IMPROVING DETECTABILITY AND VISUALISATION OF THE WEBSITE OF THE UNIVERSITY OF MINING AND GEOLOGY "ST. IVAN RILSKI"

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ABSTRACT. The aim of this report is to present the work of a team from the Department of Informatics aimed at improving the delectability and visualisation of the site of the University of Mining and Geology "St. Ivan Rilski". With the growing popularity of the World Wide Web, its recognition as a leading mass media, and owing to the development of modern tools for the creation of information systems, it has become possible to create functional and attractive applications that are available online. Nowadays, the Internet is one of the most dynamic forms of advertising. In the theory and practice of today's Public Relations (PR), an organisation's website is rated as the most efficient media and as a communication channel with optimum interactivity parameters. According to various studies, over 70% of the Internet traffic worldwide has already become mobile. The number of smart devices is steadily increasing and significantly exceeds the number of PC users. Smart devices are used as navigation tools that employ mobile applications and various dynamic sites. This requires for information to be presented in a form that is appropriate for the respective operating system, in particular for mobile devices that differ in size and resolution. Modern tools are used for building adaptive and responsive web pages. The data provided by the global network should be explored, analysed, and structured in such a way that that they be clear and easily accessible for the user. Currently, to own a corporate website is neither considered an advance, nor a luxury; in fact, it is a mandatory asset for every contemporary business.
The website of an educational institution is expected:
● To meet the information demands of those groups that are important for the development of the educational institution;
● To provide the grounds for active bilateral contacts between university representatives and the external environment;
● To actively participate in the modelling of the public image of the university.
Within the context of a continually evolving information and communication environment, the achievement of these goals requires constant updating and improvement of the site and integration of new technologies. A major factor in the promotion of an internet site that aims at attracting more visitors is the SEO (Search Engine Optimisation). SEO is a set of tools designed to obtain a high-ranking placement of a site in the search results page with an Internet search engine using keywords. The better the SEO of a site, the better its ranking on the search engines lists and, consequently, the more the visitors.
The site of the University of Mining and Geology "St. Ivan Rilski" is not well-optimised and does not have a responsive design.

Keywords: Internet, responsive design, site optimisation

ПОДОБРЯВАНЕ ОТКРИВАЕМОСТТА И ВИЗУАЛИЗАЦИЯТА НА САЙТА НА МИННО-ГЕОЛОЖКИ УНИВЕРСИТЕТ „СВ. ИВАН РИЛСКИ"

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РЕЗЮМЕ. Целта на настоящия доклад е да представи работата на екип от катедра „Информатика" по подобряване на октриваемостта и визуализацията на сайта на МГУ „Св. Иван Рилски". С нарастването на популярността на www мрежата, утвърждаването й като водеща масмедия и развитието на съвременните инструменти за изграждане на информационни системи (ИС), се даде възможност за създаване на функционални и атрактивни приложения, достъпни online. Днес Интернет е една от най-динамичните форми на реклама. Броят на смарт устройствата непрекъснато нараства и значително надхвърля броя на потребителите на компютри. Смарт устройствата се използват като средство за навигация посредством мобилните приложения и различни динамични сайтове. Това налага информацията, да бъде представена в подходящ вид за различните операционни системи и най-вече за различните по размер и резолюция мобилни устройства, използвайки съвременни инструменти за изграждане на адаптивни и отзивчиви web страници. Данните, които предоставя глобалната мрежа, трябва да бъдат изследвани, анализирани и структурирани по такъв начин, че потребителят да може да ги разбира и бързо да достига до тях. В днешни дни притежаването на фирмен уеб сайт не е нещо модерно, не е и въпрос на лукс – то е просто задължително за всеки съвременен бизнес.
От интернет страницата на образователната институция се очаква:
● Да удовлетворява информационните потребности на важните за развитието на образователната институция групи;
● Да осигурява възможностите за активни двустранни контакти между представителите на университета и външната среда;
● Да участва активно в моделирането на публичното лице на университета.
В условията на непрекъснато развиваща се информационна и комуникационна среда, постигането на тези цели изисква постоянно актуализиране и усъвършенстване на сайта и интегриране на нови технологии. Основен фактор за популяризиране на един интернет сайт с цел привличане на повече посетители е Search Engine Optimization (SEO). SEO оптимизацията представлява набор от похвати, чиято цел е добро класиране на сайт в страницата с резултати при търсене по ключови думи в интернет търсачка. Колкото по-добра е SEO оптимизацията за един сайт, толкова по-добро ще е неговото класиране в списъците на търсачките и съответно повече ще бъдат неговите посетители.
Сайтът на Минно-геоложки университет „Св. Иван Рилски" не е добре оптимизиран и няма отзивчив дизайн.

