The Interactive-Music Network

DE5.1.2
Models Integration

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Abstract:
The present document describes the activities completed concerning Work Package 5 of the MUSICNETWORK, named “Results Integration”. The work related to WP5 builds on top of the results obtained so far from the different Working Groups as sub-objectives of the Working Group 4, reporting, assessing and planning the integration activities.

Keyword List:
Digital music, coded music, Music distribution over the Internet, multimedia content, DRM, MPEG, MPEG21.

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1 Executive Summary and Report Scope

The present document describes the activities related to Work Package 5 (WP5) of the MUSICNETWORK, called “Results Integration”. The work related to WP5 builds on top of the results obtained so far from the different Working Groups as sub-objectives of the Working Group 4 and can be summarised in the following points:

1. The different Working Groups of the MUSICNETWORK identified and analysed the major problems and needs emerging from the different areas of the digital music and music content processing, distribution, protection, etc.
2. Along with problems, users and business requirements have been collected and analysed,
3. The most important framework, technologies and formats have been surveyed by each WG,
4. To have a complete view of the different scenarios involving digital music, several case studies have been considered for the different areas of interest,
5. On the basis of such analysis, each Working Group proposed suitable models and solutions,
6. The obtained results and the developed models, and the knowledge extracted, are now being integrated,
7. Integration complexity requires an incremental approach; for this reason, integration activities are proceeding at three levels:
   - At level of cooperation and joint initiatives managed by two or more Working Groups,
   - At level of introduction of a uniform model to integrate music and multimedia, and related investigation of potential contributions to the activities of the main relevant standardisation bodies,
   - At level of integrated services provided to new potential customers under the unified labelling of MUSICNETWORK.

2 Background

2.1 The MUSICNETWORK as integrated network of Excellence

2.1.1 Main Objectives

Multimedia music content owners and distributors, such as publishers, archives, libraries, conservatories, music shops, music information technology and commercial companies are extremely interested in exploiting new methods for providing content in a fast and simple way with new interactive multimedia functionalities. However, they are afraid of losing their content or money by selecting non standard, unstable and unsafe formats. Most multimedia music content owners and distributors are converting their archives of music scores from paper to images and symbolic notation to survive in the market. Typically, they also have differently organised archives where several other related digital objects are collected: images, documents, lyric and videos. This material is not organised and quite rarely managed by an integrated Digital Asset Management database and tools for their integrated inspection.

In the era of Internet, the market of multimedia music content and of its applications is strongly dependent on the Internet evolution market. The most relevant exploitation of digital content and tools will be via Internet, e-commerce and m-commerce mechanisms.

2.1.2 MUSICNETWORK working groups and activities

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/synchronised to music notation symbols or image scores or documents or lyric text, audio files related and synchronised 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, etc. To bring music coding into new multimedia interactive applications is a complex task which requires for its definition, understanding and solution the integration of the knowledge of several aspects. 7 areas of work have been identified, where several different competencies have to be used/integrated in order to produce models and solutions to be shared by a large part of users.

The working groups that have been identified are:

- **WG-MN**: coding music notation
- **WG-ML:** music coding for libraries,
- **WG-MMS:** multimedia standards for music coding
- **WG-DCM**: distribution of coded music,
- **WG-PROT:** protection of coded music,
- **WG-MPIP:** music coding for print impaired people,
- **WG-CIMS:** coding images of music sheets.

The working groups are also addressing transversal problems and applications, such as the copyrights aspects, the educational aspects of music, legal problems, etc. The integration activity of the Working group work is the tool to construct a complete view of the mentioned transversal aspects.

The main aspects that every WG has considered are the following:

ρ **State of the art and Standard review:** identification of the state of the art in the specific area of the working group; identification and monitoring of the standards, standard the facto widely recognised in the specific area of the working group: collection of information and documents related to these standards; identification and monitoring of technical leading partners of the sector, in terms of market and technical solutions; assignment of a responsible for each standard (some of them are naturally present in the consortium since they are or have been involved in standard bodies) from the working

group participants; verification of standards against the needs expressed by the requirements and test cases.

- **Market Monitoring and Analysis:** Monitoring the market size of tools and activities related to the working groups. Monitoring the technology and the market of leading partners evolution. Monitoring the user type for the functionalities and formats. Monitoring the political and legal aspects related to the formats and tools. Monitoring the legal aspects related to the exploitation of content. Monitoring the behaviour of music content providers in regard of the aspects. Monitoring and analysing the end-user profile and the usage context for the technology.
- **Technology Watch and Contribution to Standards:** The monitoring of the technology used by leading partners of the sector. Monitoring security aspects related to the adoption of content with technology of the working group. Assessment of the current technology for the new media and distribution mechanisms. Definition of mechanisms and key aspects for assessing technology. Description of the main functionalities of each category of tools related to the working group area. Survey of solutions and technologies adopted in the working group area. The production of reports with comments regarding the applicability of standards in specific music coding area managed by the working group. Contribution with specific guidelines to the most related bodies of standards, such as Mpeg7 and Mpeg 21.
- **Model Definition and guidelines production:** Social and cultural analysis of user needs and of working group technologies. Description of the detailed user needs which can be related to aspects of the working group. Production of consumptive technology report of working group. Production of reports/guidelines regarding the most important technical solutions identified. Strategies and guidelines for achieving best practices, including practices in the field of education; Strategies and guidelines for improving interoperability and exchanges between systems;

The results produced by each group need to be integrated to produce a uniform analysis and possibly seemless solutions. The next step is to stimulate the identification of integrated solutions and models.

2.1.3 MUSICNETWORK business objectives

The main objectives of the project exploitation are:
- To make the MUSICNETWORK sustainable
- To enlarge the MUSICNETWORK participant list to make the sustainability easier
- To identify the market segment for services and products of the MUSICNETWORK
- To satisfy the exploitation objectives of each single partners of the consortium in the measure in which they are in line with those of the MUSICNETWORK .

Short-Term objectives:
- Establish relations with Professional / Standard Bodies
- Promote MUSICNETWORK image of reference network of experts / community
- Gather voluntary for cooperation and basic service provisions
- Establish basic services provision

Mid-Term objectives:
- Extended services provisions
- Revise subscription policies
- Develop official journals, transactions…
- Establishment of a management board and of basic organization structures to manage an organization based on voluntary base with pay per have customer services

Long-Term objectives:
- Gadgets / marketing / promotional products e-sale
- Product categorization and price / fee policy revision based on category
- Establishment of ballots and procedures for management board and of all other organs renewal policies

- Set up of investment programs aimed at granting further sustainability of the system also in case of further growth.

3 Integration Assessment

As from Annex 1 (the technical annex) of the MUSICNETWORK, the main objectives of Work Package 5 are the summarised in the following:

- To integrate the work performed by the seven working groups mentioned in the WP4
- To stimulate the adoption of new models and guidelines for the solution of problems identified in WP2
- To validate the model and guidelines produced by using tests cases set-up in WP2.

In particular, all the knowledge produced into the WP4 for music modelling and coding have to be integrated to produce a clear view of what is needed at a level of music model for making it suitable for multimedia and interactive applications.

The integration will allow identifying additional functionalities and/or procedures that can be useful to obtain a more general model for music coding or obtaining new process for coding music or for format conversion.

3.1 Work package scope and workplan

During the activities of Work Package 5, the knowledge produced into the WP4 for music modelling and coding has been integrated to produce a clear view of what is needed at a music model for making it suitable for multimedia and interactive applications. This integration produced also integrated procedures for music format conversions and integrated models for music distribution, protection, interaction via graphics user interface, etc., all aspects of music coding. The adoption of these new integrated models and procedures have to be stimulated via the channels available by the project partners and the several MUSICNETWORK participants during the project. The validation of the proposed models, procedures, methods has to be produced by monitoring several types of trial solutions.

3.2 Risks evaluation

An assessment of project risks have been performed for the Work Package 5, concering the intergration of models and solutions proposed by the severl Working Groups.

The main risks identified so far can be summarised in the following table:

Risks Identified for WP5, Results Integration		
ID	**Risk name**	**Risk description**
R1	Extra work due to Integration complexity	Risk of ending the WP out of scheduled time, due to high complexity and huge quantity of data and information to be integrated.
R2	Overlapping & Confusion	Risk of overlapping and confusion due to different terminologies used within the different thematic areas and working groups
R3	No Uniform Model	Difficulties to find out a uniform model to integrate the several different models provided by the Working Groups
R4	Weak integration	Too wide scope, too many concurrent objectives, too many relevant interests to merge; all this may lead to a lack of depth in integration. There is the risk that only superficial aspects may be taken into account in the integration process leading to a low cohesion level of final integrated result.
R5	Partial integration	This is the most realist risk among those reported in the list. The integration process will be persecuted by the MUSICNETWORK since its conclusion. If

		the integration process will not been completed the value of the MUSICNETWOKR will be lower and thus its exploitability could be harder.

A qualitative risk level has been assigned to each risk identified. The risk level is referred to as qualitative since it is a quick approximation and does not reflect the rigor of a detailed, numerical analysis. The risk level should be high, medium, or low, depending on the severity of impact and the probability of the event occurring. Qualitative risk level is obtained on the basis of a five-part scale for the probability of risk as follows:

Probability	Low Impact	Medium Impact	High Impact
Hardly likely (<10%)	Low Risk	Low Risk	Low Risk
Not likely (<35%)	Low Risk	Low Risk	Medium Risk
Might or might not happen (35% - 65%)	Low Risk	Medium Risk	Medium / High Risk
Likely (>65%)	Low Risk	Medium / High Risk	High Risk
Highly likely (>90%)	Low Risk	Medium / High Risk	High Risk

For each for each high-level and medium risk identified, a "mitigation" response plan has been created to ensure the risk is managed successfully.

The following table shows the (draft) results of the risk evaluation, the qualitative risk level and the mitigation actions planned:

Risks Analysis for WP5, Results Integration					
ID	**Risk name**	**Severity (of risk impact)**	**Probability % (of risk occurring)**	**Risk Level**	**Mitigation**
R1	Extra work due to Integration complexity	High	35 - 65	High Risk	Carefully organise the data domain using hierarchical structure
R2	Overlapping & Confusion	Medium	> 65	Medium Risk	Use of a uniform dictionary and ontology.
R3	No Uniform Model	High	< 35	Medium Risk	MPEG framework already provides an integrated view of most of the thematic areas considered by the different WGs.
R4	Weak integration	High	30 - 40	Medium Risk	Rank results and objectives, assign weighting to each, focus on main one and related specific aspects, adopt common terminology
R5	Partial Integration	Low	60	High	Increase the focus of the work on the most promising services and products of the MUSICNETWORK to increase the certainty to be sustainable and thus to have effort to complete the model even later the conclusion of the project funding.

The activities associated with the risk plans have been integrated in the activities of the WP5 workplan, to ensure that the work is actually completed. Risk plans will be monitored to ensure they are being executed successfully and new risk plan activities will be added if it looks like the risk is not being managed successfully.

Risks evaluation and analysis will be performed periodically (monthly) throughout the Work Package life based on current circumstances to cope with new risks which may arise and potential risks that were not identified in the first place.

3.3 Description of the work performed

A brief report of the work performed can be summarised in the following points:

- The different Working Groups of the MUSICNETWORK identified and analysed the major problems and needs emerging from the different areas of the digital music and music content processing, distribution, protection, etc.
- Along with problems, users and business requirements have been collected and analysed,
- The most important framework, technologies and formats have been surveyed by each WG,
- To have a complete view of the different scenarios involving digital music, several case studies have been considered for the different areas of interest,
- On the basis of such analysis, each Working Group proposed suitable models and solutions,
- The obtained results and the developed models, and the knowledge extracted, have been integrated,
- Integration complexity requires an incremental approach; for this reason, integration proceeded at three levels:
  a). At level of cooperation and joint initiatives managed by two or more Working Groups,
  b). At level of introduction of a uniform model to integrate music and multimedia, and related investigation of potential contributions to the activities of the main relevant standardisation bodies,
  c). At level of integrated services provided to new potential customers under the unified labelling of MUSICNETWORK.

3.4 Integration added Value

The main objective of WP5 is to achieve more than just the sum of results obtained in the framework of each Working Group. Results integration should provide added value in the form of:

- A uniform set of best practices, models (possibly integrated with MPEG) and seem-less solutions,
- An integrated set of business services provided under the common MUSICNETWORK labelling,
- Investigation of the main issues under different views and approaches (implemented via joint initiatives and cross-fertilisation among working groups),
- A unified model for multimedia music modelling, formatting and decoding.
- a sort of “brand” recognition for project outcomes through effective cooperation with major actors in the field including standardisation bodies.

The integrated MUSICNETWORK model describes how coding music notation, music coding for libraries, multimedia standards for music coding, distribution of coded music, protection of coded music, music coding for print impaired people, coding images of music sheets can be integrated into a more general model. Presently a very good environment for integrating the results has been the set of workshops that the MUSICNETWORK is organising and the meeting with the MPEG form regarding the AHG on Symbolic Music Representation.

