



Methodological and Organizational Aspects of Digitization and Bibliographic Access of Cultural Heritage: Lithuanian Approach

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Abstract:

This presentation aims to indicate the lessons learnt from the initiative of the Lithuanian National Bibliographic Agency – the Centre of Bibliography and Book Science of Martynas Mažvydas National Library of Lithuania (CBBS) and other memory institutions – the Lithuanian Art Museum and the Lithuanian Archives Department, which provide authoritative bibliographic descriptions for the national collection. The article describes experience in the development, implementation, and updating of formats and standards used in recording bibliographic information and digitized cultural content, providing access to it, creation of the Integrated Virtual System and a common portal on cultural heritage <http://www.epaveldas.lt>. The presentation also specifies Lithuanian national bibliographic agency's efforts on the introduction of specific provisions on collaboration between memory institutions into legislative documents, the creation of a methodology for such collaboration and its implementation as well as encouraging the compilation of the national bibliography.

Introduction

With a new strategic framework i2010 – *European Information Society 2010* – the European Commission launches a new integrated Information Society policy approach. Fully in line with the new governance cycle of the re-launched Lisbon Strategy, i2010 will contribute to the core Lisbon goal of sustained growth and jobs. From the viewpoint of the objective – the single European information space – offering affordable and secure high bandwidth communications, rich and diverse content, and digital service of i2010, cultural heritage plays an important role in the whole programme.

Various tasks of cultural heritage digitization were fulfilled in Lithuania through the last decade. However, up to 2005, those activities had been fragmentary; there had been no unanimous strategy involving all memory institutions – archives, libraries, and museums – in the creation of digital cultural heritage content and access.

This presentation aims to indicate the lessons learnt from the initiative of the Lithuanian National Bibliographic Agency – the Centre of Bibliography and Book Science of Martynas Mažvydas National Library of Lithuania (CBBS) and other memory institutions – the Lithuanian Art Museum and the Lithuanian Archives Department, which provide authoritative bibliographic descriptions for the national collection. We would like to share our experience in the development, implementation, and updating of formats and standards used in recording bibliographic information and digitized cultural content, providing access to it, creation of the Integrated Virtual System and a common portal on cultural heritage <http://www.epaveldas.lt>. The presentation also specifies Lithuanian national bibliographic agency's efforts on the introduction of specific provisions on collaboration between memory institutions into legislative documents, the creation of a methodology for such collaboration and its implementation as well as encouraging the compilation of the national bibliography.

2. Methodology: A Common Approach to Cultural Heritage

Archives, libraries, and museums, performing their mission of memory institutions, are striving to preserve cultural heritage objects and information about them. Boundaries between these institutions often become blurred, when we take into consideration memory institutions which, due to historical circumstances, sheltered cultural heritage values that were altogether different from the objects preserved there. Though this 'object type' factor still plays a decisive role in forming organizational structures of memory institutions, it could hardly be argued, however, that a work of art, author's manuscript of this work or a review of this same work, – all of them share the same cultural and historical context, and provide evidence of comparable cultural features. With the purpose to achieve consistency between cultural heritage content and presentation of information on this content, IFLA, CIDOC, ISO, and other communities have started framing a common conceptualization of the information about cultural heritage gathered by three types of institutions: archives, libraries, and museums. In this context, the results achieved by the International Working Group on FRBR/CIDOC CRM Harmonization are very encouraging with respect to the implementation of the integrated, shared ontology for the information accumulated by both libraries and museums. This, in its turn, will ensure integrity of cultural heritage content and convenient access under the application of the Semantic Web.

We could finally admit, with some satisfaction, that the initiative started by CBBS, which originated in a request for financial support from the European Structural Funds, have developed into **A Common Methodological Approach to Cultural Heritage Digitization and Access** with respect to modelling, standards, recommendations, and practices. The methodology has been:

- **defined** in *The Concept of Lithuanian Cultural Heritage Digitization; The Strategy on Digitization of Lithuanian Cultural Heritage, Digital Content Preservation, and Access; The Strategic Framework for Implementation of the Strategy in 2007-2013*;
- **implemented** within the *Integrated Virtual Library Information System of the Cultural Heritage* (IVBIS) and the portal <http://www.epaveldas.lt>;
- **realized** within the Interorganizational Virtual Structure through coordination centres for digitization.

3. Objectives

3.1. New Paradigm in the Legislation on Cultural Heritage: Concept, Strategy, and Strategic Implementation Framework

Lithuanian memory institutions accumulate and preserve precious national heritage, which serves as a source for public spirit, self-awareness, and self-esteem of the nation as well as for contemporary knowledge, education, and leisure activities. With Lithuania joining the

EU, the importance of cultural heritage actualization, i.e. its presentation in the single digital space of Europe, has considerably increased. In 2006 a survey among Lithuanian memory institutions was held by the Ministry of Culture together with the Institute of Library and Information Science of the Faculty of Communication of Vilnius University. The survey served as the basis for a research into activities on digitization of the preserved cultural heritage, the results of which were announced and published within the annual report *Coordinating Digitization in Europe*¹ by *The National Representatives Group for Coordination of Digitization Policy and Programmes* in 2006. The results of the research revealed a wide range of multiple memory institutions (libraries, museums, archives, research and educational institutions, other public bodies) that were involved in various cultural heritage digitization projects. At that time 58% of memory institutions were involved into digitization activities, and 55% of them considered digitization as their strategic priority. The largest project ever launched by a memory institution in Lithuania was *Creation of the Integrated Virtual Library Information System* that was realized by Martynas Mažvydas National Library of Lithuania together with the partners – the Lithuanian Arts Museum and the Lithuanian Archives Department under the Government of the Republic of Lithuania in 2005-2008. The successful implementation of the project allowed setting up a databank of digital data with the capacity to store over 2, 800, 000 digitized pages of original documents. It has enabled national and worldwide users to get acquainted with cultural values preserved at these institutions.

