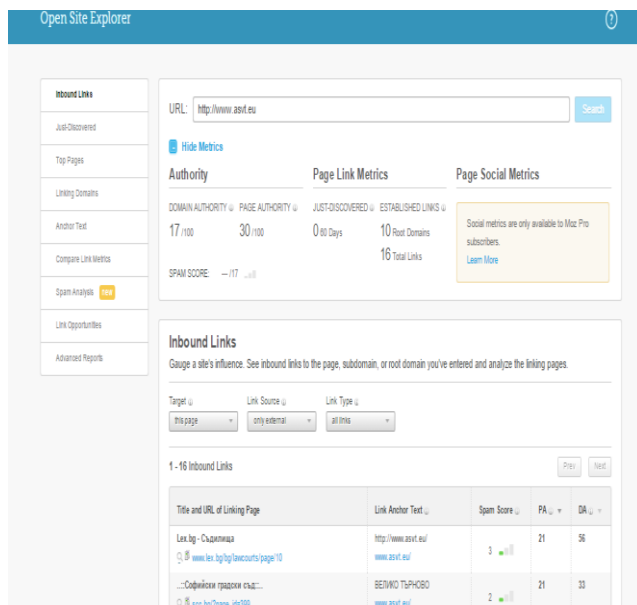


Fig. 1. Tool for complex SEO-optimization and testing of WEB-sites

D. PINGDOM TOOLS

PINGDOM TOOLS provide some excellent possibilities for precise monitoring of WEB-sites (Fig. 2). Pingdom performs a global monitoring of WEB-sites and WEB-applications [8]. It has the following functions:

Uptime MONITORING – tests and verifies the presence of sites in the WEB-space every minute automatically from over 60 selected global locations

- REAL USER MONITORING – accumulates and stores valuable performance data of the WEB-site, based on

actual visits from users in order to improve its performance.

- TRANSACTION MONITORING - shows if important interactions and operations with the site such as registration, search or downloading files are slow or crashed.
- DevOps - integrates with other mostly cloud applications to correlate site data with given indicators in real-time, in order to improve productivity.
- RELIABLE – allows any problems encountered to be checked by a second opinion to achieve filtering of false alarms through this double check.
- ROOT CAUSE ANALYSIS - determines the causes of errors and interruptions in the WEB-site or server to solve problems and prevent their reoccurrence.

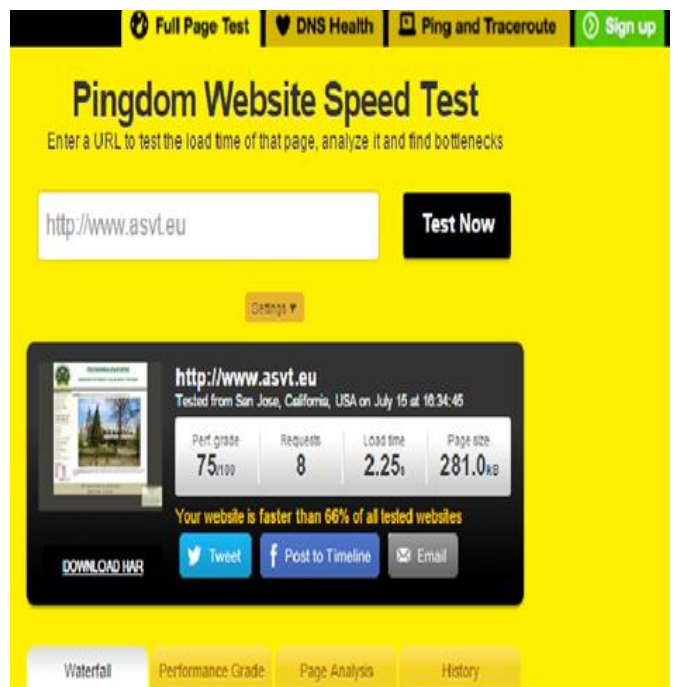


Fig. 2. Pingdom tool for monitoring WEB-sites and WEB-applications

IV. CRITERIA

The evaluation E of WEB-pages from sites of the judicial system can be defined by the multitude:

$$E = \{K_{ij}, O_j, S_j\} \tag{1}$$

where $K_{ij} = V_{jk}$; $i = 1, \dots, m$; $j = 1, \dots, n$; $k = 1, \dots, b$; V_{jk} – numeric evaluations of the criteria, m – number of evaluation criteria (received by the tools for evaluating WEB-sites),

n – number of evaluated judicial institutions, b – extreme values of the scale of the evaluated values, complex criteria O_j and S_j have values in the interval $+ \text{ or } - [0, \dots, 1]$.