4 Organisation and structure of the obtained results

4.1 Thematic areas and working groups

The thematic areas considered within the scope of the MUSICNETWORK are in direct relationships with the Working Groups activated and can be summarised as in the following table. Please note that the listed WP are not only those created and planned since the beginning, they also include the WG on music education:

MUSICNETWORK Working Groups	
WG-MN	coding music notation
WG-ML	music coding for libraries
WG-MMS	multimedia standards for music coding
WG-DCM	distribution of coded music
WG-PROT	protection of coded music,
WG-MPIP	music coding for print impaired people,
WG-CIMS	coding images of music sheets.
WG-EDU	Educational related to digital music

4.2 Categorisation of main sections, issues, topics and entities

The main common topics analysed by the various Working Group can be summarized as:

- *Actors:* the most relevant type of actors interested in music notation, music coding for libraries, multimedia standards for music coding, distribution of coded music, protection of coded music, music coding for print impaired people, coding images of music sheets;
- *Problems:* in order to extract a general model is necessary identify all type of problems and above all the lacks founded in extracting knowledge about coding music notation, music coding for libraries, multimedia standards for music coding, distribution of coded music, protection of coded music, music coding for print impaired people, coding images of music sheets. There is currently a lack of interoperability between digital content technologies that makes it challenging for consumers to easily get the content they want, in the format, platform and other preferences they choose. Additionally, there is currently no technology framework in place that allows all market participants to ensure that the business agreements they make are respected. Today, there does not exist a technical and business framework to achieve interoperability across multiple technology platforms and enable new business models.
- *Needs and requirements*: identify the needs and requirements for coding music notation, music coding for libraries, multimedia standards for music coding, distribution of coded music, protection of coded music, music coding for print impaired people, coding images of music sheets;
- *Guidelines,* best practices, survey and technical reports for the creation, development, protection and distribution of multimedia content based on music;
- *Models:* it is very important to present, if some results in this sense are obtained, the models proposed or surveyed and analysed in coding music notation, music coding for libraries, multimedia standards for music coding, distribution of coded music, protection of coded music, music coding for print impaired people, coding images of music sheets;

- *Frameworks, Technologies, formats:* a very short description of frameworks, technologies, formats surveyed in coding music notation, music coding for libraries, multimedia standards for music coding, distribution of coded music, protection of coded music, music coding for print impaired people, coding images of music sheets;

4.2.1 Actors on the scene

Concerning the main actors involved in the MUSICNETWORK's areas of interest, a simple classification is shown in the following table according to their role in the market:

Role	Description
Content Owners	Artists, multimedia creators, performers
Publishers	Labels, score publishers
Content Distributors	Broadcasters, Libraries, TV, retailers (shops), webcasters
Technology Providers	Develop the technology enabling the distribution market
Copyright Collecting Societies	Organisations devoted to collective licensing/the collection of IPR payments
End Users	Multimedia content users (musicians, amateurs, audiophiles, …)
Independent Organisations	Standardisation bodies, industry organisations, independent market researchers, other special purpose organisations
Governmental Organisations	Policy and decision makers, ministries, government
Law Experts	Experts in legal aspects of IPR protection
Projects & Research Centers	Large projects, Universities, Research Centers

In general, these categories are not totally independent each other, for example, a content owner can also play the role of music distributor, etc. Examples in such sense are Liquid Music Network, Real Networks, Net4Music (in the past), GoVivaldi (for sheet music) and recently Microsoft which provides both multimedia content distribution technologies (servers, systems and models) and music download services.

4.2.2 Matrix integration

The integration of results is performed according to a matrix approach trying to integrate information along the two different directions of the matrix:

- Vertically, considering the different categories of activities and topics developed under a single Working Group, which is the work currently performed in WP4, and
- Horizontally, addressing the different categories and topics as they are analysed by the different WGs.

To start and stimulate the work and the discussion in this direction, a certain number of summary tables are presented below, trying to capture the essential concepts of each working group. A table is provided for each of the previously mentioned main topics (or thematic areas), with the exception of Major Problems and Requirements, which are grouped in a single table.
For each thematic areas (there is a table), the main concepts and issues are listed in the first column, along with an estimation of the relevance to the specific WGs. Relevance is expressed as a numeric value in the range:

- 0 (not relevant)
- 1 (marginally relevant)
- 2 (relevant)
- 3 (very relevant).

Half points are also admitted.

For instance, concerning the "Actors" table, the WG-DCM (Distribution) column shows that the role of Content Distributors is very important within the framework of the Distribution Working Group.

Actors									
Role	WG-MN	WG-ML	WG-MMS	WG-DCM	WG-PROT	WG-MPIP	WG-CIMS	WG-EDU	**total**
Content Owners	3	2	1	2	3	1	3	3	18
Publishers	3	2	3	2	3	1	3	3	20
Content Distributors	2	2	3	3	3	3	1	2	49
Technology Providers	2	2	3	3	3	3	3	3	22
Rights Collecting Societies	0	2	1	3	2	1	1	1	11
End Users	2	3	2	3	3	3	1	2	19
Independent Organisations	3	1	3	2	2	3	1	1	16
Governmental Organisations	1	3	0	1	1	3	2	2	13
broadcasters	0	1	1	2	2	0	0	0	6

Major Problems & Requirements									
	WG-MN	WG-ML	WG-MMS	WG-DCM	WG-PROT	WG-MPIP	WG-CIMS	WG-EDU	**total**
Interoperability (modularity, flexibility in implementations)	3	3	3	3	3	2	1	3	21
Flexibility (in business models)	3	3	2	3	3	2	1	2	19
Broadband availability	0	2	3	3	1	0	0	2	11
Protection of content	1	2	2	2	3	0	2	3	15
Secure infrastructure	1	2	2	2	3	0	2	1	13
Added value services (not just content itself)	2	3	3	3	0	2	3	2	18
Address potential future extensions	2	2	2	1	2,5	2	3	3	17,5
Leverage interactivity	3	0	3	3	0	3	1	3	16
More content available (at low cost)	3	3	3	3	0	3	2	2	19
New licensing schemes	1	3	3	3	3	1	3	2	19
Multi-language support	3	2	2	3	3	2	0	3	18
Scalability (for micro businesses, SME and Large Enterprises/Organisations)	1	3	1	2	2	1	3	2	15

Guidelines									
	WG-MN	WG-ML	WG-MMS	WG-DCM	WG-PROT	WG-MPIP	WG-CIMS	WG-EDU	**total**
Content production & re-use	2	2	2	2	0	3	2	2	15
Content modelling	3	3	3	2	2	3	2	3	21
Adoption of standards for user results assessments	3	2	2	0	0	3	3	2	15
Content accessibility & usability	0	3	3	1	0	3	0	3	13
Content digitisation	2	3	1	3	1	1	3	2	16
Content conversion	3	1	1	1	1	2	2	1	12
Content protection	1	1	0	3	3	0	2	1	11
Content distribution	1	2	0	3	2	0	1	3	12
Content description and management (query)	1	3	2	3	1	1	3	2	16
Business models	1	2	1	3	3	1	1	2	14
XML usage in Music	3	3	3	2	2	3	2	3	21

Technologies									
	WG-MN	WG-ML	WG-MMS	WG-DCM	WG-PROT	WG-MPIP	WG-CIMS	WG-EDU	**total**
Braille printing music	2	1	0	0	0	3	0	0	6,0
CDN	0	0	0	2	1	0	0	1,5	4,5
CM	2	3	0	2	1	0	0	3	11,0
CMS	2	2	0	2	2	2	0	3	13,0
CPRM	0	1	1	3	3	0	0	2,5	10,5
CRM	0	3	0	0	0	0	0	0	3,0
DAMS	2	3	0	3	2	2	2	3	17,0
DRM	1	2	2	3	3	0	0	2,5	13,5
DTCP	0	0	0	3	3	0	0	2,5	8,5
ECM	1	0	0	1	0	0	0	1,5	3,5
Finale	3	2	0	2	0	2	0	2	11,0
Guido	2	0	0	1	0	0	0	0	3,0
ICE	1	2	0	2	2	0	0	2	9,0
ICP	0	0	1	2	2	0	0	1	6,0
iCRT	3	1	1	0	0	0	2	2,5	9,5
IM	1	3	1	1	1	1	0	0	8,0
LCMS	1	1	1	1	1	1	0	3	9,0
LMS	1	1	2	1	1	0	0	3	9,0
MIDI	3	2	2	0,5	2	2	0	2	13,5
REL	0	0	3	3	3	0	0	2	11,0
SCORE	3	0	0	0,5	0	2	0	2	7,5
Sibelius	3	2	0	2	0	2	0	2	11,0
Spoken Music	0	1	0	0	0	3	0	0	4,0
WCM	0	1	0	2	2	0	0	3	8,0
WEDELMUSIC XML	3	0	1	3	0	2	2	1	12,0
X-ACT	2,5	1	3	3	0	0	0	3	12,5
XML	3	2	2	2	2	2	3	3	19,0
XrML	0	0	3	3	3	0	0	2	11,0

For the meanings of the acronyms see section 7.1.

Models									
	WG-MN	WG-ML	WG-MMS	WG-DCM	WG-PROT	WG-MPIP	WG-CIMS	WG-EDU	totale
Braille model	2	2	2	0	0	3	0	1	10,0
Guido / NoteServer	2	0	0	1	0	0	0	0	3,0
Imaging formats	0	3	3	0	0	0	3	2	11,0
LilyPond	2	0	0	0,5	0	0	0	0	2,5
MEI	3	0	1	0,5	0	0	0	0	4,5
MIDI	3	2	2	0,5	2	2	0	2	13,5
MML	2	0	1	0,5	0	0	0	0	3,5
MPEG	3	3	3	2	3	0	2	2	18,0
MusicXML	3	0	1	0.5	0	2	0	0	6,0
MusicXTeX	3	0	0	0,5	0	0	0	0	3,5
NIFF	3	0	1	0,5	0	2	0	0	6,5
Pyramidal distribution (3)	0	0	1	3	2	0	0	2	8,0
SMDL	3	0	2	0,5	0	1	0	0	6,5
Star distribution (1)	0	0	1	3	2	0	0	2	8,0
Wagon wheel distribution (2)	0	0	1	3	2	0	0	2	8,0
WEDELMUSIC models	3	1	2	3	2	2	2	1	16,0
XML	3	2	2	2	2	2	3	3	19,0

(1) Secondary distribution centres are connected to a central primary one
(2) Primary distribution centres are connected in a chain stile while from each primary distribution centre is dependent a set of secondary ones connected in star fashion

(3) Distribution centres are connected in hierarchical order most relevant reside in the vertex peripheral one are located at the base. Each level of distribution servers from vertex to base has a wider population

5 Results of Integration

On the basis of the analysed activities and feedbacks from participants, each Working Group proposed suitable models and solutions. The obtained results and the developed models, and the knowledge extracted, are now being integrated. The integration proceeded at three main levels:

- Performing collaboration and joint initiatives involving two or more Working Groups,
- introducing a uniform integrated model integrating all aspects of music and multimedia,
- defining an integrated set of products and services for the MUSICNETWORK,
- building a self-sustainable MUSICNETWORK association to continue to pursue the MUSICNETWORK objectives after the end of this project.

5.1 WGs joint initiatives

The following paragraphs contain information concerning activities, initiatives and works jointly performed by two or more Working Groups of the MUSICNETWORK, in order to integrate the results obtained separately and to stimulate cross-fertilisation among different thematic areas and market sectors.

5.1.1 Music Notation and Imaging Working Groups

OMR (optical music recognition) tools are applications dealing with aspects related to the Notation WG (music notation models and formats) and to the Imaging WG (image recognition techniques, etc.), for this reason some activities are joined between the two working groups.

The joint activities performed as of March 2004 dealing with OMR tools were:

- The definition of a "Quick-Test" for OMR software. The "Quick-Test" consists of a three-page dataset and encompasses the most frequently found Common Western Music Notation symbols. It is designed to be used as a first evaluation of OMR tools to find out the capabilities of the software. The "Quick-Test" dataset can be downloaded from the documents section of the Imaging WG on the MUSICNETWORK website. The first results have been published on the last Deliverable of WG imaging and made public for all on the www site.
- The definition of OMR tools evaluation metrics, a set of evaluation categories (based on music notation symbols and their relationships, and their importance using specific weights) and some evaluation indexes for the global estimation of the performance. The first results have been published on the last Deliverable of WG imaging and made public for all on the www site.
- The preparation of a questionnaire to find evaluation categories weights to estimate the performance of OMR tools. The questionnaires were distributed at the 2nd MUSICNETWORK workshop to experts. The questionnaires collected were 17 from OMR experts, Notation experts, music editors users, engravers, and music library experts. The results of the evaluation of questionnaires is reported in the MUSICNETWORK deliverable - Coding Images of Music Sheets - DE4.7.1.
- A first assessment of three OMR tools (SmartScore, SharpEye2 and O3MR) was performed using a data-set of 7 images covering the basic and more advanced music notation symbols (triplets, small notes, ornaments, etc.), the results of the assessment are reported in the deliverable DE 4.7.1.

5.1.2 Music Notation and Standards Working Groups

5.1.2.1 Summary of the activities performed

Works on integration between Notation and Standards working groups have been started very early, when it becomes clear for these working groups that a joint activity in MPEG was needed.
The purpose of this joint activity was aimed to integrate Music Notation in MPEG. The activity started in May 2003 (month 10), with the joint elaboration of a proposal for the MPEG meeting in July 2003, in Trondheim. The MPEG group has agreed on the setting of a Ad Hoc Group, which is, in MPEG parlance, a specific group aimed to study a particular topic, in that particular case the Music Notation and its possible integration in MPEG. A mailing list (a reflector in MPEG parlance) has been settled up, as well as a web site.

During the whole process, a number of intermediate documents have been produced: user's scenarios, intermediate reports, requirements. All these documents are available on the Web site.

A request for Expressions of Interest has been produced, in order to show interest of music community. Expression of Interest have been received, from the academic world as well as from industries.
From the academic world, Expressions of Interest have been received from institutions like Libraries or research institutions. From industries, Expressions of Interest have been received from companies dealing with audio processing (automatic generation of scores from audio), or dealing with optical recognition of music scores, or even dealing with e-learning and education.

Finally, a workshop dedicated to a common elaboration of requirements for Music Notation in MPEG 4 has been organized in collocation with the 68th MPEG meeting in Munich, March 2004.

