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THE DIGITIZATION OF THE DOCUMENTARY SOURCES AND NEW TECHNOLOGIES IN THE GALLERY OF MATICA SRPSKA

Abstract. The Gallery of Matica srpska is one of the oldest museums in Serbia and an institution of national importance, with a collection of nearly 9.000 works of national fine art, dated from the 16th to the 21st century, as well as a rich history of exhibitions, research and conservation activities. Decades of professional work on study, protection and presentation of Serbian national art resulted in vast amount of documentation, not only of the art objects from the Gallery's collection, but also on many other works of art that have been studied, preserved and exhibited in numerous joint projects in cooperation with other museums, churches and private owners. This documentary material is an invaluable resource for the national history of art and culture, consisting of several units: inventory books; photo-archive; different documents about Gallery's exhibitions; conservation archive; archive of documents related to important artists and projects created in years of art-historical research, as well as specialized library with bibliographical sources. The material formats in which these documents exist are different: paper and electronic documents, manuscripts, machine-typed documents, photocopies, photo negatives and positives of different size and type, digital photographs of different quality, Word documents and in smaller amount Excel documents and printed material. The work on the creation of the database in the Gallery of Matica srpska, initiated by the development of a unique Museum Information System of Serbia (MISS), started in 2010. In the next two and a half years, the idea for the documentation system of the Gallery was developed, the basic hardware and software were acquired, and the checking and preparation of documents and filling of the base with data were organized.
This paper presents the concept, the methodology and the results achieved so far: database of artworks which is in everyday use, as well as database segments in preparation.

Keywords: the Gallery of Matica srpska, digitization, artworks, documentation, exhibition, conservation, archives.

Introduction

The Gallery of Matica srpska[1] is one of the oldest museums in Serbia and an institution of national importance, with a collection of nearly 9.000 works of national fine art, dated from the 16th to the 21st century. The most important segments of the art collection are the collections of paintings, prints, drawings, sculptures and mixed media. Moreover, a series of smaller, special collections formed for more than 165 years through the history of the museum, stand out. The regular exhibition activities of the Gallery, as one of major importance, have started in 1933 while the Department of Conservation works since 1960. Decades of professional work on study, protection and presentation of Serbian national art resulted in vast amount of documentation, related not only to the artworks from the Gallery's collection, but also on many other works of art that have been studied, preserved

[1] http://www.galerijamaticesrpske.rs

and exhibited in numerous joint projects in cooperation with other museums, churches and private owners. This documentary material is an invaluable resource for the national history of art and culture.

The types and characteristics of the documentary material in the Gallery of Matica srpska

The traditional documentation on the Art collection of the Gallery of Matica srpska exists in paper form as: old inventory books of the Museum of Matica srpska, books of entry of the Gallery of Matica srpska, inventory cards of artworks, photo negatives and positive photographic prints, as well as in digital format in the form of unrelated Word documents (containing text, lists and tables), in Cyrillic and Latin font, as well as digital images of different quality.

Documentation on exhibition activities dates back to 1927 and is sorted chronologically in registers. It consists of texts printed on paper (invitations, flyers, catalogues, newspaper articles, reports, lists of exhibited artworks and other relevant documentation) and positive photograph prints. Since 2004, most of the documentation on exhibitions exists in digital format as well, though not systematized and therefore not easily searchable. Since 2007, the full record on the exhibitions is systematically preserved in digital format.

Documentation on conservation activities dates back to 1960 when the Department of Conservation in the Gallery of Matica srpska was established. It consists of files with written reports and photos. From 2002/2003, when the Department of Conservation started to use digital photocamera and computers, the documentation exists in digital format as well, but without adopted standards how to store and search some document in database memory. Multimedia components, primarily the production of documentary films, as well as the preparation and storage of microscopic and X-rays records are added to the conservation archive since 2007.

Documentation on Art history is another important segment of documentary material which consists of handwritten and typed documents, photographs, newspaper clippings, various photocopies, sorted and named in registers by different ways (major authors, major projects, and the like).

