

## **MUSICNETWORK: MUSIC INDUSTRY WITH INTERACTIVE MULTIMEDIA TECHNOLOGY**

**Kia Ng,<sup>1</sup> David Crombie,<sup>2</sup> Pierfrancesco Bellini<sup>3</sup> and Paolo Nesi<sup>3</sup>**

<sup>1</sup> Interdisciplinary Centre for Scientific Research in Music,  
School of Music & School of Computing, University of Leeds, LS2 9JT, UK  
E-Mail: [kia@kcng.org](mailto:kia@kcng.org)  
URL: <http://www.kcng.org>

<sup>2</sup> FNB, Dutch Federation of Libraries for the Blind,  
Molenpad 2, 1016GM, Amsterdam, Netherlands  
E-Mail: [projects@fnb.nl](mailto:projects@fnb.nl)  
URL: <http://projects.fnb.nl>

<sup>3</sup> Department of Systems & Informatics, University of Florence  
Via Santa Marta 3, 50139 Florence, Italy  
E-Mail: [nesi@dsi.unifi.it](mailto:nesi@dsi.unifi.it)  
URL: <http://www.dsi.unifi.it/~nesi>

### **Abstract**

Under the EC IST FP5 programme, the Interactive MUSICNETWORK has been established to motivate and to develop a community of European Music industries, in order to bring the community into the interactive multimedia era. This paper presents the overall project aims and discusses the primary objectives of the Working Groups. More details of the thematic networking and all Working Groups activities can be found at the project website, <http://www.interactivemusicnetwork.org>, and discussions on the key issues for background to the project can be found in [1]. This paper also presents a number of selected recent and up coming MUSICNETWORK events.

### **INTRODUCTION**

MUSICNETWORK is a European Network of Excellence supported by the IST in the scope of the 5<sup>th</sup> Framework Programme of the European Commission, coordinated by the University of Florence. This project involves 14 European collaborators including:

- Department of Systems & Informatics, University of Florence, Italy
- Sheet Music Now, Denmark
- ARCA Progetti s.r.l., Italy
- Centre Research Laboratories, UK
- Extreme Information Technologies, Italy
- Fraunhofer-IGD, Darmstadt, Germany
- FNB, Dutch Federation of Libraries for the Blind, Netherlands
- GIUNTI Multimedia s.r.l., Italy
- Institute for Language and Speech Processing, Greece
- IRCAM, France

- Music Information Centre, Austria
- Notissimo, France
- Rigel Engineering s.r.l., Italy
- ICSRiM, University of Leeds, UK

The project aims to encourage collaboration between academic, industrial, small and medium sized enterprises, experts, scientific and technology groups throughout Europe and globally to develop strategic partnerships and to identify areas for new opportunities, functionalities and markets, to study and define multimedia music modelling and coding for the new age. Over the length of the project, MUSICNETWORK aims to promote interactive multimedia technologies, providing guidelines and compile relevant resources to bring music industries into the interactive multimedia era. MUSICNETWORK intends to stimulate these activities with a set of actions and services provided online at the project website ([www.interactivemusicnetwork.org](http://www.interactivemusicnetwork.org)), in order to minimise the gap between academia and industry, so that many of the products in the marketplace can exploit fully the potential of new interactive multimedia technologies.

## **WORKING GROUPS**

In order to achieve the aim and to carry out the activities effectively, MUSICNETWORK has setup the following Working Groups:

- **Music Notation:** This group examines all aspects of coding music notation, including modern music notation, format conversion, lyric modelling (multilingual aspects), fonts, and defining standards for music symbols [2, 3, 4].
- **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 [5, 6].
- **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 [7].
- **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) [8, 9].
- **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 [10].
- **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 [11].
- **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, digitising ancient music, coding for images, optical music restoration and preservation, and optical music recognition (OMR) [12, 13, 14, 15].

- 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 [16].

There will also be transversal activities bringing integration and collaboration activities between two or more Working Groups. For example, the Music Imaging and Music Multimedia Standard WGs are investigating potential graphical tagging of musical information using SVG (Scalable Vector Graphics) format; Music Notation and Music Multimedia Standard WGs are working on the definition of new integrated standards for music notation modelling for new interactive multimedia age; Protection and Distribution WGs are analysing models for distributing protected music content via Internet; Education and Library WGs are assessing their interactions, etc.

Most of the results and resources collected by the project will be valuable for both European and non-European countries and the inclusion of participants from non-EU states is also encouraged. Interested parties are encouraged to take part in this important work (see the project website, [www.interactivemusicnetwork.org](http://www.interactivemusicnetwork.org)).