5.1.2.2 OFFICIAL INPUT MPEG ISO DOCUMENTS provoked by the MUSICNETWORK

- **M9731,** Paolo Nesi, DSI, University of Firenze, Italy, Giorgio Zoia, EPFL, Switzerland, Jerome Barthelemy, IRCAM, France, Pierfrancesco Bellini, DSI, University of Firenze, Italy, David Fuschi, ILABS, GIUNTI, Italy, David Crombie, FNB, The Netherlands, Francesco Spadoni, RIGEL, Italy, Kia Ng, University of Leeds, UK, Martin Schmucker, FHGIGD, Germany; "**Proposal for Music Notation Modeling and its Integration within MPEG-4 and MPEG-7**", MUSICNETWORK IST Network and related working groups (DSI, IRCAM, EPFL), Throndenheime, Norway, July 2003.
- **M10067 Brisbane report**
- **M10068,** Paolo Nesi (DSI, University of Firenze), Giorgio Zoia (EPFL), Pierfrancesco Bellini (DSI, University of Firenze), Jerome Barthelemy (IRCAM). "**Music Notation Application Requirements and MPEG Technology**", AHG on Music Notation Requirements, Brisbane, Australia, October 2003.
- **M10235 Wikaloa report**
- **M10355,** Paolo Nesi (DSI, University of Firenze), Pierfrancesco Bellini (DSI, University of Firenze), Giorgio Zoia (EPFL), Jerome Barthelemy (IRCAM), "**Music Notation Functionality and Interface to MPEG**", AHG on Music Notation Requirements, Waikoloa, USA, December 2003.
- **M10357,** Paolo Nesi (DSI, University of Firenze), Pierfrancesco Bellini (DSI, University of Firenze), Giorgio Zoia (EPFL), Jerome Barthelemy (IRCAM), "**Music Notation Technical Requirements**", AHG on Music Notation Requirements, Waikoloa, USA, December 2003.
- **M10466 Munich report**
- **M10568,** Jerome Barthelemy, Benoit Meudic, Marc Texier, "Proposal for Music Instrumentation and WeightedScales Descriptors and Descriptor Scheme", as a result of the workshop on Music Libraries.
- **M10622,** Giorgio Zoia (EPFL), James Ingram, "**A new Application Scenario for Music Notation in MPEG**". This document presented the "synthetic opera" application scenario, introducing new requirements in terms of interaction with other media, including visual SNHC, and in terms of content protection (MPEG-4 IPMP/IPMPX). AHG on Music Notation Requirements / MUSICNETWORK, Munich, Germany, March 2004.
- **M10654, MPEG2004, ISO/IEC JTC1/SC29/WG11,** Paolo Nesi (DSI, University of Firenze), Pierfrancesco Bellini (DSI, University of Firenze), Giorgio Zoia (EPFL), Jerome Barthelemy (IRCAM), **"Music Notation Technical Requirements and Integration in MPEG-4**", AHG on Music Notation Requirements / MUSICNETWORK, Munich, Germany, March 2004.

- **M10661: MPEG2004, ISO/IEC JTC1/SC29/WG11,** Paolo Nesi (DSI, University of Firenze), Pierfrancesco Bellini (DSI, University of Firenze), Giorgio Zoia (EPFL), Jerome Barthelemy (IRCAM) "**Proceedings of AHG on Music Notation Requirements / MUSICNETWORK**". This document includes all together most of the contributions by different experts; it includes further examples of music notation related applications and examples of music notation xml formats and tools. Munich, Germany, March 2004.
- **M10769, Redmond report**
- **M11002,** James Ingram, **"Position Paper about the SMR Draft Call for Proposals",** Containing some comments on document M11083 provided by James Ingram. AHG on Symbolic Music Representation, Redmond, Washington state, USA, July 2004,
- **M11019,** Paolo Nesi (DSI, University of Firenze), Pierfrancesco Bellini (DSI, University of Firenze), Jerome Barthelemy (IRCAM), James Ingram, David Crombie, "**Draft Evaluation Criteria for Assessing SMR Proposals**", AHG on Symbolic Music Representation, Redmond, Washington state, USA, July 2004,
- **M11021,** Paolo Nesi (DSI, University of Firenze), Pierfrancesco Bellini (DSI, University of Firenze), Jerome Barthelemy (IRCAM), James Ingram, David Crombie, Neil McKenzie, "**Examples of Matching SMR aspects and available technologies**", AHG on Symbolic Music Representation, Redmond, Washington state, USA, July 2004,
- **M11022,** G. Zoia, Jerome Barthelemy, Pierfrancesco Bellini, Paolo Nesi and Mikael Bourges Sevenier (Mindego inc.), "**Graphic functionality in MPEG-4 and Symbolic Music Representation",** AHG on Symbolic Music Representation, Redmond, Washington state, USA, July 2004,
- **M11025,** Paolo Nesi, Giorgio Zoia, James Ingram, Pierfrancesco Bellini, "**Study on Draft CfP on Symbolic Music Representation**", AHG on Symbolic Music Representation, Redmond, Washington state, USA, July 2004,
- **M11083,** Michael Good, **"Response to Draft Call for Proposals N6457",** containing comments on the last version of the Draft Call for Technology on SMR, from Michael Good, Recordare, US; AHG on Symbolic Music Representation, Redmond, Washington state, USA, July 2004,
- **M11175, Palma Report**
- **M11250,** David Crombie, Roger Lenoir, Neil McKenzie, **"Accessible Information in MPEG"**, Palma de Mallorca, Spain, October 2004
- **M11307,** Paolo Nesi, Giorgio Zoia, James Ingram, Pierfrancesco Bellini, Jerome Barthelemy, M. Campanai, Kia Ng, Gioseppe Nicotra, David Crombie, "**Proposed SMR Evaluation Model and Procedure**", AHG on Symbolic Music Representation / MUSICNETWORK, Palma de Mallorca, Spain, October 2004, accessible at: http://www.interactivemusicnetwork.org/mpeg-ahg/Proposed-SMR-Evaluation-Procedure-v1-0.doc
- **M11313,** Jerome Barthelemy, Gregoire Carpentier, "Proposal for a Core Experiment of WeightedScalesDS", Palma de Mallorca, Spain, October 2004.
- **M11354,** Giorgio Zoia, Pierfrancesco Bellini, Paolo Nesi, Jerome Barthelemy, "**MPEG-4 and SMR: report on available functionality for graphics**", AHG on Symbolic Music Representation / MUSICNETWORK, Palma de Mallorca, Spain, October 2004,
- **M11496, Hong Kong Report**
- **M11542 –** David Crombie, Roger Lenoir, Neil McKenzie: "**Proposed Technology for accessible SMR decoders**", Hong Kong, Cina, January 2005.
- **M11554 –** Maurizio Campanai, Pierfrancesco Bellini: "**WEDELMUSIC as SMR proposa**l", Hong Kong, Cina, January 2005.
- **M11560 –** G. Bertoni: "**Proposal for Braille Music Symbolic Representation**", Hong Kong, Cina, January 2005.

- **M11601 –** Tillmann Weyde, Hartmut Ring: "**Proposal for Symbolic Music Representation Format**", Hong Kong, Cina, January 2005.
- **M11630 -** Hyoung-Joong Kim, Yong-Soo Choi, Yong-Ju Cho: "**SMR on the Korean Symbolic Music Representation**" , Hong Kong, Cina, January 2005.
- **M11806, Busan Report**

5.1.2.3 OFFICIAL PUBLIC and OUTPUT MPEG ISO DOCUMENTS provoked by the MUSICNETWORK

All the content that has been used to create the following documents are accessible as single or multiple pages attacked to the MPEG AHG main web page:

http://www.interactivemusicnetwork.org/mpeg-ahg/index.html

- **N6049, MPEG2003, ISO/IEC JTC1/SC29/WG11,** Paolo Nesi (DSI, University of Firenze), Giorgio Zoia (EPFL), Pierfrancesco Bellini (DSI, University of Firenze), Jerome Barthelemy (IRCAM), "**Application Requirements of Multimedia and Music Notation**", AHG on Music Notation Requirements / MUSICNETWORK, Brisbane, Australia, October 2003. (ISO public Document ISO/IEC JTC 1/SC 29/WG 11 N6049)
- **N6149**, **MPEG2003, ISO/IEC JTC1/SC29/WG11,** Giorgio Zoia (EPFL), Paolo Nesi, Pierfrancesco Bellini (DSI, University of Firenze), Jerome Barthelemy (IRCAM), "**Application Scenarios for Music Notation integrated in MPEG**", AHG on Music Notation Requirements / MUSICNETWORK, December 2003, Waikoloa, Hawaii, USA, (ISO public Document as ISO/IEC JTC 1/SC 29/WG 11 N6149).
- **N6454, MPEG2004, ISO/IEC JTC1/SC29/WG11,** "**Workplan for Core Experiment on Music Instrumentation and Weighted Scale Type**", March 2004, Munich, Germany.
- **N6457, MPEG2004, ISO/IEC JTC1/SC29/WG11**, "**Draft Call for Proposals for Symbolic Music Representation",** AHG on Music Notation Requirements / MUSICNETWORK, March 2004, Munich, Germany, (ISO public Document as ISO/IEC JTC 1/SC 29/WG 11 N6457).
- **N6689, MPEG2004, ISO/IEC JTC1/SC29/WG11**, "**Call for Proposals on Symbolic Music Representation**", Audio Subgroup, Public document, Redmond, USA, July 2004. (ISO public Document ISO/IEC JTC 1/SC 29/WG 11 N6689) accessible at: http://www.interactivemusicnetwork.org/mpeg-ahg/w6689.zip
- **N6690, MPEG2004, ISO/IEC JTC1/SC29/WG11,** "**DRAFT SMR Evaluation Procedure**", Audio Subgroup, Public document, Redmond, USA, July 2004. (ISO public Document ISO/IEC JTC 1/SC 29/WG 11 N6690) accessible at: http://www.interactivemusicnetwork.org/mpeg-ahg/w6690%20%28DRAFT%20SMR%20Evaluation%20Procedure%29.doc
- **N6812, MPEG2004, ISO/IEC JTC1/SC29/WG11**, "**SMR Evaluation Model and Procedure**", Audio Subgroup, Public document, Palma de Mallorca, Spain, October 2004. (ISO public Document ISO/IEC JTC 1/SC 29/WG 11 N6812) accessible at: http://www.interactivemusicnetwork.org/mpeg-ahg/
- **N7038, MPEG2005, ISO/IEC JTC1/SC29/WG11, Workplan for the Evaluation of Responses to the CFP on SMR,** Hong Kong, January, Cina, (ISO Document ISO/IEC JTC 1/SC 29/WG 11)
- **N7048, mandate of the MPEG AHG on SMR,** Hong Kong, January, Cina, (ISO Document ISO/IEC JTC 1/SC 29/WG 11)
- **N7152, MPEG2005, ISO/IEC JTC1/SC29/WG11, Audio Subgroup, Report on Symbolic Music Representation RM0 Selection,** April 2005, Busan, Korea (ISO Document ISO/IEC JTC 1/SC 29/WG 11)
- **N7153, MPEG2005, ISO/IEC JTC1/SC29/WG11**, **Audio Subgroup, Workplan for Symbolic Music Representation,** April 2005, Busan, Korea (ISO Document ISO/IEC JTC 1/SC 29/WG 11)
- **N7162, mandate of the MPEG AHG on SMR,** April 2005, Busan, Korea (ISO Document ISO/IEC JTC 1/SC 29/WG 11)

5.1.2.4 Chronological report of the activities performed

Joint activities performed for the integration of Notation and Standards WGs results can be summarised in chronological order according to the following points:

- **May-July 2003**: elaboration of a proposal (an input document) on the integration of Music Notation into the MPEG framework for the 65th MPEG meeting.
- **July 2003**: participation to the 65th MPEG meeting (Trondheim, NO) which established the Ad-Hoc group on Music Notation Requirements.
- **August-October 2003:** discussions on the reflector and preparation of input document on Music Notation Application Requirements for the 66th MPEG meeting.
- **October 2003**: participation to the 66th MPEG meeting (Brisbane, AU) in which was decided to continue the work on requirements.
- **November-December 2003:** discussions on the reflector and preparation of two input documents on Music Notation Application Requirements and integration of Music Notation into the MPEG framework for the 67th MPEG meeting.
- **December 2003**: participation to the 67th MPEG meeting (Hawaii, USA) in which was decided to continue the work on requirements and on application scenarios.
- **January-March 2004**: discussions on the reflector and preparation of a input document on Music Notation Application Requirements and integration of Music Notation into the MPEG framework for the 68th MPEG meeting.
- **March 2004**: organization of the 3rd MUSICNETWORK workshop/Ad-hoc Group meeting co-located with the 68th MPEG meeting, in the AHG meeting the requirements were refined and discussed with the Music Notation and MPEG experts. In the meeting is was decided to change the AHG name to "Symbolic Music Representation" because the term "Music Notation" was felt too restrictive.
- **March 2004**: participation to the 68th MPEG meeting (Munich, DE) in which a draft call for proposal for Symbolic Music Representation was produced.
- **March 2004**: integration of results of workshop on Music Libraries and MPEG in documents produced by AHG on music notation.
- **April-July 2004:** discussions on the reflector and preparation of three input documents into the MPEG framework for the 69th MPEG meeting in Redmond USA. These documents have been presented by P. Nesi.
- **July 2004**: MPEG meeting in Seattle, US, July 2004, Meeting of MPEG AHG on Symbolic Music Representation. At the meeting, the document containing the requirement has been transformed as the official CALL for PROPOSAL on Symbolic Music Representation.
- **August-October 2004**: the work of this period can be divided in different phases; 1) work done through the reflector generated approximately 120 emails that were exchanged among the subscribers of the *mn-mpeg* email reflector (with about the half of the subscribers from the industry); the informal call for weight tables to be used in evaluation received 21 answers.
- **August 2004:** MUSICNETWORK organises a Special Session at the Joint IAML - IASA Congress Oslo, August 8-13, 2004
- **September 2004**: organization of the 4th Open workshop in Barcelona. In that meeting the "Assessment model for SMR" and "Examples on matching technology" related to MPEG have been discussed.
- **October-November 2004**: Presentation of the SMR (requirements and Call for Proposal) at the ICMC conference in Miami (International Computer Music Conference, with more than 300 attendees usually), US, November 2004, presentation performed by Kia Ng, UNIVLEEDS.
- **October 2004:** MUSICNETWORK workshop on SMR: "Model Assessment for Symbolic Music Representation", co-located with the 70th MPEG meeting in Palma de Mallorca

- **October 2004**: meeting of MUSICNETWORK MPEG AHG on SMR with IEEE-IMS (27 October Milan, Italy) to investigate the possibility of an agreement and/or liaison between the Musicnetwork + MPEG AHG and the IEEE PAR 1599 Group (see section 6.12 for details).
- January 2005: participation to the 71th MPEG meeting in Hong Kong, China.
- **February 2005:** Workshop on the Assessment of Symbolic Music Representation in Paris. The meeting has been organised in IRCAM premises. The assessment of the quality of the Symbolic Music Representation models has been performed on the basis of the assessment model.
- **April 2005:** participation to the 72th MPEG Meeting in Busan, Korea
- **July 2005:** organization of a meeting of the MUSICNETWORK MPEG AHG on SMR during the 5th MUSICNETWORK Open Workshop in Vienna (Austria) on "Integration of Music in Multimedia Applications"
- **July 2005:** participation to the 73th MPEG Meeting in Poznań , Poland,

5.1.2.5 Some figures about the activities of the MPEG Ad-hoc group, from 08/2003 to 10/2004

- 625 mails exchanged by about 80 persons very active;
- 127 experts persons registered to the AHG reflector
- about 50% of companies
- 18 Expressions Of Interest (EOIs) have been received
- hundreds of people joining the AHG MPEG meetings

5.1.3 Standards and Libraries Working Groups

5.1.3.1 Summary of the activities performed

Works on integration between Libraries and Standards working groups have been started in December 2003, with the preparation of a workshop held in Munich in March 2004 in parallel with the 68th MPEG meeting. The purpose of the workshop was to try to exchange the point of views from different communities: the MPEG community, and the Librarians community. To this aim, a call for proposals was launched, calling for new experiments and applications in domains related to music description, cataloguing, searching, and exchange of information. At the same time, librarians were invited to present libraries current practices, standards, and needs.