The Library of the Gallery of Matica srpska was formed as a reference library in 1960 for the purposes of scientific researches on the art collection of the Gallery of Matica srpska. Today, it contains about 12.000 library items catalogued and classified in accordance with international standards for bibliographic description of publications (ISBD). Such cataloguing of library materials simplifies and makes easier the searching and the navigation within the electronic catalogue, as well as in the Library.

The concept of digitization

Taking into account the above mentioned volume and significance of documentary material, as well as the problems of searching the documents (in paper or digital form), the need to create a related database logically showed up. The major task for the Gallery's professional staff of art historians and conservators were analysis and preparation of

archive data, especially time consuming. This phase of the project started in 2010, initiated by the development of a Museum Information System of Serbia (MISS)[2].

The Gallery joined this project and provided data about its art collection in February 2010. The project envisaged the coding of the art collection as well, according to the model implemented by the National Museum in Belgrade, where the codes for single artwork should have been generated from the MISS database.

Because of the beginning of the revision of the Gallery's art collection and the problems in browsing data on artworks and detecting errors in the existing data (such as out-of-date data on storage of artworks, duplicated numbers, etc.), the Gallery team started to create the database. It was based on the database created within the MISS project in 2011, but the Gallery got on with the modifications according to the specific needs of its daily work. The concept that would allow verified and supplemented data to be synchronized with MISS was made, but the work progressed even further. Taking into account the features of the Gallery's collection (its origin, value and significance, type of material) and the existence of related archives and documentation, the concept that would involve all components to one system was also developed.

When creating the concept of digitization, the data had to be conceptually classified by its importance, arranged and put to its place. Regardless of the knowledge on the documentary material in the Gallery, at the beginning of the digitization process, it was difficult to remember and list all the options that might be its subject as the work progressed. Still, an initial set of useful information that should be selected when preparing documents for digitization had to be defined. The awareness that new requested options will occur in the development of data classification, not only in its defining, but also in its application, led to the need of taking into account the possibilities of later modifications during the analyses.

From the very beginning, it was clear that the verification of existing data and the preparation of metadata are demanding in time and personnel and that the whole project can progress only if introduced within the work plan as a priority. Moreover, the cooperation of different experts was necessary all the time, in order to solve dilemma on the specifics of individual segments of the documentary material. Furthermore, in parallel with the work of museum professionals in analyzing the traditional archive documentation, a concept of an integrated documentation system was developed and the technical conditions for the operational functioning and comfortable working in an imaginary database was created as well.

The starting point was the design of computer network whose characteristics should meet the requirements of stable and rapid communication of networked computers. One part of the computer equipment which did not meet the standards, both in hardware or software, has been replaced by new ones. The information flow have been also adapted to the latest standards, so the prerequisite for the communication speed was also completely met. As a basis for work, a web-based application[3] was chosen.

The software and databases are located on a central server, which means that no additional installations on users' computers are required. Users' computers are not

[2] http://eternitas.rs

[3] A web application is any application software that runs in a web browser or is created in a browser-supported programming language.

connected to specific operating systems. The access to the database is provided by a computer connected to the local network, a web browser, a username and a password.

The registration of data, any change of data or other activity related to the updating is recorded on a central server. This made a good solution for overcoming the former method of storing and processing of documents, in which the identification of updated documents was impossible, making a constant source of problems. By defining the approach "one document in one place" the data are stored on a server that is designed according to the RAID[4] standard.

This option of data storing is useful in case when one of the hard drives break down, as an identical copy remains at other place. By replacing the damaged drive with new one, the system returns to the operating state. In case when both drives crash at the same moment, due to a number of inconveniences, an external copy of the entire database, stored in a location that is physically separated from the server, becomes a "backup" for returning the operation level by restoring the server. There is also a possibility of saving another by "Cloud computing"[5], which is an additional option for data storage.

