



*Moderna*  
**arhivistika**

Časopis arhivske teorije in prakse  
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## **Moderna arhivistika**

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## ***DIGITIZED RECORDS IN THE ARCHIVES OF BOSNIA AND HERZEGOVINA - PROTECTION AND ACCESSIBILITY***

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### **Abstract:**

*In 2018, the Archive of Bosnia and Herzegovina digitized for the first time a complete fond - the BiH Religious Affairs Commission. This particular fond was selected because it was highly sought after, had no backups and consisted of only 114 archival boxes, which is the appropriate volume for the pilot project. In addition, the documents have been processed with an OCR program (it is necessary to manually enter certain corrections though). Once stored in the database, it was possible to be simultaneously used by several researchers from different locations and without contact with the originals. Suddenly, it has become simply unthinkable that until yesterday a technician had to go to the depot to fetch requested document. Almost unthinkable. The remaining 99% of the fonds are still processed by conventional methods. However, the example of the Religious Affairs Commission demonstrated in practice what kind of a bright future awaits the archives, after they master their first clumsy steps toward full digital maturity.*

*This paper presents current progress in the Archives of Bosnia and Herzegovina and its efforts to move forward with this demanding process, since the digital archive has been recognized as an indispensable part of the time to come.*

### **Key words:**

*database, digitization, scanning, access, long term data preservation*

### **Izvleček:**

#### **Digitalizirano gradivo v Arhivu Bosne in Hercegovine - varstvo in dostop**

*V letu 2018 je Arhiv Bosne in Hercegovine prvič digitaliziral celoten fond, in sicer fond Komisija za verske zadeve Bosne in Hercegovine. Ta fond je bil izbran, ker je povpraševanje po gradivu v njem veliko, ker ni imel varnostnih kopij dokumentov in je obsegal le 114 arhivskih škatel, dovolj za pilotno digitalizacijo. Dokumenti so bili obdelani tudi s programom za prepoznavo pisave, čeprav je še vedno potrebno ročno vnašati popravke. Ko so bili digitalizati vnešeni v sistem, jih je lahko istočasno uporabljalo več raziskovalcev z različnih lokacij, brez poseganja po originalnem gradivu. Nenadoma je postalo nepredstavljivo, da bi moral arhivski tehnik prinesti zahtevane dokumente iz skladišča. No, skoraj nepredstavljivo. Še vedno je namreč 99 odstotkov fondov v obdelavi na tradicionalen način. Primer digitaliziranega fonda in njegove uporabe pa prikazuje, kakšna prihodnost čaka arhive, ko bodo usvojili prve korake.*

*Avtor bo predstavil zdajšnji napredek v Arhivu Bosne in Hercegovine ter njegove težnje po nadaljevanju tega procesa, saj se je digitalni arhiv pokazal kot nepogrešljiv del prihodnosti.*

### **Ključne besede:**

*Podatkovna baza, digitalizacija, zajem, dostop, dolgoročno ohranjanje podatkov*

## 1. WHERE TO BEGIN?

It is not an easy task to write about digitized records, their protection and accessibility in the Archives of Bosnia and Herzegovina. The main reason is because processing, sorting, keeping and accessing digital records is still in its infancy. It is necessary to point out that such a situation is not the result of insufficient expertise of employees nor lack of their diligence.

The Archives of Bosnia and Herzegovina is the institution with more than 70 years of tradition and experience and for which its users and researchers have always had nothing but the words of praise. The problem is certainly not in the insufficient amount of valuable archival records; it is the oldest institution of this kind in the country and preserves over 400 fonds or more than 15.000 running metres of documents, and this number continues to grow.

The root of the problem lies in the vicious circle of financing methods of state institutions, especially those in charge of cultural heritage. They are traditionally placed at the bottom of the budget priority scale. While on the one hand steady annual flow of cash from the state budget reserve provides security for wages and fixed assets for work, on the other hand, employment of additional personnel and demanding research or large construction projects remain dependent on donations, which at this time of the recession are not easy to find at all. It is necessary to complete the new reading room, to purchase computers, to set up a PC network, to develop legal standards for the use of digitized archival material, to provide the appropriate software, to hire people who will oversee and maintain the whole process...