Ключови думи: интернет, отзивчив дизайн, оптимизация на сайт

Introduction

The role of a contemporary website is to attract and engage the user, to promote the respective brand, and to increase the awareness of a product or service. In view of this, the maintenance and development of a web application should be regarded as a continuous process related to the constant updating of the information contained therein and to the integration of new web services and technologies.

Within the past 10 years, there has been a steady trend of increasing access to the Internet over smart devices. According to various studies, over 70% of the Internet traffic worldwide has already become mobile. The number of smart devices is marked by a steady increase and significantly exceeds the number of computer users. All this requires the development of an adaptive or responsive web site design in order to format an optimum and good-looking content that is suitable for viewing through diverse devices with varied resolution (desktops, tablets, mobile phones, etc.).

The website of an educational institution is expected to:
- Meet the information demands of those groups that are important for the development of the educational institution;
- Provide opportunities for active bilateral contacts between university representa-tives and the external environment;
- Participate actively in the modelling of the public image of the university.

A major factor in the promotion of a website that aims at attracting more visitors is the Search Engine Optimisation (SEO). The better the SEO of a site, the better its ranking on the search engines lists and, consequently, the more the visitors.

Adaptive and Responsive Design

Two basic approaches have been established in designing a website intended for different devices. These are the adaptive and the responsive web design.

Adaptive design

The term Adaptive Web Design means creating different web pages that are visualised according to the specific size of the device through which these pages are accessed. In this manner, different web pages will be displayed depending on the screen resolution (Berry 2017).

Responsive design

With the Responsive Web Design (Marcotte 2010), the site is visualised equally well on devices with different resolution (mobile phones, tablets, personal computers, laptops, etc.) without changing the program code that builds it.

The benefits of using responsive web design are as follows (Wiki-RD 2017):
- Greater accessibility from different mobile devices and desktop computers;
- A design is worked out that resembles the basic (desktop design), but is intended for devices with varied resolution. Designers can use a template for all devices and, by just using CSS, to determine how the content is rearranged according to the different screen sizes;
- Better indexing by Google (SEO optimisation);
- Only one site is developed, not several sites that serve different types of device with varying resolution;
- A good long-term solution in terms of a rapidly evolving and diverse mobile device market;
- Comfortable and good-looking content, etc.

The main disadvantages of using responsive web design are as follows:
- Boot speed may be a problem with large-size sites or such with numerous video materials and images;
- Budget is high - the implementation of a responsive web design requires overall rewriting of the code which is usually expensive;
- The slow mobile internet or a poor device may lead to a delay in loading the site.

Comparison between adaptive and responsive design

Both types of design are similar in function. Their purpose is to improve the opportunities for the visualisation of a webpage using devices of various types, screens, and resolution. Most often, we aim at presenting the site in at least three different screen sizes - on a small mobile screen, on a tablet-size screen, and on a larger desktop monitor.

The main differences between the two types of design (Warner 2013) are the following:
- The responsive design conforms to the alterations in the width of the browser window by smoothly adjusting the location of the elements on the web page in such a manner that they best fit the available space. Thus, while the user slides the pages of the browser to make them larger or smaller, they will see changes in design in real time.
- The adaptive design uses sophisticated scripts to automatically detect the web server in order to identify any device that visits the site and then to deliver the best site version that is based on the size and the capacities of each device. When the user views such a site and changes the size of the browser window, the site will not change. However, should they visit the same site through different mobile devices, they will not only see the differences in design but may even see different content. This is due to the fact that with adaptive design completely different versions of the site may be sent, depending on the type of the device used.