During the workshop, a document was produced in common in order to analyse potential common works of MPEG and Music Libraries experts. Particularly, the document makes a SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis of possible relationships between the Music Libraries world and the MPEG community. The document lists possible future Proposals and Contributions to MPEG-7, and recommends the elaboration of guidelines. The document is available on the MUSICNETWORK web site.

As both communities traditionally are hardly connected to each other so far, even if MPEG-7 claims to be a very broad metadata platform, the task demanded high integration efforts. Here the Working Group design of the MUSICNETWORK has proven to be quite helpful. The workshop succeeded in bringing very different stakeholders together and creating a very productive atmosphere to identify the different approaches and perspectives, as well as showing possible directions for further developments.

5.1.3.2 Brief summary of the SWOT analysis for MPEG-7 and library integration

The following analysis has been done for assessing the impact and rationales to proceed in the direction of stimulating the MUSICNETWORK work into the direction of MPEG7. Most of this work has been done in the Munich meeting and as a consequence of the meeting, in March 2004.

Strenghts

- New possibilities of music representation/description
- Share and build up knowledge about how to develop metadata in an interoperable way

- Interoperability beyond (partners of) a specific project
- Relation to automatic extraction of information/metadata
- Agreements on cataloguing/classification issues (e.g. by profiling -> instrumentation)
- Framework for using and improving standards for applications instead of starting from scratch
- Paves the way for standardized benchmarking for intelligent applications involving multimedia metadata and search/retrieval (better possibilities to compare results)
- Toolbox approach allows for sub-setting of standards for particular applications

Weaknesses

- Missing symbolic representation, or at least missing bi-/multi-directional connection between symbolic representation and realisation (no cross-reference to scores, thus no possibility to connect MPEG-7 metadata to the score)
- Score-based similarity search etc. still more reliable than audio-based similarity search
- Over-/underspecified descriptors (e.g. „author" leaves out most roles of persons involved in the creation of a multi-faceted music object, such as arranger, conductor etc.)
- What's bridging the gap between low-level and high-level descriptors in order to obtain a useable kind of information about music?
- Automated metadata generation will not be able to replace manual cataloguing and classification for quite a while
- Complexity/size of the standard makes validation hard (10000 lines of XML code needed for the validation of 10 lines); need for XML scheme subsets
- IP status of MPEG-7: unclear licensing conditions for the use of MPEG-7 in applications

Opportunities

- New services for end users/library patrons, e.g. browsing through an opera or a music video
- Additional features based on automated classification rather than on manual classification
- Multimedia as a way (e.g. for libraries) to bring heterogeneous formats and kinds of information together (e-learning, publications, ...)
- Accessing fragmentary content: splitting a single item into different chunks e.g. for music analysis
- Description as a proxy of the „original" data (legally easier P2P distribution of metadata instead of the „original" data?)
- MPEG-7 is bound to play a major role in the Semantic Web; use cases should be developed

Threats

- Missing interest from information management technology providers and users to move towards MPEG
- Difficulties in finding the initial user base
- IP problems with (automatically generated) metadata as derivative works

Documents produced:

- Participation to report of the Music Notation AHG activities (MPEG document m10466)
- Workshop report
- Submission of a document to the 68th MPEG meeting, Munich (MPEG document m10568)
- Core Experiments to be held in MPEG (w6454 , WG11 document, approved by MPEG).

5.1.3.3 Joint Libraries / Standards Activities, figures:

- 30 Experts attending the workshop
- 9 presentations made (available on the MUSICNETWORK web site)
- 1 proposal elaborated, accepted by MPEG.

5.1.4 Music Notation and Education Working Groups

The WG on Music notation and that on Music Education have already collaborated since the beginning when the construction of the WG on music education has been set up.
The collaboration has been concretised in the production of content in the deliverables and in the WWW pages. The integration among these two groups is quite natural and supported by the activities on Music Education via Music notation such as on projects like:

- WEDELMUSIC
- IMUTUS and
- MUSCI4ALL that have not reached the funding yet was very positively assessed and evaluated.

On this line in a past open Workshop a collaboration section has been organised in which some products for music education via music notation have been assessed:

- FINALE
- WEDELMUSIC
- Etc.

Further results of such cooperation have been the dissemination activities performed by WG-education in respect of the project in all contexts where WG-education representatives (chair included) have been invited both at national and international level.

5.1.5 Music Accessibility and Education Working Groups

At present WG-education has been contacted by CEN-ISSS-APLR to start with IMS a joint initiative for the possible definition of a new set of metadata for learning objects. The new set of metadata should be focused on accessibility and related issues. Informal request for exchange of contribution has been made. Some results of such cooperation are reflected in the proposed structure for the related metadata and in the related foreseen developments.
Possible further cooperation are under exam in order to launch a joint proposal for further initiatives in the field of accessibility with a specific focus on support tools and technologies (exploiting nowadays state of the art technology developed for other field or purposes).
Invitation to take part to the: Metadata for Accessibility Workshop on the 30th April in Brussels has been received. CEN/ISSS WS/MMI-DC organizes this event in conjunction with CEN/ISSS WS/LT APLR (Accessibility Properties for Learning Resources) project (http://www.cenorm.be/sh/mmi-dc). WG-Education and WG-Accessibility presented a paper to this event even though it was not possible to directly attend.

Through the discussion lists, the accessibility work group has advised on the other groups, ensuring that the specifications and guidelines of the Accessibility WG are incorporated and reused, within the other developing work and standards.

The accessibility WG have also monitored and contributed to the Ad hoc MPEG discussion list (now the SMR ad hoc MPEG list). Specific deliverables of work related to the Accessibility WG are outlined below:

- As a result of the Conference in Madrid (June 2003), Arca and Veia Progetti have started an open discussion list (www.resonare.org). This list exists to discuss the various standards available and in use for Braille music. The list highlights the problems that are inherent to the current use cases and also how the use of Braille music could redefine improvement to the format. The list is moderated by Bettye Krolick and helped promoting the debate held at the International Conference on Braille Music that took place in Zurich, Switzerland, Sept. 23-25, 2004
- As part of ICCHP 2004(7-9 July 2004, Université Pierre et Marie Curie, Paris, France) a STS (Special thematic Session) took place on “making music accessible”(http://projects.fnb.nl/am/sts.html). The Special Thematic Session on Making Music Accessible focus on new approaches to this area, with a particular interest in:
  - initiatives which provide enhanced access to music
  - innovative use of existing and new technologies
  - incorporation of recognised international standards and guidelines

- multimedia music authoring environments
- new distribution channels

5.1.6 Music Accessibility, Notation and Standard Working Groups

The music Accessibility group has produced a glossary on music notation in partial collaboration with the music notation WG, which in the past has also provided a list of symbols and connection with several other glossaries.
Recently the WG on accessibility started a work of revision of the requirements identified in the MPEG activities of WG Notation and WG Standard to verify their suitability for supporting Braille and Spoken Music.

5.1.7 Protection and Distribution Working Groups

The main joint initiatives performed by the two working groups involved in protection and on-line distribution of music resulted in technical documents, surveys and analysis as well as the organisation of workshop, as summarised in the following paragraphs:

- Technical report analysing Apple iTunes Music Store and its success factors. Besides the technical aspects, user and customer aspects as well as content aspects are considered. Furthermore, iTunes Music Store's impact to online music distribution services is analysed and a short outlook to future music online distribution is given. The document is currently available at the MUSICNETWORK document repository at: http://www.interactiveMUSICNETWORK.org/documenti/view_document.php?file_id=430
- Technical report analysing BuyMusic.com on-line music distribution service. The report is available at: http://www.interactiveMUSICNETWORK.org/documenti/view_document.php?file_id=599
- Working draft defining the main evaluation criteria and metrics to compare on-line music distribution services (like Apple iTunes Music Stores and BuyMusic.com) and related enabling technologies. At: http://www.interactiveMUSICNETWORK.org/documenti/view_document.php?file_id=600
- Position paper to be presented at the 3rd MUSICNETWORK Workshop in Munich (13th and 14th March 2004) summarizing the music notation requirements on the digital distribution of content. The motivation is a revision of MPEG-21 according to the needs of music related content distribution. Although MPEG-21 was designed content type independently, a revision is reasonable. We don't not expect to detect any necessity for significant changes of MPEG-21. However, MPEG-21 also contains media related information, e.g. the rights expression languages (REL) and the rights data dictionary (RDD),
- Organisation of a workshop on Protection and distribution and MPEG21, at the 3rd MUSICNETWORK Open Workshop in Munich (13th and 14th March 2004). More information available at: http://www.interactiveMUSICNETWORK.org/events/Third_OpenWorkshop_2004/MUSICNETWORK-OW-March-2004-Description-v1-4-clean.htm.
- Presentations, position papers and materials from the organised events and sessions,
- Contributions to MPEG documents on issues related to distribution and protection of multimedia content.
- Preparation of a scientific paper submitted and accepted at the WEDELMUSIC 2004 International Conference, containing the main results from the "Sheet Music Publisher" Scenario analysis. Michel Girer, Bernhard Günther, Martin Schmucker, Francesco Spadoni, "MPEG-21 and Music Notation Applications", International Conference on Web Delivering of Music Scores, Barcelona (E), September 13-14, 2004. Abstract available at: http://csdl.computer.org/comp/proceedings/wedelmusic/2004/2157/00/21570028abs.htm,
- Analysis of the "Sheet Music Publisher" Scenario, addressing the requirements and needs of a typical player in the distribution value chain: an on-line publisher of sheet music. Requirements are considered for a correct and efficient production, exchange and distribution of sheet music and by products, enforcing IPR and copyrights. Collected requirements and needs are then compared with the developing MPEG21 framework identifying major challenges and critical success factors.

- Definition of Use Cases and Requirements collection for MPEG-21 support to on-line publishing and distribution of IPR-protected sheet music", in collaboration with Michel Girer, Notissimo/Listesso. The results of this activities, and the Requirements in particular, have been appreciated and requested by Leonardo Chiariglione's DMP (Digital Media Project). have been referenced and published at the DMP web site, http://www.dmpf.org/open/dmp0248.zip
- Preparation of a report on Distribution of Coded Music, containing the outcome of different initiatives undertaken and the results achieved by the WG Distribution, in terms of analysis of the market, technologies, products and services, emerging business models, existing problems and potential solutions. The work put good effort in highlighting the importance of the needs of end-users and consumers of music when considering the major problems as well as the new behaviours and possibilities originated by the availability of music in digital format. Available at: http://www.interactivemusicnetwork.org/documenti/view_document.php?file_id=1135,
- The joint effort of the Working Groups Protection and Distribution produced good results in terms of quality and quantity of the activities performed within the Distribution section of the MUSICNETWORK web portal: 120 documents posted on the WG-Distribution document repository, 20 of which downloaded more than 100 times (out of a total 200 documents downloaded more than 100 times for the whole MUSICNETWORK), 3 documents downloaded more than 1000 times (out of a total of 25 documents downloaded more than 1000 times for the entire MUSICNETWORK), 363 posts in 220 threads on the forum (as of March 2005).

5.1.8 Organisation of working sessions for the 3rd Open Workshop

An increased integration activity was performed for the organisation of the sessions on MPEG-21 and MPEG-7 of the 3rd Open Workshop. These sessions were organised by the WG Standards, WG Libraries, WG Protection.

The aim was to have a parallel session with a uniform appearance. Therefore the schedule as well as the speakers were carefully discussed among the participating WG leader and chosen cerafully. Additionally, the participants were interested in the mutual activities which was reflected not only by the WG leader participation in the session of the other WG leaders.

A final brain storming session including all participants and WG leaders and moderated by the WG libraries discussed the strengths, weaknesses, opportunities and threads.

5.1.9 Results of the session on digital content description and protection (3rd Open Workshop)

During the the 3rd MUSICNETWORK Open Workshop, held in Munich from 13th to 14th March 2004, the Working Groups **Distribution**, **Libraries** and **Protection** organised two joint sessions on digital content description and protection.