It is important to note that the process of digitizing archival documentation is parallel to the constant production of new documents in everyday's work. Therefore, a concept of switching it to e-documentation, by designing interfaces and connecting newly created and archival documents, was developed. Archival documentation that should be digitized was separated aside, while the new one is produced immediately in digital form by classifying archive material and typing the accompanying metadata within the system. Thus, the following concept was created:

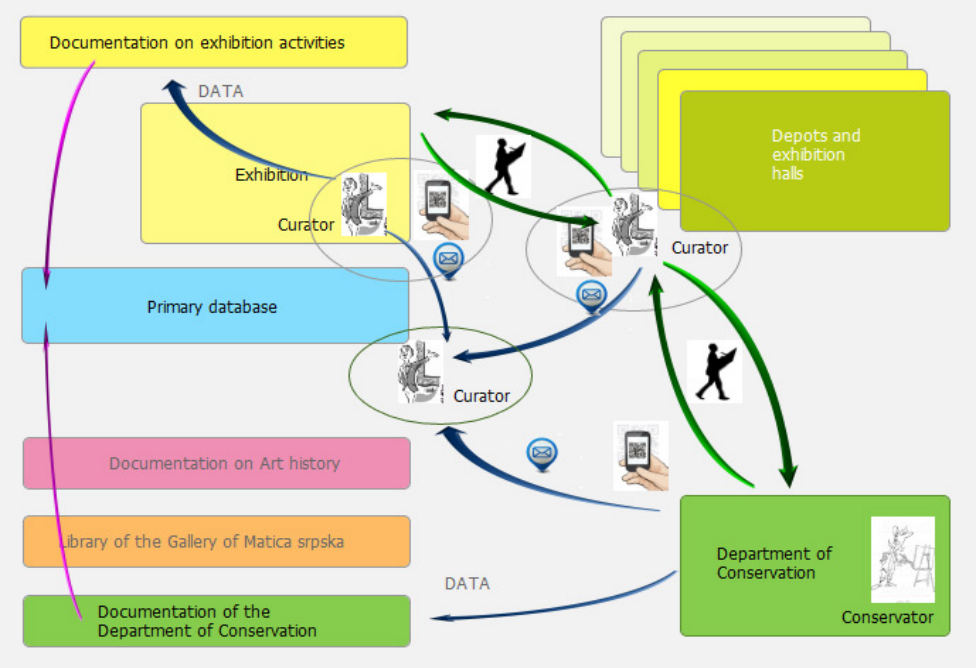

Figure 1: Documentary system in the Gallery of Matica srpska

[4] RAID (redundant array of independent disks) is a storage technology that combines multiple disk drives in a logical drive. RAID1 is an option when identical data is written to two disks – a mirror image (mirrored set).

[5] Cloud Computing is a technology that provides a flexible, on location independent access to computing resources.

The primary database – Digital inventory of the Art collection

The digital inventory of the art collection with data from inventory cards has been created in 2011, 2012 and partly in 2013. Data entered into the digital inventory are compiled on the basis of documents that are the result of decades of work by generations of curators, with an extra audit of data in the inventory files, storage data in depots and exhibition halls. This "general check up" gave results in terms of better systematization of data on the museum collection and in correcting errors that were copied and floated unnoticed in earlier audits.

Coding of the storage of artworks. The old method of labeling place of storage for works of art in the Gallery was based on principles which were logical before the computerized system of searching was introduced. That system used the combination of alphabetic characters, Arabic and Roman numerals, creating associative codes (e.g. I/OD-1 for Depot I, archive storage D, tray 1). However, this labeling is not suitable for automatic search within the database, because the storage and search through the user interface would be complicated and such model would include demanding operations in the very making of the program.

In order to make lists of thousands of items according to the storage in depots (necessary for the revision of depots and for the comparison of existing data in the records with the actual situation), it was essential to abandon the former system and adapt it to new technologies. An alternative model that uses only numbers was proposed. Moreover, the logic of codes in which the positions of numbers has the meaning of spatial features, from the widest (building) through narrower (floor, room) to those that define the precise location of art objects (sector space, cabinet / board / wall, shelf, side of panels, drawer) was also introduced. This system is suitable for automatic matching of data related to storage of artworks, but not associative in the way that employees in the museum were used to.

To overcome this situation and to facilitate the transition to the new system of marking, the sectors were marked with numbers and "code lists" were made to help in the orientation in space.