But first of all, massive digitization of fonds must be done, and for this task finances are needed (at least the same amount as for all of the forementioned actions), regardless of whether the specialized company or the Archives will take it on itself.

While archivists are waiting patiently for the golden opportunity that would be used to start up things from a stalemate, it is necessary to perform at least a theoretical preparation in order to minimize the backlog in which the Archives is already.

## 2. NEED FOR DIGITIZING

*„Paper, it turns out, is a very reliable backup medium for information... We can not say the same for digital storage.“<sup>1</sup>*

The fact that digital documents are endangered has been widely recognised. Digital transactions of historical records involve information which are not only vitally important just to the immediate circle of users, but often have cultural importance to society in general. The original Gutenberg bible from AD 1456 survives in 48 copies out of the total print of 181, and many of the remaining copies are in very good shape. But the first email message sent has been lost. This loss has of course only symbolic value - the message does not seem to have vitally important content - but there may be worse things about to happen.

Not long ago digitization was seen as opposed to preservation, but this has shifted dramatically since then, partly because digitization's usefulness for enhancing access to our documentary heritage and partly because of progress in making digitization a more reliable approach for administering documents.

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<sup>1</sup> Kelly, K. (2008). *Very Long-Term Backup, The Rosetta Project*.

Today, archivists and their tasks are being redefined and archives operate in a rapidly evolving environment which is almost unrecognisable from that which existed less than two decades ago. The archivist's role is changing from the passive reception of records that have reached the end of the active phase of the life cycle, to active involvement from the very start. There is a need for a closer cooperation between archivists and persons involved in electronic information in public administration and in the private sector. Cloudification, virtualization, data aggregation, take place over a highly-distributed Internet infrastructure, increasingly based on automated systems using AI and Machine Learning. There is a rapidly expanding range of documents and data sources available via the Internet, and a proliferation of mobile and automatic data capture devices. The effects of the rise of Open Data, Big Data, the Internet of Things and Smart Cities already could be felt, and the current trends towards the digitization of industry and government are adding even greater complexity into the mix.

The policy drive towards the Digital Single Market, together with rapid ICT technological advances, and the social and business transformation that "digital by default" will bring in the near future, create the need for clear support to be given to the creation of a strategic coalition, and a research and innovation agenda to define and describe possible paths to solutions to these future issues and opportunities. As one of "the fathers of the Internet", Vint Cerf (2016) puts it:

*„As we move toward the present, the media of our expression seems to have decreasing longevity. Of course, newer media have not been around as long as the older ones so their longevity has not been demonstrated but I think it is arguable that the more recent media do not have the resilience of stone or baked clay. Modern photographs may not last more than 150–200 years before they fade or disintegrate. Modern books, unless archival paper is used, may not last more than 100 years. That many of the digital objects to be preserved will require executable software for their rendering is also inescapable,” he wrote. “Unless we face this challenge in a direct way, the truly impressive knowledge we have collectively produced in the past 100 years or so may simply evaporate with time.”*

In order for the digital infrastructure to retain the trust of researchers and organisations, it is essential to ensure that digital records can be securely archived, retrieved, and presented while maintaining appropriate confidentiality. Archives of Bosnia and Herzegovina needs to provide absolute certainty about the authenticity of both the original and the retrieved record.

To accommodate the rapidly increasing number of users preparing to take up Digital Archiving, highly automated (minimal user intervention) archival processes which include assessment of data and different types of documents, will have to be implemented.

It is not surprise that many weaknesses within desired management of electronic archives have not yet been overcome.

### 3. FOLLOW THE RULES, OBEY THE LAW

Technological change and complexity are not the only challenges which must be addressed. Attention must also be given to social, organisational and legal issues, including the ramifications of the introduction of the new legal framework for data protection, and its harmonisation with existing regulations.