The calculation of the criterion for evaluating the judicial WEB-sites is one of the most important stages in the process. You can define the following rules for calculation.

1) The value of the first criteria K_1 is derived from the check with the validator described above (fig. 1) and is defined:

- If the site cannot be validated K_1 is not evaluated and is marked with **NO** in Table 1, part of which is shown below;
- If it is validated with errors, the derived value V_1 is recorded in the same table and $K_1 = V_1$ for the evaluated object;
- If there are no errors $V_1 = 0$ and so $K_1 = 0$.

2) The criterion reflecting a site's ranking in productivity K_2 is defined like that:

- If $K_2 = 0$ then K_2 is not evaluated and we do not record anything in Table 1 (leave an empty cell);
- Else the derived value V_2 is filled in the same table and $K_2 = V_2$ for the evaluated object.

The site is ranked, taking into account the results of tests passed until its conducting.

3) The number of requests necessary for loading the site V_3 define the criteria K_3

- If $K_3 = 0$ then K_3 is not evaluated and we do not record anything in Table 1 (leave an empty cell)
- Else the derived value V_3 is filled in the same table and $K_3 = V_3$ for the evaluated object.

This value describes the number of required elements of the site that need to be loaded for its proper operation.

4) Site loading time – V_4 defines the criterion K_4

It is defined in the following way:

- If $K_4 = 0$ then K_4 is not evaluated and we do not record anything in Table 1 (leave an empty cell)
- Else the derived value V_4 is filled in the same table and $K_4 = V_4$ for the evaluated object in seconds.

The largest and most authoritative company in this business GOOGLE ranks well a site only if it loads quickly. If the site is slow, it cannot optimize well.

The rating is good at loading speed from 0 to 1 sec, 2 to 3 seconds is average and the owners should work to improve it, and more than 4 seconds means that the owners must definitely optimize it.

5) Site total size - K_5

This criteria is defined like that:

- If $K_5=0$ then K_5 is not evaluated and we do not record anything in Table 1 (leave an empty cell)
- Else the derived value V_5 is filled in the same table and $K_5 = V_5$ for the evaluated object in seconds.

The size of the WEB-site should be optimal, depending on its purpose. The table is filled in with values in kilobytes (Kb). It is preferable the site to have a minimum size.

The results of the experiment conducted in May 2015 on 182 courts in Bulgaria are shown in Table 1.

TABLE I. PART OF THE EVALUATIONS OF THE JUDICIARY WEB-SITES IN BULGARIA

№	Name	WEB-site 2015	Valid. of WEB-sites (errors) V_1	Site rank by prod. (out of 100) V_2	Num. requests V_3	Load time (s) V_4	Site size (Kb) V_5
1	2	4	5	6	7	8	9
1	Burgas Court of Appeal	www.bgbas.org	21	87	29	0,829	131,4
2	Varna Court of Appeal	www.appeal-court-varna.org	1	85	20	1,39	250,5
5	Sofia Court of Appeal	acs.court.bg.org	no				
14	Administrative Court Burgas	http://www.admco-court-bs.org	19	82	29	1,97	250,5
...
182	Regional Court - Yambol	http://yambo.l.court-bg.org	no				

In order for the WEB-site to be evaluated, it is necessary to consider the impact of all criteria on its functionality. This is accomplished by making the following steps, which are used in the methodology [5, 6]:

A. Remove the results of experimental data beyond borders

It is believed they are due to errors in the reporting of the primary data obtained or other non-specific events during the experiment.

For each criteria, the mean square deviation is calculated and it is determined whether there are values out of range (-3σ , $+3\sigma$). If there are such values they are brought to value of the nearest border. WEB-sites that cannot be validated are excluded from calculations of further steps!

B. Normalization of criteria for evaluated objects - Web-sites of the courts

$$K_{ij} = \frac{v_{ij} - v_{javg}}{\sigma} * 100 \quad (2)$$

Where K_{ij} – i criteria for the j site $i=1, \dots, m; j=1, \dots, n$.

Performed through transformation that takes into account the averages and deviations from them.

The obtained results are Table 2 where each of the rows contains a vector with values of the criteria K_1 to K_5 (column 2 to 6) for a WEB-site. The values which are negative are below average importance, and those with a positive sign are above average importance.

