MUSICNETWORK: TO BRING MUSIC INDUSTRY INTO THE INTERACTIVE MULTIMEDIA AGE

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Abstract – The main objective of the established MUSICNETWORK is to create a community to bring the European Music industries and content providers into the interactive multimedia era. There is currently a large gap between academy and industry and many of the products in the marketplace fail to exploit the potential of new multimedia technologies. The MUSICNETWORK helps research solutions to reach the marketplace by seeking agreements between the different actors and formats. This can be achieved by bringing together research institutions, industries, small and medium sized enterprises, and experts to build the required momentum to study and define multimedia music modeling and coding for the new age. The MUSICNETWORK is going to stimulate this activity with a set of actions and a services mainly provided by means of its www site: www.interactivemusicnetwork.org

INTRODUCTION

The central focus of the MUSICNETWORK is the creation of a community to bring the European Music industries and content providers into the interactive multimedia era. This is possible by bringing together research institutions, industries and experts to have the necessary mass to reach the unique objective of studying the diverse aspects of music coding and distribution, a special care is given to small medium enterprises, SMEs. In order to identify suitable models and solutions it is necessary to integrate the knowledge of music publishers, digital libraries, universities, standardization bodies, research institutions, music associations, end-users, music schools, information technology companies, commercial distribution and e-distribution, and industry to share a common objective. The MUSICNETWORK project implements concrete actions for integrating this knowledge and bringing music into the interactive media era. To this end, a set of activities are implemented for understanding the requirements; assessing the research and technology; integrating the available technologies; and pushing them in the right direction in order to reach the objectives. The MUSICNETWORK is a Center of Excellence to bring the music industry, content providers and research institutions together. The MUSICNETWORK draws on the assets and mutual interests of these actors to exploit the potential of new technologies, tools, products, formats and models.

OBJECTIVES

The MUSICNETWORK initiative can only be performed at a European level. To our certain knowledge, no other initiatives like the MUSICNETWORK are present in Europe for studying an integrated and unified model and language for modeling music notation and its

multimedia aspects and for addressing the protection problems of multimedia music in such an integrated manner, considering all music aspects and formats.

Fig 1 – The MUSICNETWORK activities. (copyrighted by MUSICNETWORK)

The primary objectives are to:

- create a collaborative environment which makes it easier for music content providers and corporate users to access research results and technological solutions,
- provide training, technology transfer and access to expertise in the multimedia music field,
- use research institutes and standardization bodies (e.g., Mpeg7, W3C, Mpeg21, etc.) to consider problems of music coding for integrating multimedia and distribution aspects, preserving the owner rights,
- increase the competitiveness of content providers and distributors working in multimedia music delivery,
- increase awareness and confidence by building consensus among content owners and providers towards the new solutions, technologies and music models, thereby removing the problems that currently limit the digitizing of music archives,
- prepare the VIth Framework technology needs and developments for digital music,
- stimulate the exploitation of new functionalities that may open new markets for new ways of music distribution: such as e-publishing, e-book, virtual libraries, mobile entertainment, and m-commerce.

KEY ISSUES

In the area of multimedia music modeling there is currently a lack of co-ordination and standardization and within most of the present standards the music notation is totally neglected. Multimedia music presents several aspects: coding of symbolic music notation; coding of image sequences of music scores; multilingual lyric that can be mounted on symbolic notation of music according to the specific indexing; images related to music notation symbols or lyric; video related/synchronized to music notation symbols or image scores or documents or lyric text; audio files related and synchronized with music in symbolic format and images of music scores; protection aspects of audio and/or video and/or music scores such as watermarking or fingerprint; verbal description of videos and documents and scores for blind people and so on.

In addition, most of the above mentioned aspects and components of multimedia music objects may be (i) synchronized each other, (ii) played and/or viewed in specified sequences, (iii) used for building interactive/sliding shows, questionnaires, etc. The information related to synchronization, automatic execution and playing has to be stored in the multimedia music

objects as well. This set of digital information has to be integrated and may present a unique classification and identification, as well as multiple identification and classification records for each component when considering multilingual aspects. These aspects are strongly relevant for the innovative application of the new interactive multimedia age such as for educational, infotainment, edutainment, purposes. Most of the above requirements were identified in EU-funded projects such as WEDELMUSIC [6], HARMONICA [3], CANTATE [1], MOODS [4] and CUIDADO [2] (see references below), but they are still neglected in well-known multimedia standards.

For these reasons, standards such as Mpeg2 (audio/video compression) and Mpeg7 (audio/video indexing) are mainly passive formats. These standards are only at an early starting point for the definition of real standards for multimedia music objects. Mpeg4 is focused on multimedia composition of video and synthetic animations integrating SVG, VRLM, etc., but not music notation. In the same manner, OPIMA solution does not cover the needs of a format including music notation for music sheets. It is mainly based on Mpeg4 standard and therefore presents several inadequacies for modeling synchronizations, music oriented components and relationships, symbolic music, images of music score, etc. The same limitations have been detected in OCCAMM solution [5]. These formats are mainly focused on video and audio streaming, including also additional information such as text and virtual reality. Mpeg7 and Mpeg21 are interesting but seem to present deficiencies for modeling multimedia music objects. Mpeg7 propose indexing mechanisms which ranges from audio to other media, while the music notation has not been considered. The SMDL [12], [8] and NIFF [8] formats for music notation representation where proposed in Mpeg7 without significant results.