Preservation of electronic documents means taking steps to ensure the longevity of these resources. It applies to both materials "born digital" or converted from traditional analogue form.<sup>2</sup>

Archival records processing involves the process of recording, classifying, adding metadata (structured description of resources), and storing to a document management system, and is carried out after taking over for safekeeping and converting the original records into digital form or transferring to a microfilm. The records which are originally in physical form are converted to digital form in a way that ensures the preservation of all data. The documentary material must be kept complete, unchanged and arranged in premises where the prescribed microclimate chemical-biological and physical-technical conditions of storage are provided, while ensuring access to authorized users for the entire time of its conservation.

Proper conversion of the records into a form of long-term storage is the process that ensures the reproduction of all the key content of the originals, their authenticity and usability. The authenticity of the material in digital form for long-term storage is ensured by a strictly controlled and documented addition of content.

In short, documentary material in digital form for long-term storage is a material which content is recorded in digital form and stored on an electronic record holder for efficient long-term storage, providing the possibility for upgrade according to technological development.

Digital material is much easier and faster to manipulate and it is necessary to adopt a set of rules to regulate its access and use. A good example in the Archives of Bosnia and Herzegovina would be a CRPC fond (*Commission for Real Property Claims of Displaced Persons and Refugees*, 1996-2004), which was acquired in 2003 and is completely digitized and stored in the database. It is currently the only fully functional digital fond in the Archives of Bosnia and Herzegovina.

The manner of using archival material, conditions, timeframe for the use of materials and the method of issuing original certificates is specified in *Annex C* of the *Agreement on the Acquisition of Archival Material between the CRPC and the Archives of BiH*, signed on October 30<sup>th</sup>, 2003. The annex points out that the CRPC agrees that the Archives of Bosnia and Herzegovina may use archival material for use for purposes and under the conditions prescribed by the *Law on Archival Material in Bosnia and Herzegovina*, the *Law on the Protection of Personal Data of BiH* and the *Law on Freedom of Access to Information in Bosnia and Herzegovina*, immediately after receiving the material, i.e. as soon as the technical conditions are met. The right to inspect its own file without any restrictions has each applicant, as well as the person authorized by him/her, previously having presented to the employee a valid authorization, which then will be copied and the number of request will be entered on it. Persons who are not the applicants or their authorized representatives, have the right to inspect the file only if they

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<sup>2</sup> According to definition, documentary material in electronic form is a material in digital or analogue form. In the digital form is material which original content is recorded in digital form and stored on an electronic record carrier, and in an analogous form is material which original content is written in an analogous form and stored on an electronic carrier.



prove a legal interest in it. If the data from the file is used for teaching, scientific or journalistic purposes, the user is obliged to obey the laws on the protection of the interests of the applicant or the right holder and is not allowed to publish any personal data from the material. If the certificate was not delivered earlier by CRPC, the Archive is responsible to hand it over to the authorized applicant. Certificate delivery is performed only after verifying the identity of the person who is applying for the certificate. Acceptable identification documents are: valid identity card, passport or driver's license. Without these identification documents, it is not possible to receive the certificate. Upon receiving, the applicant signs the distribution list and the number of the identification document and the date of delivery must be filled in. In case of death of the applicant, the Archives will present a certified copy of the certificate to any person who prove his/her legal interest. In this case, the original certificate remains in the file.

In addition to the written records mentioned in the previous provisions, the Archives of BiH keeps records of the certificates that are delivered by entering the necessary data into the appropriate software. The data is regularly updated and submitted to the Ministry for Displaced Persons and Refugees and other interested official bodies of BiH and entities.

An example of a CRPC fond clearly shows the importance of establishing strict and clear legal norms to ensure its efficient and safe use. Related to fonds created in the 19<sup>th</sup> and 20<sup>th</sup> century (still not available in digital form for researchers), certain amendments and clarifications still should be made, which would harmonize the collision between the *Law on Freedom of Access to Information* and the integrity of the digital fund itself.