The aim of the joint sessions was to collect requirements and needs from relevant actors playing different roles in the content distribution value chain, as Librarians and Sheet Music Publishers, to investigate the typical usage scenarios for such organisations and formalise them as UML use cases.
The discussion at the working session was effectively stimulated and enriched by the presence of several MPEG-21 experts and active members, especially from Niels Rump, which also presented early results, current activities and aims of the MPEG-21 framework.

The final objective of the sessions and the subsequent work within the MUSICNETWORK is to derive general requirements to be:

- checked against existing MPEG-21 requirements, and
- proposed as a contribution to MPEG-21 framework activities, if necessary.

As a direct result of such working sessions, 4 of the members of the MUSICNETWORK prepared a research paper titled "MPEG-21 and Music Notation Applications" submitted to the Wedelmusic 2004 Conference.

In addition, work is proceeding on the use case selection and definition to provide contributions to MPEG-21, considering the requirements of publishers as a first step and the use-cases of the libraries subsequently.

5.1.10 Results of 4th Open Workshop

MusicNetwork organised the 4th Open Workshop in Barcelona on 15th and 16th September, closely following the 4th Wedelmusic Conference and colocated with the Ad Hog Group (AHG) meeting on Symbolic Music Representation (SMR) (14-15th September). Both events were kindly and professionally hosted by Universitat Pompeu Fabra.

Presentation of scientific and technological papers and research results, demonstration of applications and technologies in the various fields covered by the MusicNetwork, open discussions about the hot topics of music notation, protection and distribution captured the attention and energy of the many participants during the four days of work.

An eye-glueing session on Performance and Multimedia focused the attention of the audience around two very interesting works:
1. "A Multimedia Application With Interactive Digital Animation For Music Performances", presented by Nuno Correia from Instituto Superior de Tecnologias Avancadas (ISTEC), of Lisbon (P), proposing* an innovative approach for the use of a Multimedia Application with music performances, through the integration of interactive digital animation.
2. "Musical Interaction at a Distance: Distributed Immersive Performance" presented by Carley Tanoue from the University of Southern California Viterbi School of Engineering's Integrated Media Systems Center, Los Angeles, CA, USA. The work** (co-authored by E. Chew, R. Zimmermann, A. A. Sawchuk, C. Kyriakakis, C. Papadopoulos, A.R.J. Francois, G. Kim, A. Rizzo and A. Volk from the same institute) propose a comprehensice framework for the capture, recording and replay of high-resolution video, audio and MIDI streams, in an interactive environment for collaborative music performance, and user-based experiments to determine the effects of latency in aural reponse on performers' satisfaction.

The 4th Open Workshop hosted the EUROPRIX Multimedia Top Talent Award (http://www.europrix.org/), on 15th September 2004. The session presented the winner of the Top Talent Content Fusion Award 04 "Music meets multimedia". He presented his project, the making of and gave an example of one of Europe's best multimedia projects of 2004. The project has been selected by an international expert jury of professionals in multimedia and music, instructors and graduates from higher training institutions out of 400 entries.

The Open Workshop activities dealt with all the several MUSICNETWORK's areas of interest, in an integrated and mixed fashion facilitating discussions and cross-fertilisation. In the following there is a simmary of the workshop sessions organised:

- Tutorial 1: 15th September 2004 (section chair: David Crombie, FNB): The Music Publisher as Multimedia, Content Provider, Davo van Peursen, Muziekgroep Nederland, The aim of this tutorial is to give an overview of new techniques and developments for creating output in various formats and media from the content of a software file.

- Tutorial 2: 16th September 2004 (section chair: Pierfrancesco Bellini, DSI): Tutorial on MPEG4 Systems, Stefano Battista, Bsoft, www.bsoft.info, MPEG4 SYSTEMS: A FRAMEWORK FOR RICH INTERACTIVE MULTIMEDIA. Among the family of standards specified by the MPEG committee, MPEG4 Systems is probably not the most known and deployed. In spite of its apparent complexity, MPEG4 Systems allows new ways of creation and fruition of rich interactive multimedia content.

- Tutorial 3: 16th September 2004 (section chair: Jerome Barthelemy, IRCAM) A tutorial on algebraic-oriented paradigmatic music analysis and composition in OpenMusic visual programming language, Moreno Andreatta, Carlos Agon, Music Representation Team IRCAM Centre Georges Pompidou, Paris, France. In this tutorial we present the main ideas of the algebraic approach in the field of the formalization and computer-aided representation of musical structures.

- Education I: 15th September 2004 (section chair: David Fuschi, ILABS)
  - A case study of networked sound resources for education in traditional music: the HOTBED project, Celia Duffy, Head of Research, Royal Scottish Academy of Music and Drama,
  - MUSICDRAW: to Make Music Learning Attractive, Jacqueline Castaing, University e Paris-Nord, Institut Galile, FRANCE,

- Education II: 16th September 2004 (section chair: David Fuschi, ILABS)
  - e-guitare, instrumental e-learning project, O. SEBASTIEN , N. CONRUYT, IREMIA, Universita de la Reunion, France.
  - The TIME Machine: a Futuristic Approach to Interactive Multimedia Web-based Instruction in Music, Dave Sebald,

- Analysis: 15th September 2004 (section chair: Jerome Barthelemy, IRCAM)
  - Paper Digitization and Analysis, Kia Ng, Di Jin, Rich Sage and Bee Ong, Interdisciplinary Centre for Scientific Research in Music (ICSRiM), University of Leeds, School of Computing and School of Music
  - SCORESIFTER: a tool for the analysis of post-tonal music, Maurizio Gabrieli - Wilma D'Ambrosio.

- Distribution: 16th September 2004 (section chair: Martin Schmucker, FHGIGD)
  - Secure Music Content Standard - Content Protection with CodeMeter, Marcellus Buchheit, Raiger Kagler, VP Research and Development.
  - P2P Multimedia Annotation and browsing based on Semantic Web and MPEG-7: An overview of the DBin Project, Giovanni Tummarello, Christian Morbidoni, Francesco Piazza, Paolo Puliti, Francesco Saletti, Joakim Petersson, Dipartimento di Intelligenza Artificiale, Elettronica e Telecomunicazioni UniversitÃ Politecnica delle Marche, KTH, IMIT Royal Institute of Technology.

- Performance and Multimedia: 16th September 2004 (section chair: Francesco Spadoni, RIGEL)
  - Multimedia Application With Interactive Digital Animation For Music Performances, Nuno Correia, Instituto Superior de Tecnologias Avansadas (ISTEC), PORTUGAL.
  - Musical Interaction at a Distance: Distributed Immersive Performance by E. Chew, R. Zimmermann, A. A. Sawchuk, C. Kyriakakis, C. Papadopoulos, A.R.J. FranÃ§ois, G. Kim, A. Rizzo and A. Volk, from the University of Southern California Viterbi School of Engineering's Integrated Media Systems Center, Los Angeles, CA, USA.

- Presence and Multisensor: 16th September 2004 (section chair, Be Ong, UNIVLEEDS)
  - The general framework for PRESENCE, Alex Bakalokos,
  - MEDIATE: Key Sonic Developments in an Interactive Installation for Children with Autism, Hans Timmermans*, Gerard van Wolferen*, Paul Newland°, Simon Kunath°, *Utrecht School of Music and Technology, Utrecht School of the Arts, °University of Portsmouth,

- Music Notation: 15th September 2004 (section chair, Paolo Nesi, DSI)
  - CapXML - Design Goals, Prof. Dr. Hartmut Ring, Universita Siegen.
  - Combining audio and symbolic representations in OpenMusic visual programming language: a multimedia model of Iannis Xenakisa, Nomos Alpha, Moreno Andreatta, Carlos Agon, Music Representation Team, IRCAM.
  - Challenges and Potentials in Freehand Music Editing Using Pen and Digital Ink, Somnuk Phon-Amnuaisuk,

5.1.11 Results of 5th Open Workshop

The 5th Open Workshop has been organised in Vienna, 4-5 July 2005. The theme of the 5th Open Workshop will be the Integration of Music in Multimedia applications. This event is kindly and professionally hosted by Universität für Musik und darstellende Kunst.

The Workshop is organized around the following sections
- Applications and Technical papers. Chairs: Andrea Khol (MICA), Francesco Spadoni (RIGEL);
- MPEG SMR, Symbolic Music Representation. Chairs: Paolo Nesi (DSI), Giorgio Zoia (EPFL)
- Imaging and Interactivity session. Chairs: Kia Ng (ICSRiM) and David Crombie (FNB)
- Exposition Area, Demonstrations and papers. Chairs: Giuseppe Nicotra (ARCA), Michel Girer (LISTESSO)
- Tutorials/Survey on Music/Multimedia Technologies. Chairs: Jerome Barthelemy (IRCAM), Nicola Mitolo (DSI)
- A Panel / Brainstorming session and feedback collection on experiment description and results in application of e-based learning to cultural heritage and possibly to music / composition related issues will be organized. Chair: David Fuschi (ILABS)

The total number of emails sent with the call for proposal is 18.000. About 70 people will attend the workshop.

Presentation of scientific and technological papers and research results, demonstration of applications and technologies in the various fields covered by the MUSICNETWORK, open discussions about the hot topics of music notation, protection and distribution captured the attention and energy of the many participants during the two days of work.

Working Group Reports 1

WG Music Notation: technical overview (Paolo Nesi, DSI, Italy). This presentation reports the results of the WG examining all aspects of coding music notation, including modern music notation, format conversion, lyric modelling (multilingual aspects), fonts, and defining standards for music symbols

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WG Music in Multimedia Standards: technical overview (Vincent Puig, IRCAM, France). This presentation reports the results of the WG relating to the multimedia standards for music coding, including audio and video coding (mpeg7, mpeg21 etc), portable internet formats, synchronisation, media integration and other standardisation aspects.

WG Music Distribution: technical overview (Francesco Spadoni, RIGEL, Italy). This presentation reports the results of the WG examining all aspects of distribution of coded music including streaming, Internet, distribution models (B2B, B2C, P2P, etc.), mobile systems, WEB-TV, Mobile, and transaction models (on-line, offline, kiosks, virtual shops).

WG Music Protection: technical overview (Martin Schmucker, FHG IGD, Germany). This presentation reports the results of the WG examining all aspects of the protection of coded music, such as encryption, watermark, Digital Rights Management, profiling functionalities, active and passive protection, and other security issues.

Working Group Reports 2

WG Music Imaging: technical overview (Kia Ng, University of Leeds, UK). This presentation reports the results of the WG focused 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 restoration and preservation, and optical music recognition (OMR).

WG Music Accessibility: technical overview (David Crombie, FNB, The Nederlands). This presentation reports the results of the WG examining all aspects of 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.

WG Music Libraries: technical overview (Peter Rantasa, MICA, Austria). This presentation reports the results of the WG examining all aspects of 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 standardisation developments, sharing documents and content.

Application and technical paper 1
- Algorithmic Composition as a tool for understanding musical mechanisms (Maurizio Gabrieli, Conservatory of S. Cecilia in Rome, Italy).
- Reviewing Interactivity Issues in Music Tutoring System (Somnuk Phon-Amnuaisuk, Multimedia University, Malalaysia).
- EXTRACTING QUALITY PARAMETERS FOR COMPRESSED AUDIO USING AUDIO FINGERPRINTS (Peter Jan Doets, Delft University of Technology, The Nederlands)
- Content based Organisation of Digital Audio Collections (Robert Neumayer, Vienna University of Technology Austria).

Application and technical paper 2
- The mSpace classical music explorer – improving access to (classical) music for real people (Monica mc Schraefel, University of Southampton, GB).
- Weighted Scales A High-Level Descriptor in the MPEG-7 Framework (Grégoire Carpentier, IRCAM, France).
- An Advanced System for Content-based Access to Music Information (Frank Kurth, University of Bonn, Germany).

Imaging and Interactivity session 1
- COST287-ConGAS: Gesture Controlled Audio Systems (Nicola Bernardini, Media Innovation Unit - Firenze Tecnologia, Italy).
- Eyes4Ears - More than a Classical Music Retrieval System, Dirk Habich (Dresden University of Technology, Database Technology Group)
- Measuring Non-Spontaneous Interactivity: An Opera-related Case Study (Florian Hammer, Forschungszentrum Telekommunikation Wien, Austria)

Imaging and Interactivity session 2
- Multisensory Interactive Installation (DanielaVoto, University of Florence, Italy)
- Enhancing Electronic Music Tuition Systems with Virtual Reality Tools (Dimitrios Koutsonanos, Informatics and Telematics Institute of Thermi-Thessaloniki, Greece)
- A Report on the User Experiments in the Distributed Immersive Performance (DIP) Project (Elaine Chew, University of Southern California, USA)

MPEG and SMR
- Dynamic and Interactive Visualisations of MPEG Symbolic Music Representation (Tillman Weyde, City University London, GB)

Application and technical paper 3
- The Concept of a Visual Interface for Conducting Humans and Synthesizers (Reinhold Behringer, Rockwell Scientific Company, USA).

Exposition Area, Demonstrations and papers 1
- IMUTUS - Interactive Music Tuition System (Spyros Raptis, ILSP, Greece).