Problems associated with the visualisation of the site of the University of Mining and Geology "St. Ivan Rilski"

A thorough analysis of the web site of the University of Mining and Geology "St. Ivan Rilski"(http://www.mgu.bg) was carried out in the period January - April 2018 and the following faults were registered:
- The English version of the website has a design

differing from that of the main site;

- The drop down menu does not work in the Safari browser, which is the preferred browser for the Mac operating system and the iPhone OS;
- The descriptive code (HTML 5) through which the site has been built contains a multitude of errors and is not validated successfully;

Fig. 1: Validation of the HTML on the first page of the site before

- The same applies to the formatting code (CSS);

Fig. 2: Validation of the CSS on the first page of the site before

- The site of the University of Mining and Geology "St. Ivan Rilski" does not have an adaptive and responsive design.

The test was performed through *https://search.google.com/test/mobile-friendly*

Fig. 3: Design which is not responsive and adaptive

Activities related to the integration of a responsive design into the web site of the University of Mining and Geology

Validation of the site building code - HTML and CSS

The errors detected during the validation of the site code have been reduced to a minimum and the stylistic layout of the site has been fully validated in conformity with the standards for CSS3.

Switching to HTML 5 has made it possible to add micro data; this supports semantic searches and is recommended by SEO professionals.

Fig. 4: Validation of the HTML on the first page of the site after

Fig. 5: Validation of the CSS on the first page of the site after

Development of a responsive design for the site of the University of Mining and Geology

Over the past few years, a number of software tools have emerged for automatic generation of a responsive design of an existing site. Duda, bMobilized, Snapmobl, Mobify, goMobi, etc. are among the most popular. They build an automated mobile version of a simple web page within a few steps only: menu recognition; automatic choice of the appropriate mobile view; creation of mobile styles; addition of plug-ins. By using visual settings, the software tools make it possible to specify a multitude of additional settings: to specify the menu blocks and the main content; to choose another mobile view; to set styles; to add different buttons to the site, implemented as plug-ins - phone, e-mail, location map, contacts, links to social networks and sharing links, and so on. Bulgarian developments exist, too, that have a similar application (Rachovski).

Our team has opted for an approach whereby the responsive design is implemented manually, in keeping with the good practices in building and designing a mobile page or a mobile application. These "good practices" come down to the following (Lopez 2017):

- Minimising and mobilising - the content of the site and the amount of information is evaluated. An assessment is made of what part is appropriate to be visualised in the mobile version. It is not necessary to transfer the whole information from the standard application to the mobile one; it is often possible for part of the information to be removed or abridged. In order to sift the information, applications for site usage analysis can be employed, such as: Google Analytics, HubSpot, etc. The strategy here is to create and analyse detailed statistics whereby the number of visits to a given sub-page can be tracked, and, consequently, an extract of the sorting of information to the mobile part of the application be made. This principle is only applicable when creating a standalone mobile version of an already existing desktop one. It can accurately determine which part of the content of the desktop version to filter and what exactly should remain in the mobile version.
- Hiding and selecting of information - this principle concerns hiding part of the content. In most cases, the amount of the information provided is quite large. This requires additional processing so that not all of the information should be displayed on the mobile screen. In case of possible visualisation, the text is usually difficult to read and inconvenient to use. Good practices have shown that, as a rule, the text is placed in separate sections, with a very small portion of the text or just the title displayed to the user. The whole information is visualised only after clicking on the text.
- Using vector graphics that provide the classical advantages: small files, good image quality, easy scaling and processing. The use of these features in

responsive design is almost imperative in rendering icons and images. Easy scalability and processing facilitate their inclusion in mobile displays of various sizes. Small-sized files help alleviate the web page and its prompt visualisation.

- Key and field standardising - a very important factor, given the various mobile devices and displays. In this respect, buttons and links must be separated into individual zones and be of a suitable size for easy user access. Their layout depends strongly on the specific design and implementation of the page.