#### **4. THE FIRST STEPS**

The digital collection is by definition a set of logical and physically organized digital objects with a systematic approach to objects. The collection model is chosen based on three basic criteria: how are analog objects naturally organized, what is the purpose of their digital surrogates, and what are the expectations and experiences of those who are using digital resources. The attitude of end-users pointing to a particular collection was a critical factor in its selection for the digitization. As the digital collection is more focused on the needs of end-users, it will be more attractive and the invested resources will be fully justified. Upon choosing archival records for scanning, the selected material should have been linked by some meaningful way (its context or common topic) and its digitized versions connected and organized into digital collections.

There is no defined quality criteria for the digital archives, at least not in Bosnia and Herzegovina, which is definitely a major problem. Basically anyone can claim to be a digital archivist, and there are no criteria against which these claims could be checked. Hopefully, when the understanding of long-time preservation of electronic documents is improved, we can also agree on technical requirements concerning this activity.

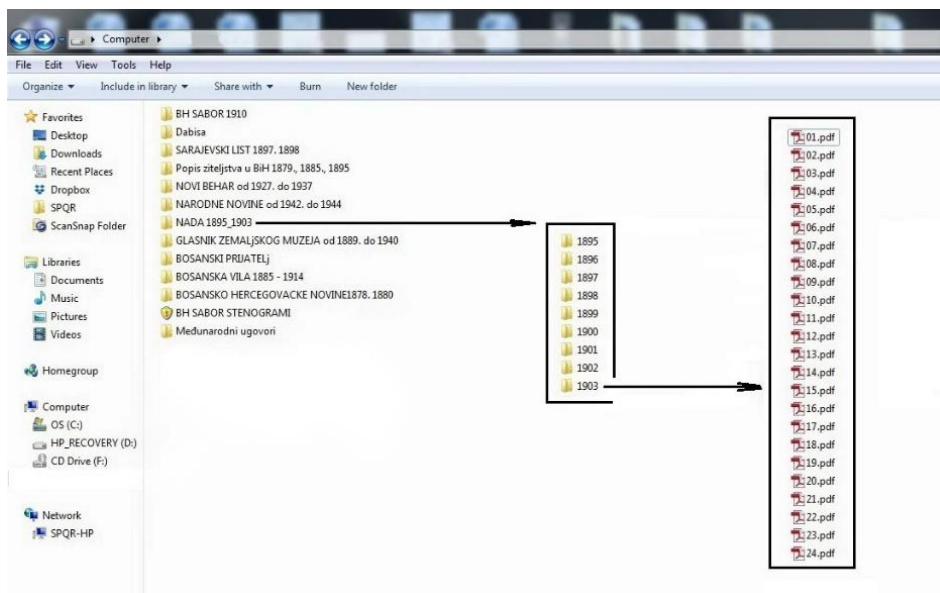
There are two main solutions for converting a document from paper to digital format:

- simply scanning the document to obtain an image of it;
- scanning the document and then encoding it in electronic form (e.g. using optical character recognition or graphics vectorisation)

It is important to emphasize that the result of textual material scanning is its digital image, not the text that can instantly be processed. Therefore, later processing with an OCR program (Optical Character Recognition) is required, which converts the image of the text into workable text. In doing so, it is not possible to avoid the appearance of a number of incorrectly recognized characters that need to be corrected manually, which is also the most demanding part of the job. Scanning a document with the intent to remain stored only as the digital photo will disable automatic text search. Text and image material can be digitized by dedicated digital cameras. They shorten the process of digitalisation of materials that can not be processed by classical scanning.

Thus, instead of making microfilms and scanning them, documentary material is digitized by a digital camera that immediately captures the image in digital form.

The Archives of Bosnia and Herzegovina started a gradual conversion of traditional archival records into digital form three years ago. Initially, the number of digital documents was relatively small<sup>3</sup>, as only two office scanners were working and just two employees were engaged in the process. There was no elaborate plan for how to access scans; they were simply stacked into the appropriate folders on the hard disk.