Figure 2: Labeling the storage sectors in depots

Since the moving of artworks for exhibitions, conservation and the like involves the change in the storage data, a *Procedure* was developed to facilitate the documentation on these changes. The procedure foresees the e-mail information on relocation of items. The

QR code for storage position of artworks was also defined. It encloses the description of the location, visible on the electronic card. In that way, the data about certain artwork (art-history data) and data about its actual position in the storage depot or exhibition space are quickly reachable, with the possibility of using "smart" phones or a tablet device with QR code scanner.

The identification of artworks. The principle of QR codes application has been used for the identification of artworks as well. It contains the basic information needed: the inventory number, the number of the book of entry (for connection to old archive documentation sorted by this number), the author's name, a title of the work, its technique, the time of occurrence, and its dimensions. These data are sufficient for the identification of artwork, wherever it is located and the possibilities are much wider. By this solution, each artwork has its proper "metadata", shortening the identification for a few steps, compared to the solutions used in some methods already seen in UPC (Universal Product Code) and its options. Compared to the standard UPC bar codes, the QR code has greater storage capacity and is capable to contain four types of standardized data (numeric, alphanumeric, byte/binary) or through supported extensions, for virtually any type of data.

The reliability of the database as a source of relevant information depends on the accuracy of metadata entered by the authorized museum professionals. New knowledge that would lead to the change of metadata, can be easily entered into the system by replacing the QR code, and the process is very simple.

The form of electronic inventory card was also defined, with all information on artworks. In collaboration with the curators of the collections, data on which the inventory cards can be sorted and searched by any word or part of a word was determined.

The data entered into electronic cards, depending on the field in which they are defined, can be searched by characters and are not attached exclusively to certain principles. It is enough to enter keywords, records, and numbers according to the fields which define our search more precisely. When the criteria of search are met, such data can be exported to Excel or PDF format, and they can still be used in this form as a subject of some other operation.

Documentation of the Department of Conservation

Digitization of the documentation on conservation of artworks started in 2012 with analysis and classifying of documentation, and in 2013 with scanning archived documentation and development of the new conservation file interface.

Before the digitizing of archive documentation all of the data about the documents had to be arranged (records of entering of artworks into the Department of Conservation, reports of conservation-restoration work, archive photos) in the degree that it would enable adding the data from the "primary database" to the scanned document. The problems of gaps of relevant data in archive documentation were discussed with responsible experts from the Department of Conservation. Archived documents were scanned and edited using JPEG format, for association of metadata into the scanned image which would enable its identification. Because the older documentation is in many cases handwritten the processing of such documentation is time consuming. Having in mind the rationalization of working time, the data are processed to a certain degree in this phase of digitizing, and the

archived document is accessible for the user (who download the document from the server) to study.