Exposition Area, Demonstrations and papers 2
- Vienna Symphonic Library
- Sheets music: Conditions for downloading (Michel Girer, LISTESSO, France).
- Adaptive Personalisation: A Mulit-Dimensional Approach to Boosting a large scale Mobile Music Portal (Erich Gstrein, ARC Studios Seibersdorf, Austria)
- StreamOnTheFly: a Peer-to-peer Network for Radio Stations and podCasters (Thomas Thurner, Team Teichenberg, Austria)

Tutorials/Survey on Music/Multimedia Technologies

- AN EFFICIENT ALGORITHM FOR MOTIVIC PATTERN EXTRACTION BASED ON A COGNITIVE MODELING (Olivier Lartillot-Nakamura, University of Jyväskylä, Department of Music, Finland)
- Musical Acts and Musical Agents (David Murray-Rust, University of Edinburgh, GB)
- Alternative Distribution Models: Social Distribution Networks (Martin Schmucker, Fraunhofer IGD Darmstadt, Germany)

5.1.12 Summary of Integration

	WG-MN	WG-ML	WG-MMS	WG-DCM	WG-PROT	WG-MPIP	WG-CIMS	WG-EDU
WG-MN								
WG-ML	some							
WG-MMS	X	X						
WG-DCM	some		X					
WG-PROT	some		X	X				
WG-MPIP	X		X					
WG-CIMS	X							
WG-EDU	X					X		

Please note that some partial integration of Music Notation with WGs on Music Library, Protection and Distribution has been naturally performed for the presence of the Coordinator that is also the co-manager of the WG on Music Notation. In fact, in most cases, the deliverables produced by those WGs contains specific sections regarding the Music Notation: tools for managing music notation in libraries, tools and solution for watermarking music scores, tools for protecting music scores and their distribution, etc.

5.2 Unified models

Models that integrate all or the most part of individual WG solutions.
MUSICNETWORK efforts aimed to propose an integrated model that exploit MPEG technologies and standards, it is very important to highlight every requirement regarding MPEG integration in coding music notation, music coding for libraries, multimedia standards for music coding, distribution of coded music, protection of coded music, music coding for print impaired people, coding images of music sheets.

5.2.1 MPEG

The music market is currently characterized by several products presenting some form of integration between music notation and multimedia, especially as far as certain multimedia related application are concerned, for example in the area of music education (where many solutions are presently integrating multimedia as a core part), and music management in library (integrating multimedia for navigation and for synchronisation support). Other relevant and remunerative fields are karaoke (where synchronisation based integration with multimedia content is a must), and SW tool suites for mobiles comprising some form multimedia editing or ring-tone composition support .
The integration of music notation in MPEG can cover the needs of these tools and much more adding: interoperability, porting them on i-TV and on mobiles, supporting scalability of format complexity, etc., permitting to these tools to integrate the powerful MPEG model for the multimedia modelling and play.
The integration of music notation with MPEG will open the way for a large number of new applications and markets, for instance the: multimedia electronic lecterns, music education via i-TV, multimedia content integrated with music notation on piano keyboards, mobiles, PDAs, etc. This action could increase the

present market for music notation that presently is mainly limited to sheet production, and may open the path to create very interesting new applications, renewing present applications that already use some integration between multimedia and music notation.
This AHG has been created by MPEG on the basis of the request of members of the MUSICNETWORK which is a large network in which are present more than 600 participants and more than 300 institutions and companies.
The requirements developed should be taken into account for producing a call for technology for including a Music Notation Model into MPEG, in addition, they could be used for determining the criteria for assessing the proposals, to verify that the potential standard meets the specified requirements, and to specify the conformance point for the standard. If you have tools that use similar technology:

- Music notation format
- music notation decoder (formatter of music notation, piano roll, braille production, etc.)

MUSICNETWORK participants as well as external companies, institutions, organisations and research centers are very interested in working with the AHG in MPEG, in an effort to guarantee that their needs will be included into the MPEG standard, and thus that their tools that will be compliant with the standard. There is also a strong market impact since tools could be integrated in several multimedia applications from I-TV, PDA players, Piano Keyboards, etc., and integrators will have the possibility of selecting among several different standard implementations of Music Notation Decoders, all compliant with the same Music Notation format.

The MUSICNETWORK started an activity on collecting detailed requirements about the music notation and its integration on multimedia. These requirements include: format analysis, and activities for defining the requirements and the functionalities of the new standard.

A contribution of MUSICNETWORK has been produced for MPEG about music notation integration with MPEG. This proposal has produced an AHG (Ad Hoc Group). The AHG of MPEG has been organised in terms of reflector and specific WEB pages, both connected to the MUSICNETWORK. Such activity led us to produce a Draft Call for Proposal for the integration of Symbolic Music Representation (a more general term referring to Music Notation and any further) into the MPEG framework.

- Paolo Nesi, DSI, University of Firenze, Italy, Giorgio Zoia, EPFL, Switzerland, Jerome Barthelemy, IRCAM, France, Pierfrancesco Bellini, DSI, University of Firenze, Italy, David Fuschi, ILABS, GIUNTI, Italy, David Crombie, FNB, The Netherlands, Francesco Spadoni, RIGEL, Italy, Kia Ng, University of Leeds, UK, Martin Schmucker, FHGIGD, Germany; "Proposal for Music Notation Modeling and its Integration within MPEG-4 and MPEG-7", MUSICNETWORK IST Network and related working groups (DSI, IRCAM, EPFL), Throndenheime, Norway, July 2003.
- Paolo Nesi (DSI, University of Firenze), Giorgio Zoia (EPFL), Pierfrancesco Bellini (DSI, University of Firenze), Jerome Barthelemy (IRCAM). "Music Notation Application Requirements and MPEG Technology", AHG on Music Notation Requirements / MUSICNETWORK, Brisbane, Australia, October 2003.
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- Paolo Nesi (DSI, University of Firenze), Pierfrancesco Bellini (DSI, University of Firenze), Giorgio Zoia (EPFL), Jerome Barthelemy (IRCAM), "Music Notation Functionality and Interface to MPEG", AHG on Music Notation Requirements / MUSICNETWORK, Waikoloa, USA, December 2003.
- Giorgio Zoia (EPFL), Paolo Nesi, Pierfrancesco Bellini (DSI, University of Firenze), Jerome Barthelemy (IRCAM), "Application Scenarios for Music Notation integrated in MPEG", AHG on Music Notation Requirements / MUSICNETWORK, December 2003, Waikoloa, Hawaii, USA, (ISO Document as ISO/IEC JTC 1/SC 29/WG 11N6149).

- Paolo Nesi (DSI, University of Firenze), Pierfrancesco Bellini (DSI, University of Firenze), Giorgio Zoia (EPFL), Jerome Barthelemy (IRCAM), "Music Notation Technical Requirements", AHG on Music Notation Requirements, Waikoloa, USA, December 2003.
- Paolo Nesi (DSI, University of Firenze), Pierfrancesco Bellini (DSI, University of Firenze), Giorgio Zoia (EPFL), Jerome Barthelemy (IRCAM), "Music Notation Technical Requirements and Integration in MPEG-4", AHG on Music Notation Requirements / MUSICNETWORK, Munich, Germany, March 2004.
- "Draft Call for Proposals for Symbolic Music Representation", AHG on Music Notation Requirements / MUSICNETWORK, March 2004, Munich, Germany, (ISO Document as ISO/IEC JTC 1/SC 29/WG 11 N6457)
- Giorgio Zoia (EPFL), James Ingram, "A new Application Scenario for Music Notation in MPEG". This document presented the "synthetic opera" application scenario, introducing new requirements in terms of interaction with other media, including visual SNHC, and in terms of content protection (MPEG-4 IPMP/IPMPX). AHG on Music Notation Requirements / MUSICNETWORK, Munich, Germany, March 2004.
- Paolo Nesi (DSI, University of Firenze), Pierfrancesco Bellini (DSI, University of Firenze), Giorgio Zoia (EPFL), Jerome Barthelemy (IRCAM) "Proceedings of AHG on Music Notation Requirements / MUSICNETWORK". This document includes all together most of the contributions by different experts; it includes further examples of music notation related applications and examples of music notation xml formats and tools. Munich, Germany, March 2004.
- James Ingram, "Position Paper about the SMR Draft Call for Proposals", Containing some comments on document M11083 provided by James Ingram. AHG on Symbolic Music Representation, Redmond, Washington state, USA, July 2004,
- Paolo Nesi (DSI, University of Firenze), Pierfrancesco Bellini (DSI, University of Firenze), Jerome Barthelemy (IRCAM), James Ingram, David Crombie, "Draft Evaluation Criteria for Assessing SMR Proposals", AHG on Symbolic Music Representation, Redmond, Washington state, USA, July 2004,
- Paolo Nesi (DSI, University of Firenze), Pierfrancesco Bellini (DSI, University of Firenze), Jerome Barthelemy (IRCAM), James Ingram, David Crombie, Neil McKenzie, "Examples of Matching SMR aspects and available technologies", AHG on Symbolic Music Representation, Redmond, Washington state, USA, July 2004,
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- Michael Good, "Response to Draft Call for Proposals N6457", containing comments on the last version of the Draft Call for Technology on SMR, from Michael Good, Recordare, US; AHG on Symbolic Music Representation, Redmond, Washington state, USA, July 2004,
- David Crombie, Roger Lenoir, Neil McKenzie, "Accessible Information in MPEG", Palma de Mallorca, Spain, October 2004
- Paolo Nesi, Giorgio Zoia, James Ingram, Pierfrancesco Bellini, Jerome Barthelemy, M. Campanai, Kia Ng, Gioseppe Nicotra, David Crombie, "Proposed SMR Evaluation Model and Procedure", AHG on Symbolic Music Representation / MUSICNETWORK, Palma de Mallorca, Spain, October 2004, accessible at: http://www.interactivemusicnetwork.org/mpeg-ahg/Proposed-SMR-Evaluation-Procedure-v1-0.doc
- Jerome Barthelemy, Gregoire Carpentier, "Proposal for a Core Experiment of WeightedScalesDS", Palma de Mallorca, Spain, October 2004.

- Giorgio Zoia, Pierfrancesco Bellini, Paolo Nesi, Jerome Barthelemy, "MPEG-4 and SMR: report on available functionality for graphics", AHG on Symbolic Music Representation / MUSICNETWORK, Palma de Mallorca, Spain, October 2004,
- David Crombie, Roger Lenoir, Neil McKenzie: "Proposed Technology for accessible SMR decoders", Hong Kong, Cina, January 2005.
- Maurizio Campanai, Pierfrancesco Bellini: "WEDELMUSIC as SMR proposal", Hong Kong, Cina, January 2005.
- G. Bertoni: "Proposal for Braille Music Symbolic Representation", Hong Kong, Cina, January 2005.
- Tillmann Weyde, Hartmut Ring: "Proposal for Symbolic Music Representation Format", Hong Kong, Cina, January 2005.
- Hyoung-Joong Kim, Yong-Soo Choi, Yong-Ju Cho: "SMR on the Korean Symbolic Music Representation" , Hong Kong, Cina, January 2005.

5.3 Integration of business services

MUSICNETWORK has so far proved to be a quite unique case and not only in Europe, proposing an integrated and unified model and a language for music notation, together with its related multimedia and protection aspects, while still considering standardisation of solutions and formats.

MUSICNETWORK offers a unique set of services to the community:

- **Innovation and stimulation:**
  - Stimulating new services and multimedia functionalities exploitation;
  - Opening new markets for distribution, e-publishing, advertising, entertainment, ODL, edutainment, infotainment, with mobile and pervasive systems;
  - Suggesting models and formats for interactive multimedia music coding, distribution and protection;
  - Suggesting guidelines for the adoption of present standards in connection with standardisation bodies such as MPEG;
- **Knowledge and information:**
  - Giving a clear view of present market and technology state of the art, best practice and trends;
  - Providing access to a large database of state of the art, requirements, technologies and solutions;
  - Providing information and support on EC activities in multimedia music area;
  - Offering training on the latest technologies, standards and solutions;
- **Visibility and accessibility:**
  - Offering wider visibility for research and technology innovations;
  - Offering free access for everyone to all kinds of information;
  - Creating an environment where partners identification according to skills is viable and simple;
- **Consulting and Standardisation management:**
  - Collecting problems and suggesting solutions for problems concerning multimedia music and innovative technologies;
  - Mediating the work of companies and research centres with the work of standardization bodies;
  - Identification of requirements;
  - Production of call for technologies in the standard bodies.

The above technical objectives are addressed thanks to a set of activities aimed at creating a collaborative environment where content providers and corporate users may access research results and technological solutions so as to make the technology transfer easier, nominally:

- Co-ordinating a set of expert working groups on the most important topics; producing guidelines, state of the art reports… in order to cope with problems met in bringing music coding, distribution and protection into the interactive multimedia age.
- Recently managing an Ad Hoc Group in MPEG on Symbolic Music Representation, SMR, http://www.interactivemusicnetwork.org/mpeg-ahg/ .
- Organizing a set of workshops and conferences, inviting experts and decision makers to highlight and solve technical and business problems.
- Organising workshops open to everybody, often co-located with other conferences[1].
- Maintaining a portal for supporting all the above mentioned services.

Integration of results from the different working groups should provide also a uniform set of concrete products and services that the MUSICNETWORK can offer now and sale in its future to its users and new potential customers.

5.3.1 Products and services

The first problem is the identification of services and products that the MUSICNETWORK could be able to deliver to its participants. In addition, services and products are also related to the business model that we would like to implement.

Contacts and networking

- Creation of a database of contacts and for information service. This is possible exploiting the huge amount of registered people and companies.
- A service can be one to provide the searching engine for experts. It is very hard to find companies interested in paying for that service since Internet can be used for the same purpose for free.

Consultancy

- Presently the MUSICNETWORK does not provide development solutions, we only analyze them and we coordinate the research in the area to cope with them. This is an indirect service for who is presenting us the problems. This is regarded as an obstacle as highlighted by people asking for solutions at the Frankfurter Musikmesse. Concerning the protection issues most of the contacts at the Messe were technical questions to get technical answer. Presently the consortium is not enough reactive to this type of activities and thus seems that the consultancy is not really viable according to the skill and the attitudes of the present partners and people involved. We should try to transform the request in contracts for partners and participants that are involved in the music network and/or for those that have the skill and are in the MUSICNETWORK to look for collaboration. This could have some value.
- consumers are looking for answers and have many questions. But there are many (subscription) models for information provision and if we can convincingly offer interesting content (from whatever perspective, be it research, market info, technical info) then it should be part of the business model.
- “people asking for solutions”, HINT for the content of the MN offer to a large group (tech consumer =66%) of potential customers. That is, one of the most important service can be “providing solutions for the digital music business”, surveying the market and technology offer, evaluating them and selling them, as consultancy, to customers. In this case we should investigate partnerships with the most important technology providers. A careful evaluation of real possibilities is needed of course.
- MUSICNETWORK could still act as a very specialized provider and helping tech consumers to find their way within the currently thousands of different offers and solutions.
- Consultancy for solving a problem, is a service. Partners are very strong in this domain and could provide valuable consultancy to the market sector. Clients may include libraries, relevant education sector. If we will decide in favour of consultancy we have to consider a framework including consulting layer, company law etc to ensure we are protected, e.g. indemnity, which has to be defined in some agreement.