### ***Appearance and structure of the first „database“ in the Archives of Bosnia and Herzegovina***

In the meantime, more professional equipment was purchased, the number of employees has been slightly increased and the steady flow of scanned documents started to pour into the Archives (archival material that was initially chosen for photocopying from the Archives of Yugoslavia, in accordance with the Succession Agreement, has been digitized on the spot).

This resulted in a significant increase in the number of scans to be sorted, classified and made available for use and research.

<sup>3</sup> The total number of scans was over 1000, but that amount was still insignificant when it was necessary to approach the more serious study of the period and the topic they were dealing with.



## 5. INFRASTRUCURE

The Archives of Bosnia and Herzegovina have a chronic problem with the infrastructure. The building in which it is located (The Presidency of Bosnia and Herzegovina) is shared among numerous state institutions. That resulted in frequent relocation of offices and changing of their purpose. In a particularly unenviable position is a Reading room - a room that should be of key importance for access to digital material.

At the moment, scientific and research work is taking place in a temporary space which does not meet the basic conditions and standards necessary for quality handling of archival records. The room has an area of 18 m<sup>2</sup> and capacity of 6 researchers. A single PC was installed with a selection of scanned materials on the hard disk (selection of important documents, annuals, periodicals and daily newspapers).



***Temporary reading room with limited space and a single PC unit***

The new reading room is still under construction. Upon completion, it will extend to 160 m<sup>2</sup>, it will have the capacity to serve 20 researchers at once and will be equipped with access to digital material.



***The new Reading room under construction and its planned appearance after completion of the works***

There is a big problem with connecting all the departments into a common computer network, due to the structure of the building in which the Archives is located. The offices are not located next to each other, but they are scattered all over the ground floor. Thick walls, built over a century ago, heavily interfere with the Wi-Fi signal, while installation of cables is complicated from two reasons. The first is the aforementioned arrangement of rooms - cables should pass through corridors, common spaces and offices of other institutions. The other reason is that the building was declared a cultural and historical monument and it is not possible to drill holes and install the kilometers of new installation without disturbing its original appearance.

## 6. SOFTWARE SOLUTIONS

Databases can pose a problem when it comes to accessing data a long time after the normal life- time of the database (e.g. for legal or research purposes). There are very few standard database formats at present. In many cases there are only two options:

- copying the database to a lower-level format (e.g. as plain text or in indexed sequential access method (ISAM)) format;
- keeping the application program which generated the database including the documentation (database management system, accounting application, etc.).

The first solution may mean that some structural elements of the base are lost. The second will often mean keeping not just the application but also a computer system that it can run on, as well as maintaining a working knowledge of the software and hardware (not easy after several years).

In many cases the database is fully integrated in a proprietary application. This is often the case with management programs.

Digital preservation requirements may be expressed differently by archives, libraries, and other types of repositories that are struggling to meet escalating user expectations with limited financial and technical resources. Storage systems should be capable of handling digital information in a wide variety of formats, including text, data, graphics, video, and sound. Digital storage is not only an alternative means for storing print formats because many types of digital objects do not have print equivalents and cannot be preserved in non-digital formats.