The digitization projects initiated by academic institutions mostly support research and educational needs. In 2003 the Institute of Mathematics and Informatics, the Lithuanian Institute of History, the Institute of the Lithuanian Language, and the Institute of Lithuanian Literature and Folklore launched a scientific project on data digitization *Aruodai*; the project *LDK Skaitmena* was undertaken by the Institute of Mathematics and Informatics together with the Institute of the Lithuanian Language, the Faculty of Philology of Vilnius University, and Vilnius University Library under the support of the Lithuanian State Science and Studies Foundation in 2006; the Faculty of Communication and the Faculty of History of Vilnius University together with the Curia of Vilnius Archdiocese and the Lithuanian Museum of Ethnocosmology have started the project *Information System of Archival Documents and Books of Vilnius Ecclesiastical Province (BARIS)*. The Institute of the Lithuanian Language and Berlin Humboldt University financed by the European Union PHARE 2003 programme have launched the project *Digitization of the Ancient Lithuanian Manuscripts of the Eastern Prussia. Danielius Kleinas' Hymnal and Prayer*. This initiative is a continuation of efforts to create the database of old manuscripts. Vilnius University Library together with the Institute of Mathematics and Informatics have joined the international project ENRICH, which aims to create the European cultural heritage digital library database by integrating the created digital content that still remains dispersed. Vilnius University Library is involved in a long-term project *Creation of the Full-Text Database of Manuscript Judicial Books of the Great Duchy of Lithuania*.

The public body *National Radio and Television* has accomplished the project *Creation of the Virtual Television Product Library Enabling Public Electronic Access to Lithuanian Audiovisual Heritage Recorded in Lithuanian Television (LTV) Programmes and Ensuring Continuous Digitization, Preservation, and Availability of This Heritage to the Public*. Under this project, a public online library of television products providing access to national audiovisual heritage recorded in television programmes was built.

¹ Manžuch Z., Pernaravičiūtė J. *Coordinating digitisation in Europe. Lithuania*. Retrieved April 24, 2009, from <http://www.minervaeurope.org/publications/globalreport/globalrepdf06/Lithuania.pdf>

Though after *The Concept of Lithuanian Cultural Heritage Digitization*² had been adopted in 2005 and memory institutions continued to be involved into large-scale digitization projects, cultural heritage digitization activities remained fragmentary throughout Lithuania. Implementation of digitization projects was not coordinated, projects were mostly focused on short-term goals, the only exception being the project by the National Library of Lithuania and the partners. Even after the conclusion of a project, preservation of digitized cultural heritage objects and access to them were not often secured.

This inconsistency of digitization activities served as the main incentive to further improve legislation on national cultural heritage digitization and access. Proper legislation is the only mechanism that provides maximum security for successful strategic activity of memory institutions and their financial support that, in its turn, ensures the sustainability of the national cultural heritage digitization process.

In the context of this report, it is important to highlight the role of the Lithuanian national bibliographic agency in the development of the legal basis for national cultural heritage digitization and access.

In 2003-2004, CBBS, aiming to bring the attention of public authorities to the urgent need for integration into the space of the European electronic content, was carrying out several forward projects on cultural heritage digitization and integration of memory institutions. In 2005 *The Concept* initiated by the Centre was approved by the Government of the Republic of Lithuania (Resolution No. 933 of the Government of the Republic of Lithuania of 25 January 2005; *Valstybės žinios*, 2005, No. 105-3877).

The Concept defines the objective, goals, and principles of cultural heritage digitization, also common selection criteria, setting the foundation for consistent and purposeful work of memory institutions aiming to secure and actualize the cultural heritage of the nation as well as improve access to it. On the basis of the *Concept*, coordination and monitoring of the support for cultural heritage digitization on the national level is carried out by the Ministry of Culture of the Republic of Lithuania together with the Ministry of Education and Science, Information Society Development Committee under the Government of the Republic of Lithuania, and the Lithuanian Archives Department under the Government of the Republic of Lithuania. They also present suggestions for efficient realization of this support to the Council on Digitization of Lithuanian Cultural Heritage.

The Concept, however, does not define organization of digitization activities and funding of these activities. This imperfection prompted the author of this publication to initiate further updating of the regulatory framework. The initiative group formed by the author of this publication developed a draft *Project for the Strategy on Digitization* and presented it to the Ministry of Culture. After the general debate by the team from the Ministry of Culture and the Council on Digitization as well as a public debate, the final *Strategy on Digitization of Lithuanian Cultural Strategy, Preservation of Digital Content, and Access* as well as a draft *Strategic Framework for Implementation of the Strategy in 2007-2013*³. *The Strategy* and *The Strategic Framework* were presented to the Government of the Republic of Lithuania for adoption.

² *Lietuvos kultūros paveldo skaitmeninimo koncepcija* : patvirtinta Lietuvos Respublikos Vyriausybės 2005 m. rugpjūčio 25 d. nutarimu Nr. 933 // *Valstybės žinios*. – 2005, rugpj. 30 (Nr. 105), p. 5-6.