For this reasons, the presently available standards are unsuitable for modeling symbolic music notation, image sequences of music scores, synchronization among audio and symbolic music, synchronization among symbolic music and multilingual lyric, multilingual classification of music at several levels (the whole object and its components, parts, etc.), the details about formatting rules of music, the hypermedia navigation on music notation, details about the protection mechanisms for watermarking music scores, a more flexible digital rights management, etc. These problems and many others were highlighted in HARMONICA [3], CANTATE [1], MOODS [4], CUIDADO [2], and WEDELMUSIC [6] projects. These aspects are absolutely mandatory for building multimedia music objects which can be useful and interesting for different music consumers (such as musicians, music lovers, music schools, multimedia libraries, etc.).

The most common formats for modeling music notation are FINALE, SIBELIUS, SCORE [12], etc., SMDL [12], [8] and NIFF [10] were proposed as interchange formats for distributing music. NIFF (defined as an interchange format) and SMDL (defined as a support for the Internet distribution of music) are too poor and not formalized enough to work on the Internet. MIDI [11] or MML do not consider several details of music notation with respect to a full set and they are too coarse for printing and formatting music according to the correct justification and positioning rules of music engravers. Currently, the MIDI format is the most common on the Internet. MIDI is supported by all music editors and electronic instruments. However, the MIDI format does not support the notation symbols for specifying the instrumental and interpretation symbols. Recently several simple XML compliant music languages (MusicXML [9], MXML, etc.) have been produced. They are capable of modeling only a subset of the full capability of WEDELMUSIC XML format [7]. As demonstrated in the MOODS [4], HARMONICA [3], CANTATE [1] and WEDELMUSIC [6] projects, the above languages for modeling symbolic music notation are too far from what is required for distributing interactive music in the multimedia age.

For these reasons, in these last weeks, the MUSICNETWORK started to define a new comprehensive format for modeling multimedia music.

ESTABLISHING THE MUSICNETWORK

The MUSICNETWORK is mainly focused on addressing problems related to music modeling for the multimedia interactive age through:

1. technology watch and contribution to standards bodies
2. definition of new models and specific guidelines for standard usage
3. reporting the best practice technical solutions.

This means that the MUSICNETWORK contributes to the present standard bodies in two manners: firstly by producing reports for stimulating the adoption of mechanisms for modeling music notation and coding into the present standards; and secondly by producing guidelines for the adoption of the present standards as support for modeling multimedia music in interactive applications. The work performed addresses several aspects of music: coding, protection, distribution, conversion, etc., by using a large group of participants of the network belonging to a large number of different states and having different cultures and technology skills. Most of the results produced by the project will have also have a strong value for non-European countries and the inclusion of participants from non-EU states is also encouraged. To this end, several different working groups are being established and interested parties are encouraged to become involved in this important work.

- Music Notation. This group examines all aspects of coding music notation, including modern music notation, format conversion, lyric modeling (multilingual aspects), fonts, and defining standards for music symbols.
- Music Libraries. This group has a cross-domain perspective including museums, archives, industry catalogues and other collections. It addresses metadata, information and content based retrieval, digital libraries, technological, legal and standardization developments, sharing documents and content.
- Music in Multimedia Standards. This working group examines multimedia standards for music coding, including audio and video coding (mpeg7, mpeg21 etc), portable internet formats, synchronization, media integration and other standardization aspects.
- Music Distribution. This group examines the distribution of coded music including streaming, Internet, distribution models (B2B, B2C, P2P, etc.), mobile systems, WEB-TV, Mobile, and transaction models (on-line, off-line, kiosks, virtual shops).
- Music Protection. This group looks at the issues relating to the protection of coded music, such as encryption, watermark, Digital Rights Management, profiling functionalities, active and passive protection, and other security issues.
- Music Accessibility. This working group examines music coding for print impaired people (visually impaired, dyslexic etc), and looks at accessibility issues, user interfaces, assistive software and devices and the provision of music in alternative formats.
- Music Imaging. This working group focuses on issues relating to imaging and processing of music sheets, printed music scores and handwritten manuscripts, including music image acquisition, acquisition of music with different types of page support, digitizing ancient music, coding for images, optical restoration and preservation, and optical music recognition (OMR).
- Music audio. This working group is focused on working on audio processing aspects such as: conversion from audio to music notation, query by content, beat tracking, audio shrinking and stretching, audio recognition and comparison for personalization, etc.
- Music education. This group analyze and work on educational aspects of music with the support of the information technology and pedagogical aspects. In particular it addresses

the aspects of: cooperative work on music notation, performances, virtual conductor, virtual orchestra, playing instruments by using internet support, e-learning, distance teaching, courseware tools, assessing music performances, self learning, software tools for music education, etc.

- Music culture. This working group addresses the cultural aspects of music and musicology. This permits to consider the music in the historical period and the interpretation aspects related to the musical context.

For everyone who is interested in the future of music and multimedia technologies, the MUSICNETWORK provides a free service which:

- gives access to the largest database of music-related state of the art technologies and solutions;
- offers clear visibility for your own research and technology innovations;
- offers training and updates regarding the latest technologies, standards and solutions;
- suggests solutions for your problems concerning multimedia music and innovative technologies;
- provides information and support on European Commission/FP6 activities in the area of multimedia music.

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