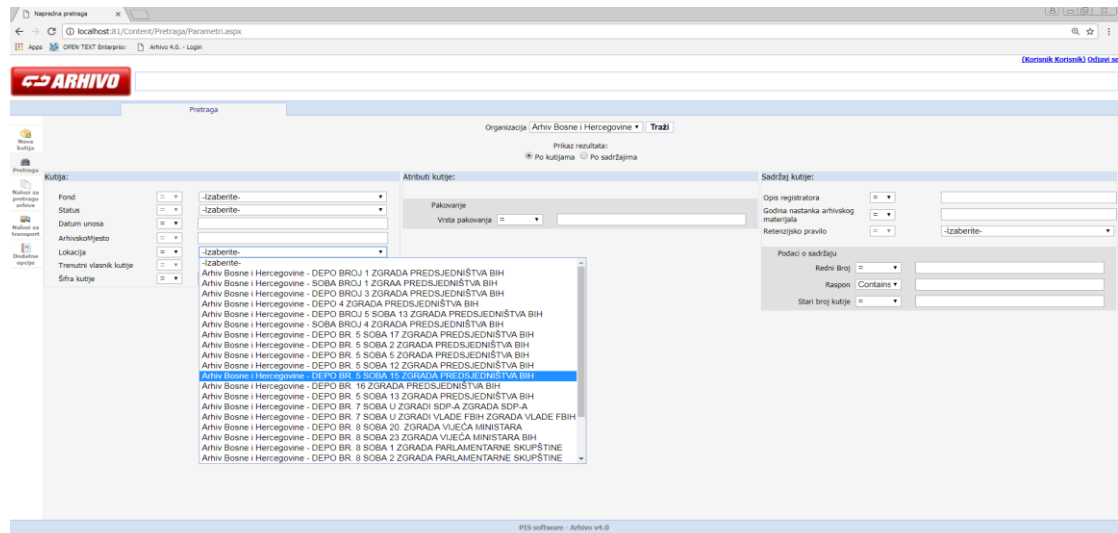
The Archives of Bosnia and Herzegovina currently uses two software solutions for the management and manipulation of digitized archival material - ARHIVO and Archive Digitization Application 2 (ADA2).

Archives of Bosnia and Herzegovina chose ADA2 as its first database because it allows to manage and control all the elements in a digitization process at very little or no additional cost. More than just managing the digitization process, ADA2 gives the opportunity to store archival holdings online and to interact with the audience, to export collections for special exhibitions or to any of the many open source catalogue management tools.

Database can serve as a temporary document repository, offering controls for metadata mapping. The search engine provides archive users with keyword, category and advanced search, and gives archive managers a multilayer overview of the archive structure, as well as user and archival statistics. Each individual document is available for review, zoom, rotation, download and printing.

At the moment, Dublin Core Metadata is used in the BiH Archive (Title, Creator, Description, Date, Type, Format, Language). With the onset of mass digitization, the number and type of these markers will undoubtedly increase. They are important way to protect resources and their future accessibility, our signposts and beacons in the jungle of information. Digital archive without metadata would be like a library without catalogue, and worse: we could neither browse its digital shelves nor read its electronic resources without knowledge of stored items.

With ARHIVO software is possible to control the receipt of documentation in the scanning center at the start of mass digitization, and also preparation, scanning, indexing, microfilming, packaging and transport in the archive to a unique archive location. This program can work with an unlimited number of scanners, index stations, with an unlimited number of employees in preparing, scanning, indexing and returning documents. Through the online system it is possible to track stages of the processing (received, scanned, indexed, exported, delivered, archived) at the scanning center.



### **Managing depots of Archives of Bosnia and Herzegovina with ARHIVO**

ARHIVO is a software solution for managing archives and depots, scanning centers and electronic documents. The software system enables the management of archival units - archive boxes and registers, and enables the creation of labels and markers for the identification and categorization of archival material, which ensures easy extraction of expired documentation and faster service for researchers. Access to the system is done through the web browser, so there is no need for the installation of any software on the user's computer.

## **7. TICKING TIME BOMB?**

Although the information in digital form are theoretically impervious to the passage of time, the media on which they are kept are far away from immortality. Therefore, much more attention is needed in monitoring and maintaining a digital archive rather than a conventional one. „From a practical point of view, anything being kept for more than a couple of years, needs to be considered in the same way as items being kept longer (maybe even forever), because the required procedures for handling five years of retention, or twenty, may be very similar or identical.“<sup>4</sup> This is especially important because devices, processes, and software for recording and storing information are being replaced with the new products, formats and methods on a regular three-to five-year cycle, driven primarily by market forces but also by technical improvements. Both records created in digital form in the first instance and those converted retrospectively

<sup>4</sup> Reine, D., Kahn, M. (2013). *Revisiting the Search for Long-Term Storage - A TCO Analysis of Tape and Disk. The Clipper group.*

from paper or microfilm to digital form are equally vulnerable to technological obsolescence.