³ *Lietuvos kultūros paveldo skaitmeninimo, skaitmeninio turinio saugojimo ir prieigos strategija* : Lietuvos Respublikos Vyriausybės nutarimo projektas. Retrieved April 24, 2009, from http://www.lrkm.lt/go.php/lit/PROJEKTAS_DEL_LIETUVOS_KULTUROS_PAVELDO_/158/0/159

In order to give a concise description of the purpose of this document, the main emphasis should be on those aspects of *The Strategy* which define coordination of digitization activities through digitization centres. Their role is to be taken by institutions having the most prolific experience in digitization and providing access to the digitized material: the National Library of Lithuania, the Lithuanian Art Museum, and the Lithuanian Archives Department. Establishment of coordination centres within national memory institutions must facilitate selection of cultural objects for digitization and preparation of lists of cultural heritage objects. It would also make digitization work coordinated, and unnecessary overlap of procedures would be eliminated. As a result, financial resources would be saved, and consistency of the entire process would be achieved. The centres' remit should include provision of manifold methodological assistance and training services for the professional community as well as invariable concern about financial support that could be obtained in line with the guidelines provided by the above-mentioned strategic document.

The vision of *The Strategy* manifests itself as the single digital information space of Lithuanian cultural heritage that extends the lifetime of cultural heritage objects; provides current, comprehensive, and authoritative information about Lithuanian cultural heritage to the European and worldwide public; ensures permanent and reliable use of cultural heritage resources for research, educational, and cultural purposes.

The Strategy pursues the aim to encourage digitization of cultural heritage objects preserved at memory institutions, guarantee long-term preservation of Lithuanian cultural heritage, its integration into the global digital space, and worldwide access to it.

The Strategy aspires to:

- create a seamless system of cultural heritage digitization and ensure its reliable functionality;
- develop and expand the Integrated Virtual System of digital cultural heritage combining search, preservation, and access features;
- standardize cultural heritage digitization, preservation, and access workflows;
- digitize cultural heritage objects and deliver their content into the common cultural heritage portal 'epaveldas.lt';
- encourage initiatives on cultural heritage access.

It must also be taken into consideration that adoption of *The Strategic Framework for Implementation of the Strategy* will provide much wider possibilities for receiving financial support from the state budget and the EU Structural Funds. Priority should be given to those projects which provide possibilities of participation in the joint activity of creating the single digital information space of Lithuanian cultural heritage and integration of their products into the system of the digital cultural heritage and common portal 'epaveldas.lt'.

The Strategy on Digitization of Lithuanian Cultural Heritage, Preservation of the Digital Content, and Access and *The Strategic Framework for Implementation of the Strategy in 2007-2013* will be adopted at the beginning of May, 2009. It shall expand the existing infrastructure for the purpose to create a single digital cultural heritage information space, extend the lifetime of cultural heritage objects, provide current and authoritative information about Lithuanian cultural heritage in the virtual environment, and facilitate preservation and promotion of Lithuanian culture under globalization.

3.2. Common standards as the basis for the Integrated Virtual System and common portal

Expansion of digitization activities has stimulated development of an integrated, shared ontology for the information about the collections held by memory institutions. It was only a short time ago that common standards started to be applied for most of the digital repositories

and access systems set up by memory institutions. Prior to that, the absence of concern for using common standards prevented consistency in retrieval of digital content and access to it.

That is why in the above-mentioned strategic documents on cultural heritage digitization, special prominence is given to the need of applying common standards. These documents aim to have common digitization standards adopted in order to coordinate projects and initiatives undertaken by memory institutions, ensure compatibility of cultural heritage repositories on a national level and their integration into the European digital content.

Currently the National Library of Lithuania together with the project partners – the Lithuanian Archives Department and the Lithuanian Arts Museum – are the only institutions adhering to common standards for metadata, archiving of digital objects, their preservation, and access to them within the Integrated Virtual System created under the joint project of 2005-2008.

Application of common standards is essential, because they call for integrity of the digital content and more qualitative information resources, where objects can be browsable, searchable, and identifiable in a hierarchy system.

For achieving interoperability with national memory institutions, the European Digital Library (EDL) (<http://www.theeuropeanlibrary.org>), and Europeana (<http://www.europeana.eu/portal/>), the following standards have been applied within the Integrated Virtual System:

Controlled vocabularies	EUROVOC ⁴ – archives LCSH ⁵ (Lithuanian version) UDC ⁶ – libraries ULAN ⁷ – museums
Data content standards	ISAAR (CPF) ⁸ , ISAD(G) ⁹ DC – archives ISBDs ¹⁰ – libraries

⁴ *Eurovoc* : *Europos žodynas*. Retrieved April 24, 2009, from <http://www3.lrs.lt/pls/ev/ev.main>

⁵ *Lietuvos nacionalinės Martyno Mažvydo bibliotekos rubrikynas*. Vilnius : Lietuvos nacionalinė Martyno Mažvydo biblioteka, 1994.

⁶ *Universal Decimal Classification (UDC)*. Vol.1-2. Complete ed. London : BSI, 2005.

⁷ *ULAN : the union list of artist names*. Getty Center, Los Angeles, 2000. Retrieved April 24, 2009 from http://www.getty.edu/research/conducting_research/vocabularies/ulan/

⁸ *ISAAR (CPF) : international standard archival authority record for corporate bodies, persons, and families*. Retrieved April 24, 2009, from <http://www.ica.org/en/node/30004>

⁹ *ISAD (G) : general international standard archival description*. 2nd ed. ICA, Ottawa, 2000. Retrieved April 24, 2009, from http://www.ica.org/sites/default/files/isad_g_2e.pdf

¹⁰ *ISBD (A) : senųjų (antikvarinių) monografinių leidinių tarptautinis standartinis bibliografinis aprašas*. – Vilnius : Lietuvos nacionalinė Martyno Mažvydo biblioteka, 1999.

ISBD (CM) : kartografinės medžiagos tarptautinis standartinis bibliografinis aprašas. – Vilnius : Lietuvos nacionalinė Martyno Mažvydo biblioteka. Bibliografijos ir knygotyros centras, 1999.

ISBD (CR) : serialinių leidinių ir kitų tęsiamųjų išteklių tarptautinis standartinis bibliografinis aprašas. – Vilnius : Lietuvos nacionalinė Martyno Mažvydo biblioteka, 2007.

