

# New Means to Preserving and Safeguarding a Cultural Heritage in Digital Space

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## INTRODUCTION

In our rapidly developing technological environment, people are coming to rely more and more on databases and networks to access information. To meet this demand, cultural heritage institutions particularly have to rethink traditional approaches to managing and disseminating information about their collections. They have to think about the sustainability of their collections. Digital technologies have added new means to preserve of cultural heritage – safeguarding it in digital space. Multimedia technologies open the door to new multimedia business, and an electronic system of the multimedia rights clearance (MMRC) is necessary.

The digital collections already created demonstrate operability of multimedia data base approachon digital acquisition and archiving, transfer and presentation of unique multimedia items as well as prove the benefits of interactive delivery. This stimulates the multimedia content industry to exploit new business opportunities and establish a European platform for information management. Multimedia rights clearance and exploitation of collections become a crucial point in this period of transition “from scribe to screen”. This is emphasized in several European programmes related to cultural heritage and IT development, especially in the latest EU program - eContent taking action to provide a bridge between companies in the digital content area and potential investors.

Let us investigate demands and benefits of this new era while considering one example of the project based on the early European music dispersed everywhere and the opportunities emerging with its representation in digital space.

Traditionally the original manuscripts of early music written in medieval scriptoriums, adorned with illuminations and used in monasteries and churches represent a valuable part of cultural heritage in many countries. They demonstrate a common cultural heritage of Europe and its common roots in music, which is a basic heritage of mankind in spite of differences in languages and cultural traditions. Unfortunately, these manuscripts are dispersed in a number of libraries or church archives, occasionally forgotten or still undiscovered. Even if this is not a case, the access to them has to be rather restricted: original materials being fragile and perishable are hardly assessable for research and moreover inaccessible for general public. Nevertheless it is a rich and unique source for scholars studying the development of manuscripts, illuminations and musical notations, musicologists and hobbyists interested in early music transposition and performance, as well as general public whose interest in early music and spirit of times mentioned is growing continuously.

## A VISIONARY PROJECT

As a result of a project, let us call it eeMUSICA (**E**arly **E**uropean **M**usic: **S**afeguarding, **I**nvestigating and **C**omplete **A**ccess), joining together several European countries, we could *investigate and design novel methods of most effective introduction of early European music heritage to a general audience and making it accessible to scholars for research by creating a unified digital archive for European countries involved into the eeMUSICA project*. It should contain:

- (i) high quality images of the musical manuscripts (sheets) and prints (12-18<sup>th</sup> centuries);
- (ii) contemporary and old music recordings (audio and video if available);
- (iii) related items such as: texts, book covers and illustrations, pictures of instruments, all this providing insights into the daily life of the times.

Multimedia tools and interactive information system should empower scholars exploring effectively documents from different countries through created interface to compare different notations or versions of one work and analyze development of styles or genre.

The general user would place himself in the persona of early time inhabiting, for example, a 16<sup>th</sup> century monastery somewhere in Europe. Imagine the central hall of the monastery giving access to the Library, the Church, the Scriptorium and to the Study. The central hall displays the musical instruments of the period - a visitor can try to play any of them and hear sound. He can find here also the information desk for the digital archive, the site map of digital space, the glossary of terms, the guided tour. From the central hall the door would lead to the Library, where a visitor finds manuscripts, maps and "equipment" to listen to the music or be instructed by local monk if having problems. Turning to the Church a visitor can listen the Georgian chant. In the Scriptorium the early writing styles and music notations can be explored and text samples printed in chosen style on user's demand. The study would contain references, quotations and thoughts of outstanding people of the time or known composers. Through the windows of the monastery a visitor would be able to watch rural scenes or celebrations and dances on festive occasions.

By choosing any country at the interactive old map in the Library, a visitor would find himself in the environment of that country, arranged according to the available content of early music of that area.

Each country could provide in average 10-20 musical manuscript pictures, 10-15 excerpts from corresponding musical recordings, several video records if available, pictures of old musical instruments, book illustrations - as many items related to the theme as available.