Directories, eMarketplace, information exchange

[1] WEDELMUSIC2003, MPEG meeting March 2004, WEDEMUSIC2004, IAML, IAMIC, etc.

- Exchanging of ideas and collaboration
- Exchanging information:
    - forum,
    - mailing lists,
    - Workshops and meetings
- we have to involve market key actors and convince them that it is worth the effort to share part of their knowledge This is presently working by means of the MUSICNETWORK workshops that permit to collect information coming from institutions and industries.

Information digest (from MUSICNETWORK to customers)

- Information (on latest technologies, research activities, standards, …)
- But: A lot of information is available on the Internet for free (newsgroups, academic and industry websites) so people will hardly pay just for it. Also adding value to information is difficult as value depends on the usage itself.
- People pay for specific, high professional, precise, updated, revised and certified information available in an efficient way (quickly, one-stop-shop). This can be the real value added, something that will make them, as well as other customer groups, wanting to pay for an information service. Boston's MIT provide a information service on new technologies (in general) comprising a periodic "new technologies review" newsletter. We can do something similar (apart from the brand) focusing on the eMusic business. As a second step, we should think if and how MUSICNETWORK can provide such "digest" service. On this basis MUSICNETWORK can produce an "news" magazine/newsletter, rather on hard copies than on email, which will provide the news in eMusic field. A small fee for subscription would be required, with the "collateral" benefit of giving MUSICNETWORK a more formal shape of organization. This magazine/newsletter can include apart from news, several articles and views of experts.
- One problem is the production of content and articles that can be sold, so having interesting and valuable content. This capability is in the hand of the project partners. In this direction, we are trying to realize a couple of books on the aspects of the MUSICNETWORK .
- "Information digest" service should be part of the business model. It can be the first (in time) subscription service for the MUSICNETWORK , since it is the closest to what we are providing at the moment. In addition, such service can be a good vehicle for other services, like "consultancy" or "providing 3rd-party solutions".
- smaller companies are probably interested in a technical survey. But the question is will they find MUSICNETWORK when they are using search engines or links.
- Latest development and research efforts done at universities and research institutions are an appealing topic for companies that are looking for new developments. At the same time for R&D units (especially of universities) it can be interesting to see who is looking for what so we can also think of establishing a sort of "marketplace" where to post announcements of new developments, results.

Dissemination and promotion:

- Via our mailing list of participants
- direct announce of new products to our participants, as a forum
- promotion of products to our workshops and to associations, we should restrict the field: educational, publishers, etc.
- organizing and promoting research and development of the partners and participants at MUSICNETWORK workshops. This offer has a value in terms of visibility for who is buying the service. The registration at the conference have been keep free presently. In the next meeting the registration should become a small fee just to make clear that the service has a price and a costs for the partners and to verify if the attendees are motivated to come.
- Lists of selected (probably those that have received the seal):
    - companies, web pages for advertising, etc..
    - experts, web pages
    - products, web pages, workshops
    - tutorial, web pages, workshops

- success stories, web pages
- reports, web pages, workshops
- etc.

Standards (notation, Web Services, MPEGx, …)

- The MUSICNETWORK can become the reference body for creating and maintaining standards in the area of Computer Music. On this view and line, the WGs on Music Notation and Multimedia Music Standard are joining their effort for creating a standardized version of Music Notation integrated into MPEG. To this end, the first contact with MPEG has been established and a specific AHG has been created. http://www.dsi.unifi.it/~nesi/mpeg/ahg-mn-65-66.html

Publishing and selling of books, guides, surveys

- Reports can be created on demand trying to guess the market and realizing them only if the sold is profitable with respect to their cost:
  - Publication of the index with a summary and a price, index, list of figures, etc., numbers are facts and they are reasons to get the document in most cases. Word based documents are not really valuable for the market since there is a lot of them around the world for free
  - Collections of the orders
  - Verify if the report can be realized in time, otherwise it can be delayed or canceled
  - The document can be committed to experts since the beginning
  - The collection of data is needed
- Reports on hot topics (free of charger or with a price, etc..)
  - Technology review
  - Tutorials
  - State of the art analysis
  - Market analysis
  - Critical Assessment of products, certification of products
- A good starting point e.g. for WG imaging will be selling the collected music sheets as a reference material for OMR software evaluation (if we have the permission of the publishers). This is something which we considered as added-value.
- Possible good examples of documents and books that can be distribution from money can be:
  - Conference proceedings of the conference presently they are free of charge and thus they are freely distributed.
  - Tutorials, MPEG4, Music Notation, archive management for archives, etc.
  - Reports on: OMR, Watermarking, business models, etc.
  - Test cases collections, e.g. test cases for OMR
  - Review material and tools for making it (small market)
  - Report and guidelines on standard music notation, music score digitization, music sheet digitization, etc.
  - On this line, several documents have been produced and distributed for free:
    - Comparison of music notation languages
    - Comparison of CMS for music
    - Comparison of DRM
    - Analysis of I-Tunes
    - Etc.
- Publishing and distributing CD roms with all the collected information, etc. with an internal browser, etc.

The main strength of the MUSICNETWORK with regards to products and services offered can be summarised by the following points:

- being managed by an experienced and differentiated pool of companies and organisations;
- as a consequence of the above point, having a wide and significant core set of skills and competencies in the most different fields related to digital music;
- running a (more or less) collaborative community of skilled people, which can be involved in the value chain at different levels:
  - as potential users to gather feedbacks and reactions to new products and services,

- as sources for market analysis for new products and services,
- as potential suppliers of services themselves (as suggested by Michel in a previous point), as potential customers of services and products sold by or through the MUSICNETWORK

The following table lists potential services and products ordered from the most probable to the less probable and difficult:

MN Services and Products	Description
Information digest (from MN to MN's customers)	News, market announcements, events related to the digital music business, case studies, **technology surveys**. It must be specific, high professional, precise, updated, revised and **certified** information available in an efficient way (quickly, one-stop-shop).
Dissemination and Promotion	To have promotion, dissemination of products, events, activities, solutions, best practices, companies, conference organization, etc.
Publishing and selling of books, guides, surveys	Production and distribution of documents that could be sold on demand or on the summary (and built only if profitable). The production of the document could be even performed by others
Sealing	Analysis of software products and guidelines, or tutorials to assign them a MUSICNETWORK seal.
Directories, eMarketplace, information exchange	A service for third party consultants and technology providers to get to their customers (and viceversa) **more efficiently**, to have **promotion**, **dissemination** and greater **visibility**
Contacts and networking	Offering participants/customers the possibility to gather new contacts and
Standards (notation, Web Services, MPEGx, …)	Participation to various standardisation activities can generate a revenue stream in case of successful adoption. A market to explore is the definition, developement, providing, certification of Web Services standards for the eMusic market
Consultancy	Consultancy on technology and business organisation, provided **directly** from MN members

5.3.2 Customers and competitors

The following table summarises the main customers and competitors for each one of the identified products and services.

MN Services and Products	Possible Business Models	Target customers	Main Competitors	Possible partnerships
Information digest (from MN to MN's customers)	On demand, or Annual fee, or Free of charge (in combination with other pay services)	all (with differentiated content offer)	ScreenDigest and several similar companies that have large and stable contacts with large companies. See pres.net	large companies is needed, but not easy
Dissemination and Promotion	Activity based model, conference registration, promotion campaign	technology providers, product distributors	other product distributor and research institutions	large research institutions and technology providers
Publishing and selling of books, guides, surveys	Royalty based, and/or Annual fee, also on demand	technology consumers, NPO, libraries, publishers, etc.	technology providers that promote their products as the unique absolute solution	ScreenDigest, MIDEM, MILIA, etc.
sealing	Receive an annual subscription to the register and receiving information about the analysis that produce the sealing. Receiving a payment for analyzing a given product. This is weaker.	Industry for computer music software builder.	Magazines and associations. Some ot them perform this kind of activity. For example the music education association TIME assess the educational software for music education.	Possible associations such as IAML, IAMIC, etc. that could delegate MN to become their technical counterpart.
Directories, eMarketplace, information exchange	Annual fee plus a fixed percentage on each successful transaction	Technology providers, consultants and their customers	several portals and the same associations. This could be a service in conflict with the previous	Associations without this service, big groups, large companies, NPO
Contacts and networking	Annual fee, or Free of charge (in combination with other pay services)	all	several institutions and portals, the same Internet	Idealist, EC, Content Village, EMO, several associations
Standards (notation, Web Services, MPEGx, …)	Royalty based, or Annual fee, the support can be included in the registration (following MPEG, creating documents, maintaining the standard, translating doc in sveral languages, etc.)	Mainly technology providers that have to be supported by a standard to increase their distribution, see for instance the Music Notation	MIDI.ORG, MUSICXML, etc.	MIDI.ORG, MUSICXML, MPEG, etc.
Consultancy	On demand, specific contracts, a fixed number of consultancy hours could be included in the industry registration if the fee is reasonable high	Mainly technology consumer, but also technology developer without a research unit. They are mainly SMEs. Also NPO and libraries can be interested.	Some of the partners, several companies, large consultancy with more power of development, etc. We should stay at a different level, as monitoring or supervising.	With associations of category.

5.4 MUSICNETWORK Association

The possible legal forms to be taken are:

- EEIG: European Group of Interest. In this case, each member of the EEIG has unlimited joint and several liability for its debts. This can be avoided with a specific agreement contract to be signed aside the creation of the EEIG.
- ECS: European Cooperative Society. Also in this case, the responsibility for debts can also be engaged even if it can be "Limited".
- EA: European Association. As regards liquidation, insolvency and suspension of payments, the EA is to be subject to the laws of the State in which it has its registered office. In France for example, the liability of members cannot be engaged for debts.

In any case the future organisations should have the:

- Possibility of distributing products
- Possibility of providing Services
- Possibility of organizing conferences, etc.
- Needs of solving the conflict of interest

The statute can fix that the MUSICNETWORK have to be a No Profit Organization, such as other European research and education institutions - even as conference organizers -, standardization bodies etc. In effect, the NPO are the closest organization to the structure and the interest of the MUSICNETWORK.
EEIG seems to be made for economic profit, and are intended to serve the profit of its members, even if the EEIG is not intended to make profit by itself. An extract of the status says:

- "It is not intended that the grouping should make profits for itself. If it does make any profits, they will be apportioned among the members and taxed accordingly. Its activities must be related to the economic activities of its members, but cannot replace them."

Neither European Association nor EEIG are requesting for capital, but a minimum capital will be requested for the future European Cooperative Society (a minimum of 30.000 euros), with possibility of financial responsibility of its members.

After considering the above facts, the legal form chosen for the next MUSICNETWORK Association is an Socially Usefule italian Non-Profit Organization (ONLUS in Italian). ONLUS Associations in Italy have a number of administrative facilities. The legal form is a non profit institution (NPO) which may sale products and services. See for the draft version of the statute in Appendix I.

Like many competing associations and services we should pass from free services to fee-based services with a real business and sustainable model.

5.4.1 MUSICNETWORK Association aims

- Defining every year a renovated annual strategy to decide the specific topics on which the MUSICNETWORK effort has to be focussed for producing/stimulating: reports, conferences, workshops, tutorials, analysis of products, etc. …
- To gain a clear view of market and technology state of the art, best practices and trends
- To access to an invaluable resources of music-related documents and reports on the state of the art, requirements, technologies and solutions for your business
- To acquire visibility for your own research and technological innovations
- To train and keep up-to-date with the latest technologies, standards and solutions
- To identify solutions for your problems concerning multimedia music and innovative technologies
- To provide information and support on European Commission activities in the area of multimedia music
- To co-ordinates expert working groups on the most important topics to overcome problems encountered in bringing music coding, distribution and protection into the interactive multimedia age

- Tp organise workshops and conferences, inviting experts and decision makers to highlight and solve technical and business problems
- To suggest integrated models and formats for interactive multimedia music coding, distribution and protection based on new standard proposals and/or guidelines for the adoption of present standards in association with standards bodies such as MPEG, etc.
- To stimulate the exploitation of new services and multimedia music functionalities
- To open new markets for music interaction and distribution, e-publishing, advertising, entertainment, distance learning, edutainment, infotainment, with mobile and pervasive systems
- To accelerate the digitisation and conversion of archives and digital collections by both removing technical problems and by creating awareness about the capabilities of present technologies and solutions

Qualification levels for the information and people

- **Qualified Experts** validated and selected by other experts and by their curriculum. Experts have to post on the WWW site their activity including at least 10 of their works. Are also experts those that once invited to some Open Workshop have continued to collaborate with the MUSUCNEWORK
- **Qualified Product** companies are those that have been presented at some MUSICNETWORK workshop and that have posted information on the www site or that have been assessed in some review by experts of the MUSICNETWORK.
- **Qualified Tutorials** that have been given to the some open workshop of the MUSICNETWORK.
- **Qualified best practices** that have been presented to the some open workshop of the MUSICNETWORK.
- **Success Stories** that have been presented to the some open workshop of the MUSICNETWORK or that have been experienced by some expert.
- **Qualified Project**, or EC project or national projects, that have been presented to the some open workshop of the MUSICNETWORK.