Rachovski (Рачовски 2014) outlines some more factors that are of particular importance to mobile design:

- Page search - the search in the system is of vital importance in assisting mobile users; with a greater volume of information, the desired result can easily be achieved;
- Code simplicity - sites that use HTML provide a simple and relatively affordable content delivery system with useful features. The use of simplicity of coding results in smaller file sizes, in faster download speed, and is better for use with smartphones that do not have good support for Cascading Style Sheets and other advanced programming features;
- Menu creation - the feature-rich menu is an easy way of communicating in a desktop environment; yet, when it comes to a mobile environment with a small-size screen, the menu should be synthesised and alleviated. It is recommended that the main categories be compared;
- Navigation between menus - to facilitate navigation within the content, a menu for easy access to other topics is imperative;
- Low technical requirements - in most cases, mobile devices have low technical parameters; this should be considered in the event of the use of visualisation modules and a large amount of information (Sharples 2012).

The following were used:
- Hiding and selecting of information;
- Menu creation;
- Navigation between menus.

Having developed the responsive design of the web site of the University of Mining and Geology "St. Ivan Rilski", a number of tests were carried out. They have shown that the site is suitable for mobile devices. The page boot speed has also been improved.
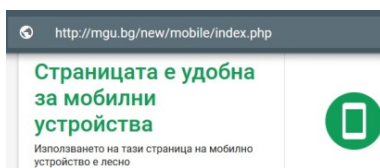
Fig. 6. Testing the responsiveness of the site after the changes
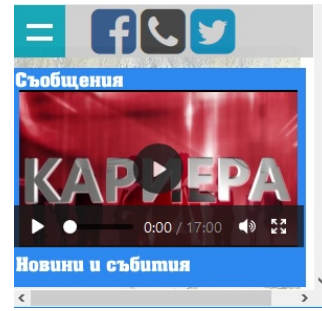

Fig. 7. Responsive design on the site (320x420px)

Search Engine Optimisation

A major factor in the promotion of an internet site and in attracting more visitors is the Search Engine Optimisation (SEO). SEO is a set of tools designed to obtain a high-ranking placement of a site in the search results page with an Internet search engine using keywords.

Commonly, Internet users run into a site by following hyperlinks suggested by such Internet search engines as Google, Yahoo! or MSN Search (now Bing). The better the SEO of a site, the better its ranking on the search engines lists and, consequently, the more the visitors.

Internet search engines make use a large number of factors to determine the relevance of a website (for example, Google is claimed to use over 200 criteria in site assessment). Many of these criteria are company secrets. Overall, SEO is not a static process - the work of search engines often changes and this requires the appropriate adaptation to the new conditions.

The activities that are carried out in order to achieve the optimum SEO can be divided into 2 types:

- On-page SEO – site optimisation involves changes in the HTML code that mostly affect the <head> section, and also addition of extra files to manage the visibility of pages. In general, these changes do not affect the site visualisation but only have an effect on the site index. Since On-page SEO is limited to the capacities of the designed website itself, it can be performed within a short while.
- Off-page SEO – external optimisation involves the overall activity of the optimisation outside the Web site itself. The most popular Off-page SEO techniques are building links to the site, registration of search engines and social networks, content sharing, etc. As a rule, off-page SEO is performed after on-page SEO. Overall, off-page SEO is a very expensive process.

Fig. 8 SEO activities

Modern search engines also have criteria for site evaluation that will result in the lowering of its rating (Black hat SEO). These include the use of hidden text, reciprocal hyperlinks with link farms, etc.