In order this dream become true, we need not only software tools but also consider IPR matters what are not the same in various countries. Therefore it is vital to investigate and to use existing software systems (survey by Schnepf M., 200) for intellectual property rights clearance. Therefore we have to follow the steps:

- (i) To develop new generation of tools - software for filling and searching Internet-integrated multimedia data base (MDB) and copyrights trading environment in one-step marketing and management of multimedia products and rights capable of operating on European basis.
- (ii) To create an MMRC value chain that links object creation, marketing, customer and access management, distribution and use.
- (iii) To create an MDB prototype using as entries multimedia musical heritage items (MMHI), based on early European musical heritage data (the images of musical manuscripts, audio-video music records, related pictures, texts).

The prototype will demonstrate MDB operability on digital acquisition and archiving, transfer and presentation of unique multimedia items as well as prove the benefits of interactive delivery.

**The main goal** of such project would be to create consolidated approach and MDB on a transregional, European basis – it can be reached by setting up the framework bridging together content owners-providers (libraries, cultural institutions), know-how partners (advanced multimedia technology institutions) and producers. The research work in advanced databases management, data mining and IT methods is necessary in order to process a huge amount of digital information, representing the highest-quality pictures, sounds and video records, and to create a fully explorable digital archive connected to Internet. Metadata creation and integration with content become an important task in this repository (Cherry, 2002, DC-dot and other). The interactive delivery of results also require innovative solutions and research.

## **DETAILED DESCRIPTION OF TECHNOLOGICAL DEVELOPMENT**

Work with an endangered cultural heritage in multimedia environment is unique. Not only are advances facilitating new methods for creating, preserving and sharing information, but also they are also dramatically increasing the inter-relatedness among activities previously perceived as separate. Issues of digital acquisition, image and audio/video processing, archiving and multi-medial presentation of collections are very complicated, wide in scope and require research in many fields (Smolka, 2001).

Considered project would aim to develop and enhance the following technologies: (1) multimedia tools, (2) databases for hypermedia, (3) the integration of multimedia-Internet-offline tools.

**The development of software for Internet-integrated MDB** (from text to sound and images) management and interactive delivery involves:

- A creation of original software for filling MDB online with MMHI;
- Managing MDB and running it on an Internet server for an output delivery online;
- Research in advanced data bases mining and knowledge discovery;
- Research of innovative methods for processing a huge amount of digital information; representing the highest-quality pictures, sound and video records,;
- Creating websites as one of multilingual information and distribution channels, representing early music and its context by means of interesting pictures, descriptions, and examples of music. The following issues from (A) to (E) are of specific interest.

**(A) Acquisition and MMHI processing issues:**

- Acquiring a digital copy of an image requires, among other things: providing proper illumination, choosing the digitising device according to object characteristics, preparing the object for the information acquisition process;
- Correction of artefacts introduced in the process of image acquisition can be divided into: correction of geometric distortions from object surface distortion and picture channel imperfections, colour calibration and initial image processing;
- Comparison of direct and indirect method of image acquisition quality and development of compensation procedures for errors specific to the indirect method;
- Image and audio signal analysis for feature extraction;
- Analysis of the best encryption and watermarking tools for efficient protection of digital objects, the best available protection of music-sheets distribution over the Internet.

**(B) Issues of archiving, transfer and presentation of acquired MMHI** include:

- Storage of information acquired: choice of image file format, media, and problems of data migration and conversion to new standards with special emphasis on automation of those processes;
- Determination of objective quality coefficients which requires establishing a standard for compressed MMHI quality assessment;
- Choice of the optimal compression method;
- Creation of data indexing system and metadata structures related to MMHI acquired.

**(C) Image quality enhancement.** Experience gained in area of image quality enhancement can lead to further studies of algorithms efficiency in document image quality enhancement. This issue has great importance because properly conducted initial filtering enhances visual value of image and makes analysis and feature extraction much easier. Moreover, proper artefact correction in the image greatly improves results of lossy compression of information contained.