TABLE II. VALUES OF CRITERIA AND RANKING OF THE SITES OF THE JUDICIARY

№	K ₁	K ₂	K ₃	K ₄	K ₅	O _{ij}	S _{ij}	R.
1.	2.	3.	4.	5.	6.	7.	8.	9.
160	0,000963 726	0,36354 88	0,029 33	0,001 28	0,001 02	0,760 647	0,1521 2946	1
12	0,014442 872	0,36061 2219	0,017 98	0,001 42	0,000 86	0,729 849	0,1459 6982	2
74	0,005407 937	0,36061 2219	0,018 91	0,001 49	0,000 76	0,727 07	0,1454 1391	3
7	0,007924 696	0,36061 2219	0,037 84	0,000 82	0,001 2	0,697 213	0,1394 4259	4
27	0,001852 569	0,32331 7632	0,043 51	0,001 38	0,000 76	0,695 997	0,1391 9947	5
144	0,002148 849	0,36061 2219	-0,035	0,001 55	0,000 831	0,681 209	0,1362 4183	6
57	0,004222 814	0,36061 2219	0,029 33	0,001 45	0,000 91	0,681 092	0,1362 1841	7
...
104	0,003184	0,00146 8	0,000 953	0,000 894	0,000 346	0,001 239	0,0002 48	137

R. – rating.

C. The integrated evaluation of each site is determined by the expression:

$$O_i = \sum_{j=1}^n w_j v_{ij} \quad (3)$$

where $i = 1, \dots, m$, $j = 1, \dots, n$, w_j -weight coefficient indicating the importance of each criterion, v_{ij} - numeric value of criteria j for site i .

This evaluation O_{ij} weighs the different criteria in the final evaluation. In this case the weight of the first and the second criteria is $w_{1,2} = 2$, which means that they are basic and have a two times greater effect than the other three which are of weight $w_{3,4,5} = 1$. They are shown in column 7 of Table 2.

D. Complex evaluation of sites

$$S_i = \frac{\sum_{j=1}^n O_{ij}}{n} \quad (4)$$

where $i = 1, \dots, m$, m -number of the evaluated sites (does not include non-validating sites), $j = 1, \dots, n$, $n=5$, O_{ij} - integrated evaluation j for site i .

The complex evaluation of WEB-sites of the judicial system is calculated as the average of the evaluation of other criteria and their weighted influence. Thus the qualities of the development and functioning of the sites are considered. The results are in column 9 of Table 2.

V. DISCUSSION

The results show that 45 (24.73%) of the sites cannot be validated and are excluded from the evaluation. This leads to a

violation of the standard and the urgent need to take action to resolve the issue.

The remaining 137 sites are validated with different number of errors in the code, adversely affecting their quality. There are 16 sites in which no errors were made and complied with standard WWW [2, 12].

The integrated O_i and the complex evaluation S_i are illustrated in Fig. 3.

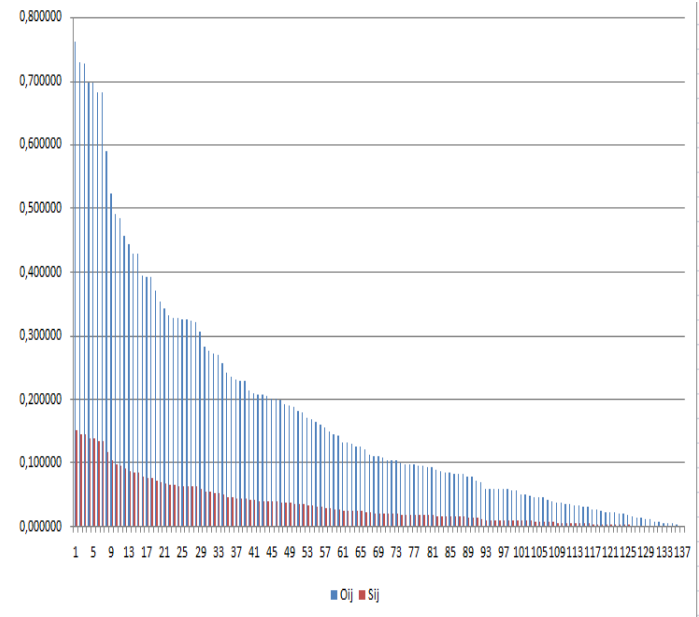


Fig. 3. Integrated and comprehensive assessment of websites

VI. CONCLUSION

The existing WEB-pages of the courts are evaluated by appropriately selected criteria, tools and methodology. The proposed conclusions and recommendations were obtained after analyzing the experimentally determined values of several criteria. They cover the important features of this type of communication and their visual expression in the WEB-space.

A large number (45) of the pages of judicial institutions are not validated and cannot be evaluated. They need to be adjusted and adapted to the standard for validating the content.

The remaining (137) WEB-pages have a large number of errors, which are subject to correction and improvement to reach a good level of maturity. This will ensure better results in the service of citizens and employees who work for these institutions.

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