## **SERVICES AND ACTIVITIES**

This paper only briefly presents the aims and activities of the MUSICNETWORK project and highlight a few working-groups. For anyone who is seriously interested in the future of music and multimedia technologies, the MUSICNETWORK provides a free service which:

- provides 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; and
- provides information and support on European Commission/FP6 activities in the area of multimedia music.

All these activities and services can be found online at the project website and everyone interested is encourage to register free online. MUSICNETWORK is also actively participating and disseminating at relevant events and fairs. Recent events include:

- Musikmesse, Frankfort, Germany, March 2003

- Electronic Imaging & the Visual Arts (EVA 2003), Florence, Italy, March 2003
- MIDEM 2003, Canne, France, January 2003
- International Festival & Symposium of Sound and Experimental Music (MAXIS 2003), Leeds, UK, April 2003
- European Music Navigator, Vienna, Austria 2003
- MUSICNETWORK Open Workshop 2002, Darmstadt, Germany, December 2002
- International Conference on Music and Artificial Intelligence (ICMAI 2002), Edinburgh, UK, September 2002
- and many others

Up coming MUSICNETWORK supported events include the 2<sup>nd</sup> MUSICNETWORK Open Workshop, 17<sup>th</sup>–18<sup>th</sup> September 2003, which is co-located with the 3<sup>rd</sup> International Conference on WEB Delivering of Music (WEDELMUSIC-2003) 15<sup>th</sup>–17<sup>th</sup> September 2003 ([www.wedelmusic.org/wedelmusic2003](http://www.wedelmusic.org/wedelmusic2003)), to be held at the University of Leeds Interdisciplinary Centre for Scientific Research in Music, UK ([www.ICSRiM.org.uk](http://www.ICSRiM.org.uk)). For free registration to the MUSICNETWORK Open Workshop 2003, please email [musicnetwork@dsi.unifi.it](mailto:musicnetwork@dsi.unifi.it).

## ACKNOWLEDGEMENTS

Thanks to the partners of the MUSICNETWORK project, the more than 500 participants and over 200 institutions and companies that are registered to MUSICNETWORK. Thanks to all the collaborations and supports.

## References

- [1] Pierfrancesco Bellini, David Crombie and Paolo Nesi (2003), Musicnetwork: To Bring Music Industry Into The Interactive Multimedia Age, in *Proceedings of the Electronic Imaging & the Visual Arts (EVA2003)*, Florence, Italy.
- [2] Pierfrancesco Bellini, Paolo Nesi (2002), The Perfect Structure for a Music Notation Language, 1<sup>st</sup> MUSICNETWORK Open Workshop, Darmstadt, Germany. (available from: [http://callisto.dsi.unifi.it/wg\\_notation/upload/musicnotationlanguage.doc](http://callisto.dsi.unifi.it/wg_notation/upload/musicnotationlanguage.doc))
- [3] Jerome Barthelemy (2002), Is There a Place for a New Development of a Music Notation Standard?, 1<sup>st</sup> MUSICNETWORK Open Workshop, Darmstadt, Germany (available from [http://callisto.dsi.unifi.it/wg\\_notation/upload/position.doc](http://callisto.dsi.unifi.it/wg_notation/upload/position.doc))
- [4] Michael Good (2002), MusicXML and MUSICNETWORK, 1<sup>st</sup> MUSICNETWORK Open Workshop, Darmstadt, Germany. (available from [http://callisto.dsi.unifi.it/wg\\_notation/upload/musicxml-musicnetwork-2002.pdf](http://callisto.dsi.unifi.it/wg_notation/upload/musicxml-musicnetwork-2002.pdf))
- [5] David Crombie (2002), Opening Access to Libraries & Archives, 1<sup>st</sup> MUSICNETWORK Open Workshop, Darmstadt, Germany. (available from [http://callisto.dsi.unifi.it/wg\\_libraries/upload/positionpaper\\_fnb\\_20021205.pdf](http://callisto.dsi.unifi.it/wg_libraries/upload/positionpaper_fnb_20021205.pdf))