**(D) Creating MDB warehousing and copyright trading environment** for one-step marketing and management of multimedia products and rights capable of operating on European basis. The technology for implementing the warehouse both in terms of hardware, software, identifier and watermarking standards necessary for its physical operation and the operation of the rights clearance has to be applied. Issues such as pricing structure have to be addressed relating to differential pricing according to the user (commercial, educational or private individual, regional variations). This could be considered as an alternative to the Open Access Initiative (OAI, Chan & Kirsop, 2001)

**(E) Developing methods of automatic compilation and generation of personalized interactive CD-ROMs** in an attractive form. This is a completely new area. Innovation is needed, but full automation of process hardly can be expected.

## MARKET APPLICATION & EXPLOITATION

Marketability of any product is a necessary component in contemporary economical environment, it must include the following features:

- (i) ensure a wide international market by featuring significant European content,
- (ii) cover the needs of users where networks are narrowband or too expensive,
- (iii) save the end-user time and effort when licensing.

European countries are rich in contents (words and pictures, sounds and images), but the European market needs new products, services and distribution channels to exploit this wealth in the burgeoning market for electronic publishing, interactive media, the Internet and WWW. The transition from conventional print media and linear structures to interactive media demands provide employment opportunities for youth to digitise cultural holdings and related resources for use in MDB and display on the WWW, more than powerful computers and software tools alone. A new order of production skills and business models is required to produce attractive, viable products for this dynamic new market. Many people do not yet appreciate the commercial and personal potential of these new media and methods. In particular, many small and medium-sized enterprises do not perceive the value of multimedia computers and networked communications. This is reflection both of the lack of practical information and of useful and cost-effective products and services. Such project has to foster a close cooperation between content owners or providers, scholars, multimedia producers, service providers (marketing, distribution channels) and end-users. The cooperative trans-national network, mainly of industry, should be developed as a result of the project and create pan-European multimedia business nodes.

Cultural heritage institutions will have a chance to maintain their collections: a high-quality digital copies of multimedia objects or licenses can be sold to publishers, the musical industry, collectors of cultural values while the original collections safeguarded better. In this way, multimedia technologies open the door to new multimedia business.

Economic exploitation of communication channels resources would be one of the important features of such project: CD-ROM-on-demand technology saves networking costs and provides a product of the highest quality exactly to the interested user. Currently not all European homes have broadband access to the Internet, and this service will improve accessibility. Each partner will issue online and offline products, taking advantage of the international market, and adapt them to a local user, developing and adding a local-language version.

**Target Audience:** general audience (particularly for musical education, self-development, life-long education, music lovers), business (publishers, musical industry managers, rightholders, intermediate and final users of rights) scholars researching manuscripts, musicologists, educators, amateurs and collectors' societies.

**International Market.** A huge demand for multimedia contents is emerging: the European multimedia industry, from small sized developer's teams that still have to be discovered for the market up to big, renowned enterprises. The results of the *eeMUSICA* would be available in English and in the languages of participating countries. The provision of multilingual and cross-cultural information guarantees a wide international market. Each partner country will have the opportunity to localize and publish CD-ROMs on-demand; therefore postal costs would be minimal.

**Follow-Up Actions.** Presentations of multimedia digital collections to general audiences, workshops for specialists interested in this topic, organization of "*Forgotten Music*" concerts. A natural extension of this project is to include more and more European countries. MDB software can be used for any other topic as well, such clearly foreseen MDB market application topics are: digital archives of folklore collections, that were recorded on old-fashioned devices, virtual museums collections physically located worldwide but brought together in cyberspace.

**Deliverables.** The digital European MMHI **archive** based on early European music established using the latest technologies, with a projected life of at least 10 years, ready to be replicated and to evolve following the technology development. Evolving multilingual **multimedia applications based on the content** of the digital archive has to be developed:

- (i) MDB mining and the online service for legal acquisition of image/text/sound digital record;
- (ii) personalized multilingual interactive CD-ROM-on-demand service;
- (iii) project web portal in English and web sites in the local languages of project partners.

