The Interactive-Music Network

DE6.1.2
External Assessment and Evaluation Report

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Deliverable Number: DE 6.1.2 Contractual Date of Delivery: M35, June 2005 Actual Date of Delivery: 13/09/2005 Title of Deliverable: External Assessment and Evaluation Report Work-Package contributing to the Deliverable: External Assessment and Evaluation Report Nature of the Deliverable: Public Working Group: ALL Author(s): External evaluators, plus comments of the WG leaders and of the Coordinator (paolo nesi)

Abstract:
This document reports about the external evaluation and assessment done on the basis of the main deliverables of the project and of the main activities. This assessment has been done by external evaluators.

Keyword List:
Music, multimedia, infotainment, edutainment, music notation, standards, music libraries, optical music recognition, music distribution, protection, accessibility, music creation, education, music archives, music publishing, digital rights management, asset management.

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1 Executive summary and report scope

The objective of the document is to contribute to the control of the project evolution and quality, that according to the technical annex have been focused on assessing the work performed up to the May 2005 by the MUSICNETWORK.

The main topics of the assessment have been:

- scientific and technological quality and innovation,
- community added value and contribution to the EU policies,
- contribution to community social objectives,
- economic development and scientific and technological prospects,

The MUSICNETWORK intended to reach these general objectives by offering the following main set of services to the community:

- giving a clear view of market and technology state of the art, best practice and trend
- providing access to a large database of music-related state of the art, requirements, technologies and solutions
- offering clear visibility for your own research and technology innovations
- offering training and updates regarding the latest technologies, standards and solutions
- suggesting solutions for your problems concerning multimedia music and innovative technologies
- providing information and support on European Commission activities in the area of multimedia music
- mediating the work of companies and research centers with that of the standardization bodies.

For professionals in this field the MUSICNETWORK also:

- co-ordinates a set of expert working groups on the most important topics to help overcome problems encountered in bringing *music coding*, distribution and protection into the interactive multimedia age
- organizes workshops and conferences, inviting experts and decision makers to highlight and solve technical and business problems
- suggests 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 connection with standards bodies such as MPEG
- stimulates the exploitation of new services and multimedia music functionalities
- opens new markets for music interaction and distribution, e-publishing, advertising, entertainment, distance learning, edutainment, infotainment, with mobile and pervasive systems
- accelerates the digitization and conversion of archives and digital collections by both removing technical problems and by creating awareness about the capabilities of present technologies and solutions

For each of the first group of points, the reviewers were asked to make an assessment. These reviews are reported in the document in the parts “General evaluations”.

Together with this evaluation, the experts were asked to make general appreciation on the deliverables (planned for the M18 and M34-35) produced by all the WGs, to state the adequacy of the content with the subject, as well as its usefulness. Elements like structure, ambitions, goals, and completeness were proposed as possible discussion points. The experts were also encouraged to make recommendations in order to improve the document in next versions and in general to pass from M18 towards the conclusion of the Project. These detailed and more technical reviews are reported in the document in Section 3, while the documents that have been delivered to them are available on the document list of the single Working Groups on the MUSICNETWORK web site.

2 General evaluations

2.1 MPEG AHG on SMR: mainly WG on Notation and Standard

As a general assessment of the work performed by MUSICNETWORK for integrating Music Notation in the MPEG framework, *Leonardo Chiariglione (Digital Media Strategist and chair of MPEG)* have publicly stated at the MPEG Forum in front of hundreds of experts of the world (in Munich 2004) and reported in an email of appreciation to Nesi and Zoia that

«*The topic of this proposed MPEG work item and the approach followed by the Ad Hoc Group are an excellent demonstration of the synergy that can be created between advanced research topics and standardisation as carried out by MPEG in integrating existing technology with potential industrial impacts. In the case of music notation the added value is in bringing to life application fields where education, culture and entertainment blend.*

Recently the colocated Symbolic Music Representation Ad Hoc Group and MUSICNETWORK meetings resulted in the production of the Draft Call for Proposal on Symbolic Music Representation. The work is being done at a high level of professionalism and great enthusiasm and can sure become a guide for other future topics.

I congratulate on your achievements so far and look forward to seeing your successful reaching of the next milestones."

The MUSICNETWORK thanks a lot to Leonardo Chiariglione about the appreciation for the work performed and states that the synergy that has been established between the MUSICNETWORK people and MPEG is very important for us and that we have found in the MPEG forum a very exciting and excellent environment in which the work of MUSICNETWORK may be rightly exploited to give the real possibility to companies and research centres to join their efforts to enter in the Interactive Multimedia Music Age. We have continued to work in this are obtaining at the end the production of a Call for proposal in the MPEG ISO to include a standardisation process on Symbolic Music Representation. Today, at the end of the 36 months of work the standardisation process has been started and many companies and researchers are working on it. The MUSICNETWORK would say thanks to all experts that have supported this successfully area of work.

2.2 Why do we need "The Interactive-Music Network"?

This document gives a brief personal and general view of the initiatives and work within The Interactive-Music Network.

My primary approach to The Interactive-Music Network consists of 3 areas:

The conferences, the email lists and the documentation and information on the website. .

I have attended several of the conferences that The Interactive-Music Network has been organizing in the recent years. In general the conferences are of high standard, both concerning content and logistics.
The Interactive-Music Network succeeded in presenting some of the most important participants and researchers, in the different fields, and thereby creating the basics for presentations of a high level, a good and rewarding dialogue and interesting new contacts to be made.