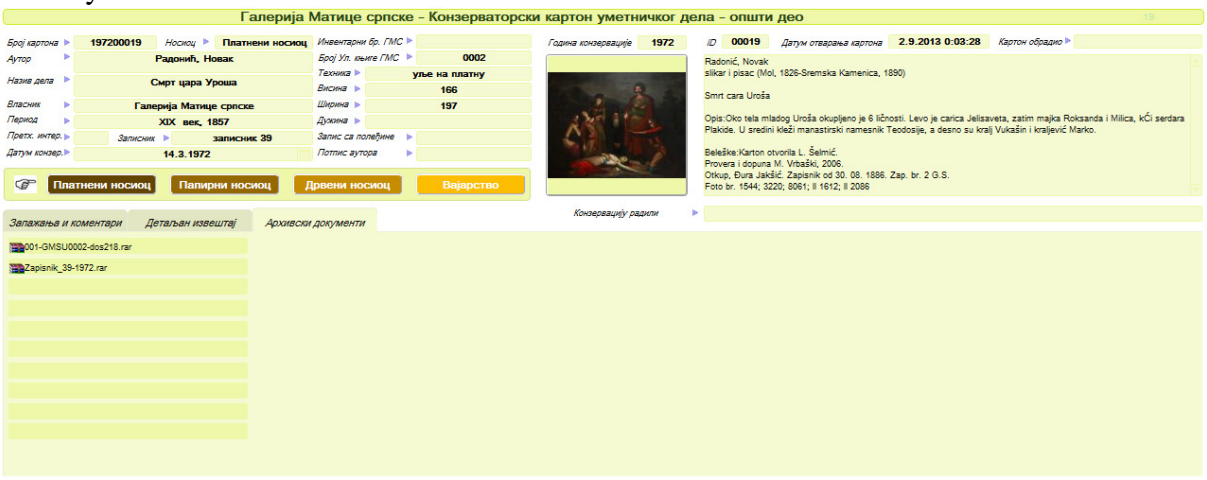

Figure 3: Digitized conservation archive documents

Being able to search conservation archive has immediately shown its benefits. For example, one can easily check if an artwork was conserved multiple times in the past, which is an important information in future conservations. Accessing this data from the archived files has become an excellent opportunity for professional and scientific analysis of conservation history of the artworks in the collection. Access to this information is enabled through intranet web environment and is determined by administrator, moderator or user (who can view or download data) rights. Parallel to the digitization process of the existing documentation on conservation, an interface has been developed that enables switching to digital documentation in the full extent of its meaning. The level of detail of the data entered is much higher, in line with the latest standards. The new data about conservation treatments of the artworks automatically becomes a part of the conservation database.

Documentation on exhibition activities

The preparation for digitizing the documentation on exhibition activities started in 2013. The first phase consisted in analyzing the exhibition archive structure which dates back to 1927. As the result of this analysis the working methodology was set, predicting the order of archive documents to be classified and stored in the database: from the latest in 2013 to earlier years, so that the new exhibitions would be properly classified for archiving and used as a relevant data for future research. Because of different structures of Gallery's archives enclosed inside this project, model adopted for digitization structure of exhibitions archive is different from the one used in processing of conservation documentation. Documentation on exhibitions is abundant and complex and it takes a well thought-out plan for that material to be classified. The search principle is simple, by typing keywords, or only syllables, in fields that correspond to that type of search. With "container saving" of archived documents, accessing them in packed form is enabled through web environment. Thanks to the primary processing of such documents by inserting the corresponding metadata, the user which takes the document or a package of photos, audio recordings, videos or any other type of document, regardless of the files name, uses the metadata from the description. All documents that are in written form were converted to PDF format. That

kind of storage is appropriate because the data cannot be changed accidently without the use of proper tools. This way all the conditions for data processing have been met, and no time is wasted on searching. Classification as general data, press clipping, videos, documents, and protocol visits enables data placement in corresponding folders (containers). With this solution, for this phase of digitization, there is a system which satisfies the needs of the Gallery of Matica srpska. Because all basic demands have been met, migration of data to a new, better, system in the future will not represent a problem.

Figure 4: Interface for exhibition archive

Art-historical documentation

Digitization of art-historical documentation is a job that is to be done in the future. Experience in digitizing basic data about the art collection, documentation on conservation treatments of artworks and documentation on exhibitions, has shown that the analysis of the structure and classification of data is very time consuming and cooperation between museum professionals and information technicians is mandatory.

The Library of the Gallery of Matica srpska

A specific segment of digitization is the Library of the Gallery of Matica srpska. Library information systems have been developed long ago, and the Gallery is processing library fund in cooperation with the Library of Matica srpska as a referrer library. A user interface is developing, which will contain all the basic data about the library fund, make searching easy and which will become a link in the process of applying international standards in library-information system.

Conclusion

After three years of preparing data, developing the digitization concept and setting a system, one segment – digital inventory is in everyday use, and the other two – documentation on conservation and documentation on exhibition are in test phase. It is hard to estimate how many years exactly it will take to finish this work completely. It is important that every finished segment is put into functioning state immediately, which increases the users trust and facilitates the search for resources (human, time and financial)

in future. The system is developed for the needs of the Gallery of Matica srpska, it is open for upgrades and updates which can prove useful and necessary, and through metadata compatible for understanding and integrating into broader national and regional systems.

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