ISBD (G) : bendras tarptautinis standartinis bibliografinis aprašas. – Vilnius : Lietuvos nacionalinė Martyno Mažvydo biblioteka. Bibliografijos ir knygotyros centras, 1995.

RIS based on CIDOC CRM¹¹ – museums

Data structure standards	EAD ¹² – archives UNIMARC ¹³ – libraries DC ¹⁴ – museums
Data preservation standards	METS ¹⁵ } – archives } – libraries } – museums
Access standards	Z39.50 ¹⁶ , } – archives SRU/W ¹⁷ } – libraries } – museums

The following scheme illustrates the interaction of these standards within the Integrated Virtual System of cultural heritage.

ISBD (M) : monografinių leidinių tarptautinis standartinis bibliografinis aprašas. – Vilnius : Lietuvos nacionalinė Martyno Mažvydo biblioteka. Bibliografijos ir knygotyros centras, 1997.

ISBD (NBM) : neknyginės medžiagos tarptautinis standartinis bibliografinis aprašas. – Vilnius : Lietuvos nacionalinė Martyno Mažvydo biblioteka, 2002. *ISBD (PM) : natų leidinių tarptautinis standartinis bibliografinis aprašas.* – Vilnius : Lietuvos nacionalinė Martyno Mažvydo biblioteka. Bibliografijos ir knygotyros centras, 1998.

International standard bibliographic description (ISBD) / recommended by the ISBD Review Group ; approved by the Standing Committee of the IFLA Cataloguing Section. – Preliminary consolidated ed. – München : K.G. Saur, 2007. – 1 vol. (loose-leaf) ; 32 cm. – (IFLA series on bibliographic control ; vol. 31). – ISBN 978-3-598-24280-9.

¹¹ *CIDOC CRM : conceptual reference model.* Retrieved April 24, 2009, from <http://cidoc.ics.forth.gr/>

¹² *EAD: encoded archival description.* Version 2002. The Network Development and MARC Standards Office, 2002 Retrieved April 24, 2009, from <http://www.loc.gov/ead/index.html>

¹³ UNIMARC manual : bibliographic format. IFLA, 2000. Retrieved April 24, 2009 <http://www.ifla.org/VI/3/p1996-1/sec-uni.htm>

¹⁴ *I5836:2007* Informacija ir dokumentai. Dublin Core metaduomenų elementų grupė (tapatus ISO 15836:2003). Vilnius : Lietuvos standartizacijos komitetas, 2007.

¹⁵ *METS : meta data encoding and transmission standard.* Version 1.6. METS editorial board, 2007. Retrieved April 24, 2009, from <http://www.loc.gov/standards/mets/mets-home.html>

¹⁶ *ISO 23950: 1998* Information and documentation – Information retrieval (Z39.50) – Application service definition and protocol specification. Retrieved April 24, 2009, from http://www.iso.org/iso/catalogue_detail?csnumber=27446

¹⁷ *SRU : search/retrieval via URL.* Version 1.2. The Library of Congress. Retrieved April 24, 2009, from <http://www.loc.gov/standards/sru/index.html>

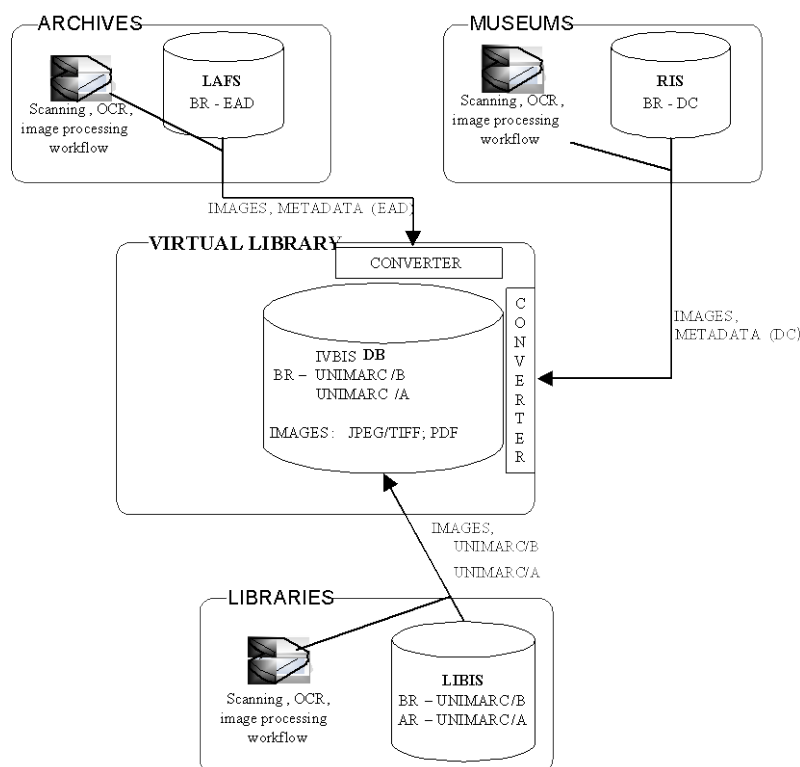


Figure 1. Architecture of the Integrated Virtual System

BR – Bibliography records

AR – Authority records

LAFS – Lithuanian Archival Funds Collection (*Lietuvos archyvu fondo sąvadas*)

RIS – Collection Information System (*Rinkinių informacijos sistema*)

IVBIS – Integrated Virtual Library Information System of the Cultural Heritage (*Integrali virtuali bibliotekų informacijos sistema*)

LIBIS – Lithuanian Integrated Library Information System (*Lietuvos integrali bibliotekų informacijos sistema*)

3.2.1 Descriptive metadata solutions

The level of metadata used in the Integrated Virtual System has been the principal issue calling for most urgent solution.