The terms "mass storage" and "long-term preservation" embrace a contradiction in the current state of affairs of digital library development, representing a time bomb that threatens the long-term viability of this new type of library. New technologies for mass storage of digital information abound, yet the technologies and methods for long-term preservation of the vast and growing store of digital information lag far behind. Our ability to create, amass and store digital materials far exceeds our current capacity to preserve even that small amount with continuing value.

There are three strategies that can be used for long-time preservation: refreshing, migration and emulation. So far, in the Archives of Bosnia and Herzegovina only the refreshing has been implementing. Refreshing, that is, copying information without changing it, offers a short-term solution for preserving access to digital material by ensuring that information is stored on newer media before the old media becomes unreadable. Refreshing is a vital task for any digital archive, but does not as such guarantee that information remains useful if the software / hardware environment needed for using the information disappears. It is certain that the corresponding software will cease to be used in the not-so-distant future and all the data, even though impeccably preserved, will become unreadable.

A printed book is human readable as such, provided that the language is familiar to the reader and the text has not been encrypted. Old storage devices such as punched paper tape are also in theory readable by humans without dedicated hardware and software, although the work was very slow. More modern storage media do require special hardware and software.

When data is transferred into a more modern media the problems have only started. Digital document always needs interpretation. A single byte may mean many different things, depending on for instance whether the document contains sound, text, image or all of these. And this interpreter is again an application, which itself must be interpreted (executed) by computer hardware.

## POVZETEK

### DIGITALIZIRANO GRADIVO V ARHIVU BOSNE IN HERCEGOVINE - VARSTVO IN DOSTOP

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Arhiv Bosne in Hercegovine se je soočal s problemom kako urediti svoje obširno arhivsko gradivo, mu dodati metapodatke in ga napraviti dostopnega za raziskovalce, hkrati pa zavarovati digitalne dokumente pred izgubo.

V digitalnem okolju fizična lokacija izvornega dokumenta postane nepomembna. Visoka kvaliteta digitalnega nadomestka, ki je dostopen preko spleta, je zadostna za potrebe raziskovalcev, hkrati pa močno zmanjšuje možnost poškodovanja izvornika. Prednosti so številne in jih ni potrebno naštevati. Ne glede na to, da je digitalizacija drag, zapleten in časovno potraten proces ter da trenutna situacija v arhivih ni najboljša, je potrebno najti najbolj učinkovit način implementiranja digitalizacije v arhivih. Ker Arhiv Bosne in Hercegovine ni imel izkušenj na tem področju, je znanje iskal pri ustanovah, ki so se s tem že ukvarjale. Izkazalo se je, da je potrebno za kvalitetno digitalno rokovanje z gradivom najprej povečati kadrovske in materialne vire.

Arhiv Bosne in Hercegovine je oblikoval ekipo, ki so jo sestavljali IT-strokovnjaki in arhivisti, z nalogo razdeliti proces digitalizacije na faze in s tem postopek napraviti bolj pregleden in enostaven. Odgovornosti te multidisciplinarne strateške ekipe so naslednje:

- pregledati zahteve uporabnikov (vključno s pravnimi vidiki);
- identificirati pomembne zapise;
- definirati pravila za učinkovit klasifikacijski načrt;
- definirati standarde in specifikacije za zagotovitev neodvisnosti podatkov od nosilcev ter zagotoviti njihovo trajnost;
- definirati sistem vrednotenja;
- identificirati odgovorne za vsako nalogo;
- definirati politiko usposabljanja;
- nadzorovati implementacijo novih sistemov.

Ekipa se zaveda vseh infrastrukturnih in tehničnih ovir, vendar že prvi rezultati kažejo na pomembnost tega projekta. Pomembno je poudariti, da brez podpore skupnosti pomembnejši rezultati v bližnji prihodnosti ne morejo biti uresničeni.

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