5.4.2 Services for MUSCINETWORK Members and participants

- Free Access to the MUSICNETWORK data base of reserved documents with search engine, etc., more than 900 documents, mainly in PDF format:
  - Product review
  - Reports on technology comparison
  - Reports on best practices
  - Reports on success stories
  - Etc.
- Free Access to the reserved regular publications on the MUSICNETWORK portal, technical reviews, comparison of technical products, etc.
- Free Posting on the newsletter of your news and information, distributed over 930 registered participants:
  - Free Reception of the newsletter with announces
  - Free Access to the newsletter historical data
- Free Access to the thematic Mailing lists, 10 mailing lists, each of them with at least 700 registered participants with some overlap among each other:
  - Free Access to the mailing lists historical data
- Free Access to qualified information on MPEG SMR
  - insure interoperability of MPEG SMR products through an open standards process with broad industry participation.
  - developing and enhancing MPEG SMR to respond to market needs.
  - Promoting and encourage the use of MPEG SMR technology and products in established and growth markets.
  - protecting MPEG SMR in its use and commerce
- Free help to providing commercial and technical partners
  - Contact analysis
- Free Publication, visible to more than 150000 access per month, of
  - 3 WEB pages for products of each company subscribed,
  - 1 WEB page for each expert subscribed,
  - 1 WEB page for each company subscribed,
- Discount of the

  - 10% for conference access/registration, for the annual and/or 6-monthly conferences and workshops, production of conference proceedings, tutorials, etc.
  - 10% for advertising banner on the first page, free for 100 hours trials.
  - 20% for high cost publications such as tutorials, books, proceedings, etc., all that cost at the general public more than 200 Euro.
  - 20% for a space in the exposition area of MUSICNETWORK events, if any.
  - 20% for hourly cost of high level consultancy
- Privileged access to the collaborative research activities and related results stimulated and performed by the MUSICNETWORK Associated Members.
- If Gold or Platinum annual registration is provided, then it is granted
  - a place in the MUSICNETWORK Board of Directors, MBD, with the possibility of influencing at the directive level the strategies of the MUSICNETWORK Association with voting rights and one place free access to all conferences and MUSICNETWORK events. The annual strategy is defined to decide the specific topics on which the effort has to be focussed for producing/stimulating: reports, conferences, workshops, tutorials, analysis of products, etc.
  - the possibility of publishing every month an article on the MUSCINETWORK web page and newsletter

5.4.3 Sources of revenues

- **Subscription to the MUSICNETWORK Association**, to become a MAM, per one year:
  - Individual: about 50 euro
  - Students: about 30 euro
  - Public institutions, Silver, Gold and Platinum: from 300, 1000 and 3000 Euro
  - Corporate subscriptions have scaled costs according to their size, while the access is granted to their people via a set of access points (login access and email for newsletter mailing) depending on their size.
  - Cumulated costs with 5% of discount for multiple year subscription.
  - Honoured sustainers: 5000 Euro or greater.
- **Sale of Advertising on the portal**
  - a price has to be defined, but could be for example about 30 Euro per each 24 hours and the banner can stay stable on the portal for distinct request and rotate with others banners.
  - A different and more usable solution can be that used by Google. For example, the adoption of a cost per click (performed on the customer banner located on the MUSICNETWORK portal). The customer can arrange for a contract with the MUSICNETWORK starting to bus services for a give amount. The clicking on its banner consume the amount up to zero. The customers are interested in providing an high cost per click so that the banner appears more time, more frequently. A minimum cost could be even of 0.01 Euro.
- **Conference registration** differentiated for: speakers (250 Euro), students (-30%) or attendees (+30-40%), and for regular or associated (discount for associated of about the 20%)
  - Coffee breaks, lunches and proceedings
  - about 50-90 participants
  - 2-3 days, workshops, panel, tutorials, etc.
  - Stand for about 400 Euro
- **Sale of documents and proceedings**
  - about 50 euro per each tutorial
  - about 80 euro for each proceeding copy
- **Hours of consultancy:**
  - Highest level consultancy in the areas related to the WGs
  - about 200 Euro per hour
  - about 150 Euro per hour for MAM

5.4.4 Roles of the MUSICNETWORK Board of Directors

- Definition of the strategy
- to decide the specific topics on which the effort has to be focussed for producing/stimulating: reports, conferences, workshops, tutorials, analysis of products, etc.
- selection and assignment of the qualification
  - the qualification allow the assignment of the consultancies

- assignment to the prices and awards

6 Next Integration activities

The next planned activities of integration, before and after the end of the project, within the MUSICNETWORK Association, are:

- Production of specific guidelines integrating the effort of more WG on the same document,
- Continuing the work started in the MPEG environment
- Continuing to Stimulate the insertion of Industries in the integrated activities
- Refining the assessment of the results of integration reported in this document and preparing the content for the validation phase
- Organising workshops for the MUSICNETWORK about every 6 months, one in the fall and one in the first months of the year. They could be collocated with other events.
- The **5th Open Workshop** of the MUSICNETWORK will be in located in **Vienna**, at **MICA** (Music Information Centre Austria). The dates are from 4th to 6th of July 2005. The theme of the 5th Open Workshop is the **Integration of Music in Multimedia applications**. Currently many new music-related applications are strongly impacting and attracting the market. Most of them will become more and more widespread in a short time due to users' demand. The 5th Open Workshop will be organized around the following sections:
  - **Applications and Technical papers,** chairs: Andrea Khol (MICA, khol@mica.at), Francesco Spadoni (RIGEL, spadoni@rigel.li.it)**:**. The topic of interests for the Application session is wide ranging. For this section, we are going to accept papers and proposals from Experts and from Industries coming from different areas of music for finals user applications and/or innovative technologies. Proposals may be **Industrial presentations of music applications or experts papers.** The session will be focused on current applications, case-studies, applications scenarios, latest development, as well as future directions, innovative technologies. These interdisciplinary domains share one common point the applications of science and technologies in Music or the applications of Music in interactive multimedia domains.
  - **MPEG SMR, Symbolic Music Representation, State of the art report:** Chairs: Paolo Nesi (DSI, nesi@dsi.unifi.it), Giorgio Zoia (EPFL, Giorgio.Zoia@epfl.ch**).** The idea of this section is to provide support to industries and groups that intent to exploit the MPEG SMR Technology http://www.interactivemusicnetwork.org/mpeg-ahg/.
  - **Imaging and Interactivity session**. Chairs: Kia Ng (ICSRiM – University of Leeds, kia@comp.leeds.ac.uk) and David Crombie (FNB, dcrombie@fnb.nl). The main focus of this session is to explore interactive and imaging technologies for music and edutainment. We welcome papers and proposals from researchers, practitioners and industries on all topics related to imaging and interactive multimedia technologies for music, on latest developments, research/commercial applications, case-studies, state of the art surveys, as well as discussions on future directions and ongoing projects.; Music Imaging: optical character recognition for music, optical music recognition, optical document digitisation, restoration, preservation and other optical document imaging techniques and systems that can be applied in the domain of music.
  - **Exposition Area, Demonstrations and papers,** chairs: Giuseppe Nicotra (ARCA, nicotra@dodiesis.com), Michel Girer (LISTESSO, info@listesso.com), For this section, we are going to accept exposition proposals on all the topics of the previous section. Proposals may be related to c**ommercial products or Research Results ready to be exploitable from the industry.**
  - **Tutorials/Survey on Music/Multimedia Technologies,** Jerome Barthelemy (IRCAM, Jerome.Barthelemy@ircam.fr), Nicola Mitolo (DSI, mitolo@dsi.unifi.it)
- Continuing the activity of MUSICNETWORK promotion and dissemination and support towards large institutions and organisation.

- Attracting other IST music related projects to collocate their events to those of the MUSCINETWORK.
- Assessing the possibility of producing a book with integrated content coming from the integrated activities of the WGs
- Analysing to formally support or not activities proposed by other groups: the MUSICNETWORK is still waiting for a formal request with a detailed description of the needed support from the IMS project regarding music notation standardisation in IEEE.

The following table presents a synthetic view of the integration activities performed, in progress as well as planned for after the project end (self-sustaianble MUSICNETWORK ASSOCIATION):

	WG-MN	**WG-ML**	**WG-MMS**	**WG-DCM**	**WG-PROT**	**WG-MPIP**	**WG-CIMS**	**WG-EDU**
WG-MN								
WG-ML	some							
WG-MMS	X	X						
WG-DCM	Reinforce		Reinforce					
WG-PROT	some		Reinforce	X				
WG-MPIP	X	(NEW)	Reinforce					
WG-CIMS	X				(NEW)			
WG-EDU	X	(NEW)				X		

In any case, in longer term (within the end of the project), the idea is to cover all the possibilities of integration by exploiting all the common problems, actors, technologies, guidelines, and models identified in this document. This means that not all the integrations will be covered with the same intensity.

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- DE4.3.1, MMS: multimedia standards for music coding, IRCAM, MUSICNETWORK deliverable,
- DE4.4.1, DCM: distribution of coded music, RIGEL, MUSICNETWORK deliverable,
- DE4.5.1, PROT: protection of coded music, FHGIGD, MUSICNETWORK deliverable,
- DE4.6.1, MPIP: music coding for blind people, FNB, MUSICNETWORK deliverable,
- DE4.7.1, CIMS: coding images of music sheets, UNIVLEEDS, MUSICNETWORK deliverable,
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- DE4.2.2, ML: music representation for libraries, MICA, IRCAM, MUSICNETWORK deliverable,
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7.1 Abbreviations list

Abbreviation	Description
CDN	Content Delivery Network
CM	Content Management
CMS	Content Management Systems
CPRM	Content Protection for Recordable Media
CRM	Customer Relation Management
DAMS	Digital Asset Management System
DRM	Digital Rights Management
DTCP	Digital Transmission Content Protection
ECM	Enterprise Content Management
Finale	A format and tool for music notation editing
ICE	Information & Content Exchange
ICP	Internet Content Provider / Independent Content Provider
iCRT	Intelligent Content Recognition Techniques
IM	Information Management

IMS	Global Learning Consortium (Interoperable Learning Technologies)
LCMS	Learning Content Management Systems
LMS	Learning Management Systems
MEI	Music Encoding Initiative
MIDI	Music Instrument Digital Interface
MML	Music Markup Language
MPEG	Motion Picture Expert Group
NIFF	Notation Interchange File Format
RDD	Rights Data Dictionary
REL	Rights Expression Language
Sibelius	A format and tool for music notation editing
SMDL	Standard Music Description Language
URI	Uniform Resource Identifier
WCM	Web Content Management
WEDELMUSIC	Web Delivering of Music an dits related technology
X-ACT	XML- Active Content Technologies
XML	Extensible Markup Language (data modelling and transfer language).
XrML	Extensible rights Markup Language

7.2 Glossary

CMS (Content Management System)
CMS is a system used to manage the content, allowing the content manager or author to manage the creation, modification, and removal of content from a Web site. Also collaborative development is possible because of version management. During last years, new simple and quick implementations of CMS are emerging, under the common name of Wiki.

LCMS (Learning Content Management System)
LCMS is a system that is used to create, store, assemble, and deliver personalized e-learning content in the form of learning objects. It is a combination of functionalities of a CMS and an LMS.

LMS (Learning Management Systems)
Internet based software that deploys, manages, tracks and reports on interaction between the learner and the content & the learner and the instructor. In particular, learning management systems perform student registration, track learner progress, record test scores, and indicate course completions, and finally allow instructor trainers to assess the performance of their students. US term LMS is equivalent of the UK MLE (Managed Learning Environment)

DRM (Digital Rights Management)
DRM are systems for protecting the IPR of data circulated via the Internet or other digital media by enabling secure distribution and/or disabling unauthorised distribution of the data. Typically, a DRM system protects intellectual property by:

- encrypting the data so that it can only be accessed by authorized users,
- marking the content with a digital watermark or similar method so that the content can not be freely distributed,
- keeping track of the usage of identified content

IMS (Global Lerning Consortium for Interoperable Learning Technologies)
IMS is a global consortium of vendors, institutions, technical developers and others, developing specifications to enable learning technology to be interoperable.

IPR (Intellectual Property Rights)

The set of rights allowing the author or creator of an original work to decide what, where, when and how such work can be used (viewed, distributed, modified, sold, …).

MLE (Managed Learning Environment)
MLE is the whole range of information systems and processes of a college that contribute directly, or indirectly, to learning and the management of that learning. A Managed Learning Environment, therefore, can include Student Record Systems, VLEs, Library Management Systems and other college systems. In the US, the term LMS (Learning Management System) is often used to describe the same type of overall system.

MPEG (Moving Picture Experts Group)
MPEG is a working group of ISO/IEC in charge of the development of standards for coded representation of digital audio and video. Established in 1988, the group has produced MPEG-1, the standard on which such products as Video CD and MP3 are based, MPEG-2, the standard on which such products as Digital Television set top boxes and DVD are based, MPEG-4, the standard for multimedia for the fixed and mobile web and MPEG-7, the standard for description and search of audio and visual content. Work on the new standard MPEG-21 "Multimedia Framework" has started in June 2000 (excerpts from the MPEG Home Page, http://www.chiariglione.org/mpeg/).

REL (Rights Expression Language)
REL is a language for specifying:

- rights for authorised usage of content,
- fees, licences or other considerations required to obtain rights
- types of users qualified to obtain those rights,
- associated information

necessary to enable distribution of content and commercial transactions in content rights.

W3C (World Wide Web Consortium)
W3C is an international consortium of companies involved with the Internet and the Web. The W3C was founded in 1994 by Tim Berners-Lee, the original architect of the World Wide Web. The organization's purpose is to develop open standards so that the Web evolves in a single direction rather than being splintered among competing factions.

XML (eXtensible Markup Language)
A specification developed as a W3C standard to definte the structure of content and data as well as to express the content itself. As it's extensible, XML allows designers to create their own customized tags, enabling the definition, transmission, validation, and interpretation of data between applications and between organizations.

XrML (Extensible Rights Markup Language)
An XML-based REL, developed by ContentGuard, for expressing rights and conditions associated with digital content, Web services, or any digital resource.