There was no uncertainty over the presentation online of digital image metadata, as the Dublin Core metadata standard had been adopted as a national standard in Lithuania.

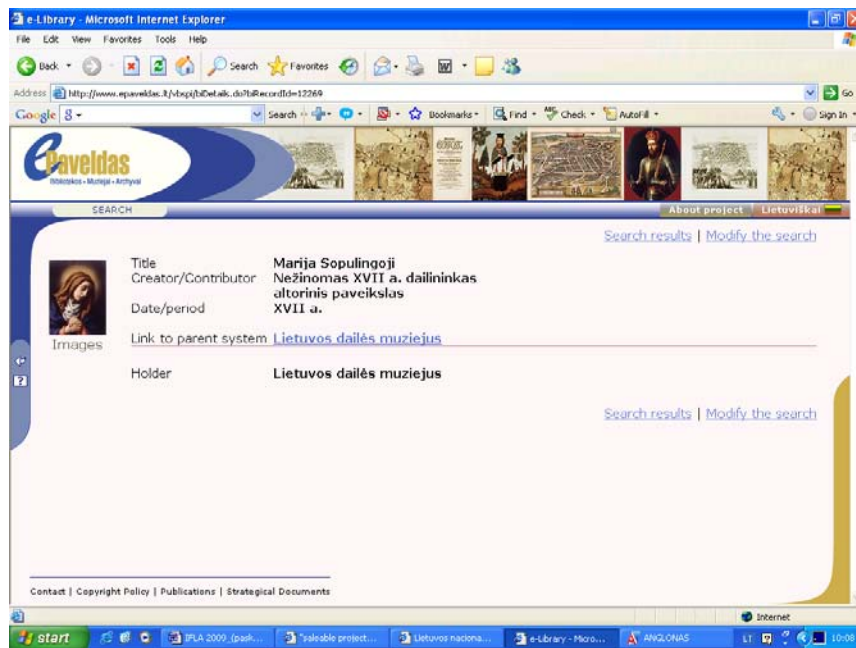


Figure 2. An example of DC metadata within the portal www.epaveldas.lt
<http://www.epaveldas.lt/vbspi/biDetails.do?biRecordId=12269>


<pre> <dc:title>Marija Sopulingoji</dc:title> <dc:creator>Nežinomas XVII a. dailininkas</dc:creator> <dc:subject>altorinis paveikslas</dc:subject> <dc:description>Drobė, aliejus, h/pl. - 60x46 cm</dc:description> <dc:contributor>Lietuvos dailės muziejus</dc:contributor> <dc:date>XVII a.</dc:date> </pre>	
<p>DC-based metadata</p> <pre> <dc:source>http://www.rinkinys.ldm.lt/iris/index.as px?cmp= </pre>	

Figure 3. An example of DC metadata within the Integrated Virtual System

The DC metadata format is simple to manage: creation of Dublin Core records for any kind of information presents no difficulties. On the other hand, there are some disadvantages: there are no cataloguing rules that could specify the recording of data in the fields.

However, some of the elements are capable of causing some confusion, e. g. “creator” data’. Within archives, a description of each archival item is relevant only when an explicit description of the creator of the fonds to which the object belongs is provided. It is only the history and structure of the creator that can help the user understand the conditions in which the document was created or collected and appraise the content of the document. The relevance of this category of data for the description is very high. Dublin Core is lacking namely this category of data. In Dublin Core, the ‘creator’ element is defined as an entity primarily responsible for making the content of the resource. This definition will not pertain to archives. In ISAD(G), a creator is defined as “the corporate body, family or person that created, accumulated, and/or maintained records in the conduct of personal or corporate activity”. Individuals responsible for

accumulation of fonds usually differ from creators. Though the qualified version of Dublin Core has been chosen for the Virtual System, we pursue creation of extensive records.

The creation of the virtual system for digital heritage was guided by the approach that descriptions of digital objects should have the same hierarchy structure as traditional descriptions, as illustrated in Figure 4 below.

The General International Archival Description (ISAD(G) provides guidance for recording information in each of the 26 elements, which can be merged to constitute a description of an archival object. ISAD(G) ensures creation of consistent, appropriate, and self-explanatory descriptions, facilitates retrieval and exchange of information about archival materials, makes possible integration of descriptions from different locations into a unified information system.

In case of a digitized physical archival object, there is a need to provide access to its content. For this purpose, either the physical representation of the object or its content must be described. In case the object is a fonds, an archival description representing the structure architecture and component parts of the whole fonds has to be made (see Figure 4).

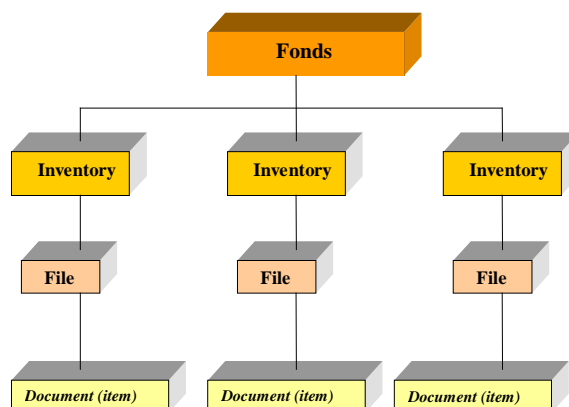


Figure 4. Hierarchy structure of an archival description within the Integrated Virtual System

Bibliographic descriptions for digitized archival objects are created in compliance with the General International Archival Description (ISAD(G), which makes it possible to provide hierarchy structure; in other words, more complete and simplified description of archival objects and databases in an electronic environment. This methodological solution was applied for the creation of the Integrated Virtual System.