The Lithuanian State Research Institute is involved in the key direction is investigation and adaptation of new information processing technologies for the needs of the humanities and could be strong in development of technological needed for such project. It has also an experience in educational activities: creating contents and tools for education of specialists to use advanced information processing technologies: preparing and delivering the postgraduate/undergraduate courses in informatics for the humanities, the intensive digital publishing courses.

It is evident that the project of such kind as described above requires of consolidated efforts of leading-edge technological partners and content providers, having valuable cultural repository at hand.

#### **PRESENTATION OF POSSIBLE CONTENT CONTRIBUTION OF THE LIBRARY OF THE LITHUANIAN ACADEMY OF SCIENCES**

The Library of the Lithuanian Academy of Sciences received the building and the holdings of the former State Vrublevskiai library, which was founded by the lawyer T.Vrublevskis and was one of the largest Vilnius libraries of the time. On January 1, 2000 the holdings of the library counted 3699397 volumes and 245161 manuscripts. Library of the Lithuanian Academy of Sciences is the State universal research library continuously adding foreign and local research titles to its holdings.

Holdings of the Manuscript department cover documents, divided up into 353 fonds. The oldest documents are dated 11th century. Majority of them are dated 16-20th centuries, they are written in Latin, old Byelorussian, Polish, Russian, German languages, from the end of 16th century in the Lithuanian also. Part of holdings is reflected in printed and electronic catalogues; majority of holdings is reflected in card catalogues, the subject-information catalogue is not complete.

The majority of documents originate from the historical territory of the Grand Duchy of Lithuania. They elucidate the past of the present Lithuania, partly Byelorussia, northern Poland, East Prussia and Klaipeda district. Most valuable groups of documents are parchments collection (1421 units, 12-19th centuries), stocks of church institutions (i.e. the archive of the Vilnius Cathedral Capitula and a part of Archbishop's archive, 1387 - middle of the 20th century), the archive of the Evangelist-Reformer Synod of Lithuania (16-20th centuries), the archive of a vanishing community of Karaites, living in Lithuania, part of the archive of the family of Sapiega, a noble family of the Grand Principality of Lithuania, some fragments of the manor archives of Lithuania (15-20th centuries), archives of Lithuanian national organisations, editorial offices of newspapers, which were functioning during the occupation of Vilnius district, collections of the Russian church manuscripts and other books (11-19th centuries), books of songs, collections of works by Lithuanian artists, archives of the professors of the old Vilnius university, diverse collections of documents about the political, economical and cultural life of Lithuania and it's capital Vilnius.

In the Manuscripts Department the archives of famous scholars, academicians of Lithuania, majority of historians, writers, architects, etc. of Lithuania are preserved.



Cover and page from 16<sup>th</sup> century hymnal, Vilnius Bernardin's Monastery, Lithuania

#### EXPECTED RESULTS AND ECONOMIC BENEFITS OF NETWORKED COLLECTIONS

1. **Innovative solutions** in Internet-integrated MDB filling online and personalized delivery of requested data online and offline will result *in reduced delivery costs of production and ensure multimedia market competitiveness.*
2. **Promotion of information exchange between scientists and industry** in all participating countries will *develop market for high-technology products.*
3. **Software and experience** in creating a prototype MDB on MMHI based on early European music and making it accessible as a total unit for researchers and other users produce *the original software and digital collection entries as marketable products.*
4. **Knowledge**, undiscoverable by other methods achieved by data mining of the MDB created, *will foster development of new research and industry areas.*
5. **Safeguarded** as digital copies fragile and perishable cultural values become accessible in digital space and *serve as a resource for the sustainability of the original collections.*
6. **Multimedia rights clearance and trading environment** as an electronic MMRC system capable of operating on a European basis will *simplify and speed up the rights clearance process and reduce localization costs for new products.*
7. **Dissemination** of knowledge obtained both online (DB running on Internet server and delivering responses) and offline (publishing CD-ROMs-on-demand) *will reduce delivery costs and create new jobs.*
8. **A network** of organizations created to collect and digitalize MMHI will advance the preservation other cultural values in digital space, their spread in the international market, cooperation between industry and content owners. It can be *used in the future as a production distribution network.*

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