- [6] Wolfgang Krueger (2002), Possibilities and Developments of Interactive Technologies in Music Libraries, 1<sup>st</sup> MUSICNETWORK Open Workshop, Darmstadt, Germany. (available from [http://callisto.dsi.unifi.it/wg\\_libraries/upload/presentation\\_krueger\\_20021205.pdf](http://callisto.dsi.unifi.it/wg_libraries/upload/presentation_krueger_20021205.pdf))
- [7] Vincent Puig, Jérôme Barthélemy (2002), Multimedia standards for music, 1<sup>st</sup> MUSICNETWORK Open Workshop, Darmstadt, Germany. (available from [http://callisto.dsi.unifi.it/wg\\_standards/upload/mmwg.position.ircam.doc](http://callisto.dsi.unifi.it/wg_standards/upload/mmwg.position.ircam.doc))
- [8] Riccardo Lenzi, Francesco Spadoni (2002), The Distribution Of Coded Music In The Electronic Market, 1<sup>st</sup> MUSICNETWORK Open Workshop, Darmstadt, Germany. (available from [http://callisto.dsi.unifi.it/wg\\_distribution/upload/position-rigel-v2-0.zip](http://callisto.dsi.unifi.it/wg_distribution/upload/position-rigel-v2-0.zip))
- [9] Mark Sandler (2002), Bringing the Music Industry into the Debate, 1<sup>st</sup> MUSICNETWORK Open Workshop, Darmstadt, Germany. (available from [http://callisto.dsi.unifi.it/wg\\_distribution/upload/mn-distribution-session2-m-sandler.ppt](http://callisto.dsi.unifi.it/wg_distribution/upload/mn-distribution-session2-m-sandler.ppt))
- [10] Martin Schmucker (2002), WG Protection, 1<sup>st</sup> MUSICNETWORK Open Workshop, Darmstadt, Germany. (available from [http://callisto.dsi.unifi.it/wg\\_protection/upload/mn\\_wg\\_protection\\_protocol\\_021212\\_1.0.doc](http://callisto.dsi.unifi.it/wg_protection/upload/mn_wg_protection_protocol_021212_1.0.doc))
- [11] David Crombie, Sijo Dijkstra, Roger Lenoir, Neil McKenzie, and Edmar Schut (2002), Accessible Music: Meeting the Needs Of the Print Impaired, 1<sup>st</sup> MUSICNETWORK Open Workshop, Darmstadt, Germany. (available from [http://callisto.dsi.unifi.it/wg\\_accessibility/upload/lenoir.doc](http://callisto.dsi.unifi.it/wg_accessibility/upload/lenoir.doc))
- [12] Kia Ng (2002), Music Imaging, 1<sup>st</sup> MUSICNETWORK Open Workshop, Darmstadt, Germany. (available from [http://callisto.dsi.unifi.it/wg\\_imaging/upload/mus-img-pos-200212-ng.pdf](http://callisto.dsi.unifi.it/wg_imaging/upload/mus-img-pos-200212-ng.pdf))
- [13] Ivan Bruno and Paolo Nesi (2002), Converting old music sheets with digital technology with minimal effort and cost, 1<sup>st</sup> MUSICNETWORK Open Workshop, Darmstadt, Germany. (available from [http://callisto.dsi.unifi.it/wg\\_imaging/upload/mus-img-pos-200212-bruno2.pdf](http://callisto.dsi.unifi.it/wg_imaging/upload/mus-img-pos-200212-bruno2.pdf))
- [14] João Caldas Pinto, Pedro Vieira and João Sousa (2002), Recognition Of Musical Symbols In Ancient Manuscripts, 1<sup>st</sup> MUSICNETWORK Open Workshop, Darmstadt, Germany. (available from [http://callisto.dsi.unifi.it/wg\\_imaging/upload/mus-img-pos-200212-pinto.pdf](http://callisto.dsi.unifi.it/wg_imaging/upload/mus-img-pos-200212-pinto.pdf))
- [15] Bertrand Couïasnon (2002), Improving Optical Music Recognition, 1<sup>st</sup> MUSICNETWORK Open Workshop, Darmstadt, Germany. (available from [http://callisto.dsi.unifi.it/wg\\_imaging/upload/mus-img-wg-talk1-couasnon-2002dec.pdf](http://callisto.dsi.unifi.it/wg_imaging/upload/mus-img-wg-talk1-couasnon-2002dec.pdf))
- [16] David Luigi Fuschi (2002), MUSICNETWORK – WG-Education, The International Association of Music Information Centres Annual Meeting (IAMIC 2003), Rome, Italy. (available from [http://callisto.dsi.unifi.it/wg\\_educational/upload/iamic-2003.doc](http://callisto.dsi.unifi.it/wg_educational/upload/iamic-2003.doc))