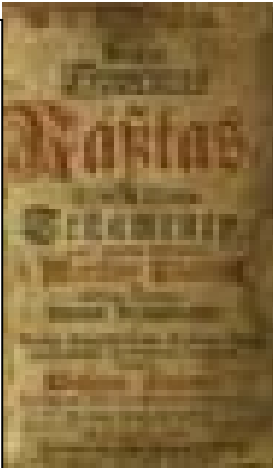
For the bibliographic description of the holdings of the Lithuanian Art Museum, the specification for the use of 40 data elements based on CIDOC CRM (CIDOC Conceptual Reference Model) approved by the Regulation of the Ministry of Culture of the Republic of Lithuania of 1997 is followed. This set of rules specifies what data related to a collection item are mandatory and what are left at the discretion of the museum.

For the description of objects from the National Library of Lithuania, the internationally adopted ISBDs are applied. They have been translated into Lithuanian, and the translation of the consolidated ISBD is underway.

For transferring the created records to the common system, encoding is needed. For encoding of descriptive metadata of archival digital objects transferred to the virtual cultural heritage system, the Encoded Archival Description (EAD) is used by Lithuanian archives.

For encoding of bibliographic records for digital object from the National Library of Lithuania, UNIMARC/B and UNIMARC/A for authority records that has been designated as a national standard by the Resolution of the Minister of Culture is applied (see Figure 5).

05245cam0 2200757 450
001C1R0000047484
00520090219114028.0
100##\$a20020722d1816 |||y0lity50 |||ba
1011#\$alit \$cger \$iger
102##\$aRU
140##\$acf |||aa ||yb|0000||
2001#\$aBiblia, tai esti: Wissas Szwentas Rásztas
Séno ir Naujo Testamento.....



UNIMARC-based metadata

8564#\$uhttp://www.epaveldas.lt/vbspi/biDetails.do
?libisId=C1R0000047572

Figure 5. An example of UNIMARC-based metadata within the Integrated Virtual System

For transferring digital images from the Art Museum to the virtual heritage system, DC metadata format is used. The problem with compatibility between different metadata description schemes and different systems for data encoding has been solved by the introduction of crosswalks. They allow making compatible objects that have been described by means of different schemas and different encoding formats.

Since the presented digital object metadata are made complete to the most possible extent, the system supports a possibility to revert from the short record within the portal www.epaveldas.lt containing the main elements of the DC bibliographic description to the source system hosting complete records. This is made possible by crosswalks.

The example below shows a descriptive metadata crosswalk indicating the content and encoding of descriptions for digital objects from the source systems.

Use of crosswalks

<i>ISAD (G)</i>	<i>ISBD</i>	<i>CIDOC CRM-based RIS</i>
3.2.1. Name of creator(s)	1.5 Statement of responsibility	Actor
<i>EAD</i>	<i>UNIMARC</i>	Dublin Core
<origination>	7-- Responsibility block	<dc:creator>

Several crosswalks have been introduced and are currently used in the Integrated Virtual System. They enable to uniquely represent descriptive and other necessary elements when transferring objects from partner systems to the common data archive.

As regards harmonization of descriptive metadata at the follow-up of the project that is intended to be undertaken later this year, the previous efforts by all IFLA working groups (i.e. ISBD, RDA, FRBR/ CIDOC CRM Harmonization and several others) should be taken into consideration. These achievements are very important, because they lead to the integrity of digital content and simplified retrieval.

Besides further enhancing structural compatibility between descriptive metadata, the next stages of the project development also imply setting up of the integrated database comprising names, geographical names, and chronological data of Lithuania. This undertaking should also contribute to laying the groundwork for the drafting of the standard. The benefit of these efforts is self-evident. After they are embraced by all Lithuanian institutions involved in digitization of the national cultural heritage and providing access to it, retrieval of digital cultural heritage objects will be made much more effective.

In the context of the report, it is important to indicate the effective application of the results of the project for the retrospective bibliography retroconversion that was started in 1991 in carrying out digitization of documentary heritage.

In 2005, when digitization of books in Lithuanian (1547-1830), books in Polish published in Lithuania (1799-1830), and books in Hebrew published in Lithuania started, their bibliographic and authoritative records had been already completed, what, in its turn, facilitated delivery of the computerized records to HPB (Hand Press Book), TEL, also to the established portal 'epaveldas.lt'.

Towards the second stage of the project, intense activity is taking place in preparation of the national bibliography for its conversion into the digital format. Taking into account the more speedy nature of the digitization process in comparison with cataloguing, organizational changes must be applied in order the maximum number of professionals could be involved into the process.

The initial stage of the project realization was marked by active participation of the Lithuanian Art Museum: a great number of books and albums from its holdings were digitized. This fact had an impact on the decentralization of the national bibliography.