Activities related to improving On-page SEO of the site of the University of Mining and Geology

The site of the University of Mining and Geology is not well-optimised. Convincing evidence as to that is the fact that, by 1st May 2018, when typing keyword "University" in the Google search engine, it appeared on the 4th or the 5th page (Fig. 9).
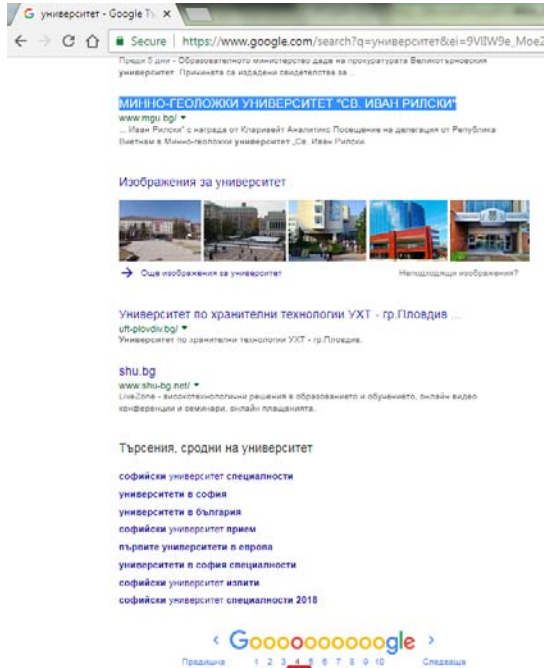
Fig. 9. Google result for the search criteria of "University"

In order to improve SEO, the following On-page activities were carried out:
- A template for a page has been developed that will activate with HTTP status code 404 (the page has not been found);
- A robots.txt file has been added - There are 2 ways that can restrain search engines bots from crawl the site or some of its individual pages. One is to place the so-called META Robots tag in the HEAD section of your site (this only works for those pages in whose header it was placed). The other is by adding a special file with instructions called "robots.txt". The latter is used to set the same behaviour for multi-page robots. Thus, the files and directories that should not be indexed are specified. Robots.txt is the file for the functional performance of the Robots Exclusion Protocol (REP). This file is a set of web standards that regulate the behaviour of the Internet robots as well as the indexing on the part of the search engines. This is the file for the web queries that have been passed to the Webmaster, as well as to the webmaster of the site;

- The sitemap.xml file has been added - XML sitemap is an XML document which lists all the URL addresses that exist in the respective domain. This helps search engine crawlers (scripts that constantly search for new and unique information to index) to easily scan and crawl your site/blog and thus index all of its content. The sitemap.xml site map for robots is the logical addition to the robots.txt file. While robots.txt indicates to search engines which pages are banned for indexing, sitemap.xml reports which pages are available for indexing (Figure 10).

Fig. 10. The sitemap.xml file in the website of the University of Mining and Geology

Besides, recommendations for Off-page SEO have also been given.

Other improvements of the site of the University of Mining and Geology

In addition to the above activities, the following improvements have also been made:
- A design corresponding to the main site was integrated into the English version of the website. The substitution of outdated information in English with up-to-date data has also commenced. The template offered can easily integrate other languages as well;
- A new menu was built that works with all modern browsers: Google Chrome, Mozilla Firefox, Internet Explorer, Microsoft Edge, and Safari;
- The Information and Technical Support Division was assisted in integrating a module for uploading exam dates and updating academic staff data into the site of the University of Mining and Geology.

Conclusion

The rise in popularity of the World Wide Web, its establishment as a leading mass media, and the development of modern tools for the building of information systems have all made it possible to create functional and attractive applications available on-line.

Today, the Internet is one of the most dynamic forms of advertising. In the theory and practice of contemporary PR (Public Relations), an organisation's website is rated as the

most effective proprietary media and as a communication channel with optimum interactivity parameters.

Nowadays, owning a corporate website is not just a modern trend; it's not a matter of luxury either; it is a must for any modern business.

Within the context of a continually evolving information and communication environment, the achievement of these goals requires constant updating and improving of the site and integration of new technologies. In the 21st century, smart devices are used as a means of navigation through mobile applications and various dynamic sites. This requires for information to be presented in a form that is appropriate for the different operating systems, and above all for mobile devices of varied size and resolution, using modern tools to build adaptable web pages. The data provided by the global network must be explored, analysed, and structured in such a way that the user could comprehend it and quickly access it.

The integration of a responsive web design into the site of the University of Mining and Geology "St. Ivan Rilski" has brought about an improved vision of the web site of the university and the quality of the data it presents.

These have been the initial steps towards improving the SEO of the site.

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