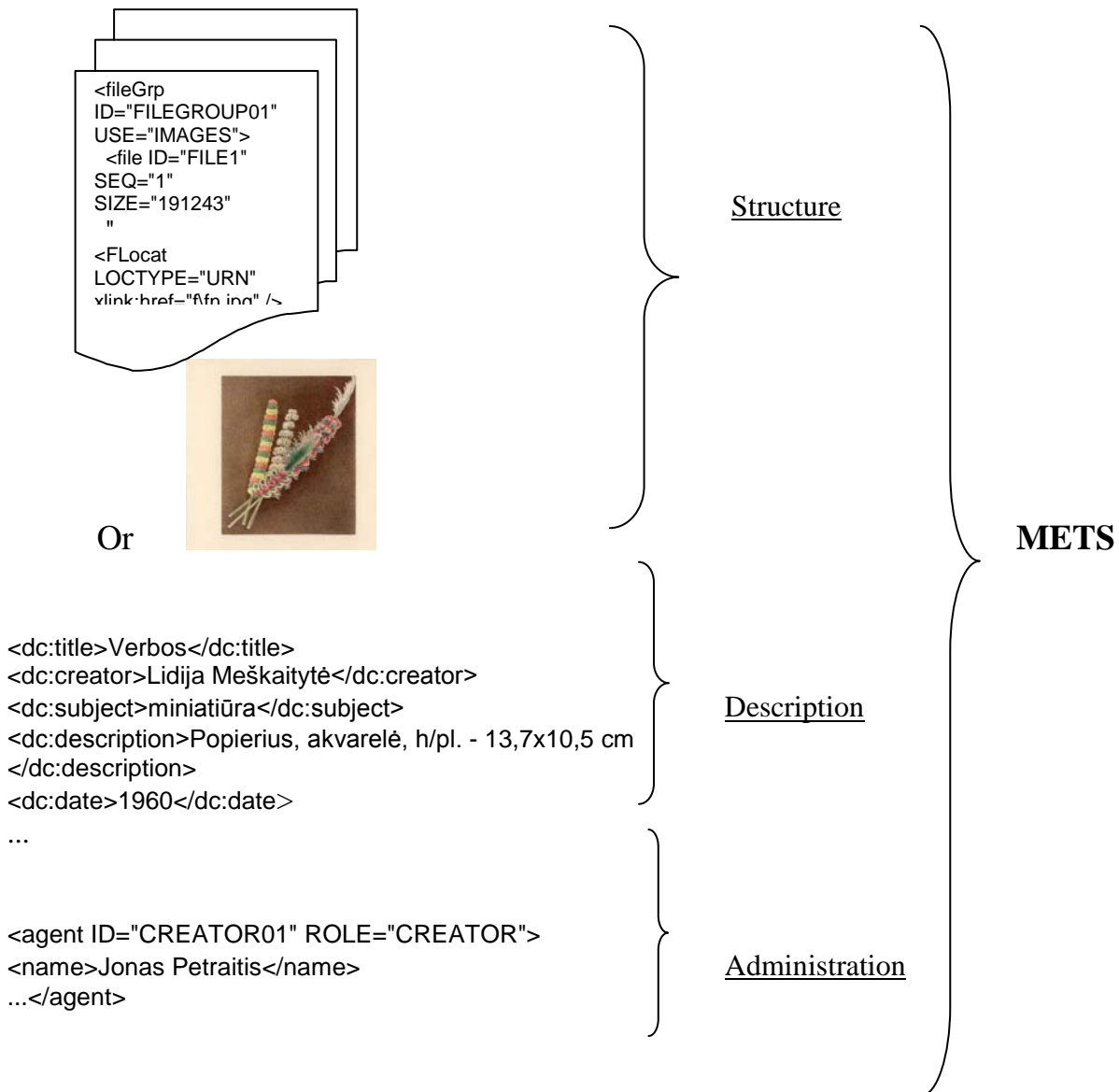
The dynamic of presentation of documentary heritage online will be increased by the involvement of the two major national academic and five public county libraries into the project of 2009-2013. This project will also call for acceleration of making extensive computer records for such parts of the collection as books and periodicals published in Hebrew, Polish, and other languages published in Lithuania.

The involvement of Vilnius University Library and the Library of the Academy of Sciences into the joint project of 2009-2011 shall have a significant impact on the production of the national bibliography, because these institutions are our partners in the compilation of the national retrospective bibliography.

3.2.2 Archiving of metadata and digital objects

METS has been chosen for archiving digital objects and metadata within the Integrated Virtual System of the cultural heritage. It has been developed as a means for putting a virtual wrapper around digital files that need to be held together. METS not only provides the structure for complex digital documents, it can also bundle the documents together with their descriptive metadata, like Dublin Core, and administrative information about the documents.

Here is an example of digital content and metadata in METS within the Integrated Virtual System



Metadata Encoding and Transmission Standard (METS) is the most convenient XML schema for creating XML document instances that express the structure of digital library objects, the associated descriptive and administrative metadata, and the names and locations of the files that comprise the digital object. The metadata necessary for successful management and use of digital object is both more extensive than and different from the metadata used for managing collections of printed and art works or archival documents.

Project activities included creation of the software for workflow management, which permits aggregation of digital objects into integrated sets, where quality control, return for redigitization of corrupt images, linking with the recognized full-text file, and linking with a bibliographical object in the database of the relevant catalogue could be performed. The objects with added descriptive metadata are ready for the export to the central database of the Virtual

Heritage System. The transmission is performed by METS. Complete information related to the work and links to external objects – digital image files – are included into the METS package used for the data export. The description of the object in METS serves as a linking element between different parts of the document and its different versions. The following first 5 sections of the METS standard are used in the System:

1. METS Header;
2. Descriptive Metadata;
3. Administrative Metadata;
4. File Section;
5. Structural Map.

The advantage of the software consists of its being operational both under the connection with the Virtual System and under the absence of such connection; it also supports transmission of data in different media. Currently the ftp protocol as well as portable discs are applied for data transmission. To avoid failures in copying of files and corrupt or incomplete images, the checksum algorithm of the MD5 standard is applied. Before the METS package is wrapped, all the MD5 sums of images related to the works are calculated and included into the package. Before uploading the data into the system, the sums are checked in order to avoid errors.

The procedures are aggravated by the need to associate different descriptive metadata that are encoded in different systems. As mentioned above, this problem is solved by the application of crosswalks: UNIMARC/DC/EAD.

Transmission of METS-wrapped data using UNIMARC and Dublin Core standards has been fully achieved. If need arises, the System could be easily extended by additional encoding standards for bibliographic description.

3.2.3 Access solutions

For access to the Virtual Heritage System, an Internet web site <http://www.epaveldas.lt>, accessible via SRU/W and Z39.50 has been introduced. Since the Virtual Heritage System has been designed for provision of visual information, digital objects within this system also contain descriptive metadata. The user interface permits switching to a page with a detailed description within LIBIS, LAFS or RIS for more in-depth examination. For this purpose, a reciprocal linking system has been introduced, i.e. there is a link between each work and the relevant description in the source system, and vice versa. The linking mechanism to objects within the Virtual System has been established to retain permanent http links: with changes in the realization of the Virtual Heritage System, the links would remain intact. The structure of the link is the following:

<http://www.epaveldas.lt/vbspi/biDetails.do?libisId=C1R0000046342> Here
<http://www.epaveldas.lt/vbspi/biDetails.do> is the permanent part, and [libisId=C1R0000046342](http://www.epaveldas.lt/vbspi/biDetails.do?libisId=C1R0000046342) is the variable part that corresponds to the value of field 001 of the UNIMARC record.

3.3 Interorganizational structure as a guarantee for interoperability between Lithuanian memory institutions

In scientific literature the interorganizational form of a virtual system is defined as a specific form of collaboration, in which partnerships retain their legal and economic rights. Such an organization is characterized as an alliance of individual, advanced, and legally independent

organizations sharing common professional background, possessing a modern technological framework that remains operational until the common business goal is achieved.

This goal is achieved without any special institutional supervision and control mechanisms, mutual trust playing the decisive role. The connective factor within a virtual organization is knowledge and expertise.

One can acknowledge that the joint project by the National Library and the partners that was completed in 2008 resulted in the establishment of a virtual organization, which did not cease its activity after the project's conclusion. The National Library of Lithuania, the Lithuanian art Museum, and the Lithuanian Archives Department jointly proceeded with the framing of *The Strategy on Digitization of Lithuanian Cultural Heritage, Digital Content Preservation, and Access, The Strategic Framework*, and preparation of an investment project, which is a continuation of the project already undertaken.

The motivation for activity of this organizational structure consists of aiming to improve legislation on cultural heritage digitization and seeking financial support for the projects to come. By means of joint effort, the above-mentioned documents – *The Strategy* and *The Strategic Framework* – have been prepared. *The Strategic Framework* contains specific provisions on the structure of a virtual organization, which is based on the activities of the coordination centres: the Lithuanian Art Museum and the Lithuanian Archives Department.

What national benefit could be gained from establishment of such coordination centres? The main reason for validation of activities of these centres has been the objective to strengthen intersectoral collaboration between memory institutions and exploit opportunities offered by online access with the purpose of ensuring user access to cultural heritage resources irrespective of their location. It could be achieved by a common virtual cultural heritage information system integrating all digitized cultural heritage objects preserved at national memory institutions and by the virtual system of archives, libraries, and museums together with the portal 'epaveldas.lt', which is intended for further development.

Lithuanian memory institutions routinely select cultural heritage objects for digitization according to the content and physical state of their holdings, without mutual consultations and irrespective of the digitization projects carried out by other institutions and agencies. In this way there is duplication of effort and resources are not effectively used. Establishment of coordination centres for digitization in every area related to memory institutions will enable collecting data on cultural heritage objects preserved at cultural institutions on a national level, coordinate their selection and inclusion into the lists of cultural objects scheduled for digitization in accordance with the general selection criteria defined in *The Concept*. The national list of objects selected for digitization will enable effective coordination of digitization initiatives and application of a purposeful policy on national heritage digitization. Coordination centres will make it possible to target analysis and coordination of cultural heritage digitization to specific priorities on a national level and ensure preservation of cultural heritage objects and access to them. The centres, by longitudinal studies on digitization market and user needs, will also guarantee permanent monitoring and analysis of national digitization activities and involvement of other memory institutions into digitization processes. Their concern will be provision of methodological support, promotion of international collaboration in digitization, and assurance of dissemination of information on digitization both on national and international levels.

An important direction for the centres' activities could be development of digitization projects that are in demand and capable of integrating cultural heritage into educational and study

processes, promoting social cohesion of the community, and, in this way, ensuring public interest in the history and culture of the nation.

Conclusions

1. A common methodological approach to cultural heritage digitization and access, irrespective of the type of the object, its provenance, content or structure of objects has been established for the first time in Lithuania. This view expresses a national approach, which has been declared and defined in the strategic documents on cultural policy: *The Concept of Lithuanian Cultural Heritage Digitization*; *The Strategy on Digitization of Lithuanian Cultural Heritage, Digital Content Preservation, and Access*; and *The Strategic Framework for Implementation of the Strategy in 2007-2013*.

2. Decisions taken on digital object description and use of these descriptions comply with the requirements for memory institutions on representation of objects in the digital environment. They also answer the users' needs for acquiring more detailed information than a digital object within the portal could provide.

Building on the previous experience with the creation and development of LAFS, LIBIS, and RIS has enabled a next fresh step to be taken – to create a virtual digital heritage system integrating all the above-mentioned systems in order to provide as varied and efficient services to national and worldwide users as possible.

The decision to make extensive use of databases and bibliographic record catalogues of the project partners has enabled to avoid duplication of functions, had a cost-cutting effect on the process of transferring data into the Integrated Virtual System, and provided a safeguard against errors.

3. The established Virtual Interorganizational Structure has provided a background for initiatives for further development of legislation on national cultural heritage digitization and financial support for future projects. The principal achievements of the interinstitutional framework are *The Strategy on Digitization of Lithuanian Cultural Heritage* and *the Strategic Framework*, which shall ensure successful strategic activities of national memory institutions and other agencies concerned with long-term preservation of national cultural heritage and providing access to it as well as provide guarantee for sustainable financial support.