The email lists are gradually developing to one of the primary sources of inspiration in every-day life. The level of activity in most lists is high and the discussions go far – from extremely professional debates to quick questions and answers of high quality.

The Interactive-Music Network website contains important information and documentation concerning many topics of relevance for my daily work in the music department of a large research library and for my additional work as a teacher on The Royal Library School. For example I have been very satisfied with the vast amount of information concerning issues of music librarianship both now and in the future. The website itself needs to be improved. A usability test could reveal the most important flaws and add a focus on how the information and documentation is presented for the users.

The importance of initiatives like The Interactive-Music Network cannot be underestimated.
In our day of networking across the world it is of vital importance to all participants in the various parts of the music business to join essential musical "communities of practice". Joint ventures like The Interactive-Music Network thereby secure the fundamental conditions of a dynamic development of both the commercial and research branches of the musical life.

Ole Bisbjerg
Music Librarian / Master of Learning Processes (MLP)
Head of Music Department - State and University Library, Aarhus Denmark.
Head of Danish IAML branch.

2.3 DE 7.3.1 on Interactive-Music Network Exploitation Plan

2.3.1 Revision by Martin Russ, British telecom

Objectives:

scientific and technological quality and innovation	*The analysis seems to be detailed and relevant, with informed inferences being drawn from the charts and tables*
community added value and contribution to the European Union policies	*The apparently large number of users shows value to the community, but some qualification of what the numbers mean (and the target audience size) would be useful: For example: what fraction of the addressable number does 941 (25/05/2005)registered users represent? (Sections 3.6, 9.2)*
contribution to community social objectives,	*The users seem to be consumers rather than contributors. In terms of social activity then an internet-only means of bringing people together might be seen as limiting.*
economic development and scientific and technological prospects	*Scientific and technical progress is clearly shown by the networking and dissemination activities, but the economic value is harder to show: the comment about interest only being in free information is very significant. Sections 10 and 12 also apply.*
giving access to the largest database of music-related state of the art technologies and solutions	*Not sure if this is clearly shown in the document. Section 8 does not mention very much in this area.*
offering clear visibility for participants own research and technology innovations	*There is evidence of this activity.*
offering training and updates regarding the latest technologies, standards and solutions	*Some evidence of this activity.*
suggesting solutions for problems concerning multimedia music and innovative technologies	*SMR fits within this topic area, and shows clear drive and persistence.*
providing information and support on European Commission/FP6 activities in the area of multimedia music	*Evidence of Axmedis, NM2 and other EU project links was not immediately visible.*

Sections 1,2,3,5, and 6 have lots of material, but it might be seen as background, supporting and analytical information for the project so far, rather than a plan for how to exploit the activities of the network. Sections 4, 7, 8… show the activity. It might be useful to start section 4 with an overview of selected highlights (less than 1 page of major activities).

Section 2.3 could be augmented by showing the role that music often plays in the content timeline: something like: 'Music is often a good advance indicator of the rest of digital technology, particularly in terms of the adoption and modes of use of technology. Music is normally five years or more ahead of similar trends in video, for example. Comparisons which illustrate this temporal linkage include: CDs and DVDs; Digital Audio and Digital Video; and finally, MIDI and Flash/SVG etc. In each case the music technology occurred first, and the video technology followed some years later, normally along similar lines of adoption, exploitation and mis-use.'

In section 3, I am not sure that the partitioning of the participants into Management, Technical and Commercial is a valid one, since the set of Commercial people probably encloses the other two sets. I would have suggested the following partition scheme:

- *Commercial Management*
- *Commercial Technical*
- *Non-commercial Technical (students, etc)*

(and hope that this could be corrected in future years).

In section 6, I was unsure as to the exact ordering scheme used for the competitors - what sorting method was used?

Section 7 would benefit from an overview at the start to show the major activities - there is lots of detail, but no clear strategy overview at present.

Overall, this is a comprehensive and detailed report that covers the history of exploitation of the Interactive Music Network. It clearly shows a responsive, pro-active methodology and approach.

Comments from the MUSICNETWOR partners.
Thank to this this comment the exploitation plan has been improved.

2.3.2 Revision by Paul Kafno, Thames Production

Summary
This is a detailed document (deliverable) seeking to establish a route to self-sustainability for the Interactive-Music Network from an EC funded project. The authors have assembled an impressive array of documentation, ranging across statistical analysis of project website usage, analysis of existing/potential user profiles, some metrics of relevant parts of the media business, examination of organisations offering competing services, and descriptions of partner interests/perceptions/conflicts, etc. Authors have also proceeded from use of the SWOT analysis tool to a projection of possible future activities, together with metrics describing the means needed to sustain the business, and tactics to respond to a range of market responses. However, business activities do not seem focused, but spread over a range of possibilities such as standards work, consultancy, sale of specialist documents, accessibility for the handicapped etc. Although this is a very painstaking plan, its length tends to aggregate complexity rather than distil a clear set of decisions and vision for the future. An exploitation plan is a close relative of a business plan, and as such needs to be logical, persuasive and succinct (short). For this reviewer, the lengthy plan here under consideration poses a number of significant questions, and unhappily does not provide an immediately clear route forward to sustainability.

The Plan
The MusicNetwork Consortium ranges across a number of specialist institutions and companies with diverse high level interests in eMusic, such as technology, notation, aggregation and accessibility. Services have been offered in the fields of innovation, knowledge, visibility and access, consulting and standardisation management, and these have clearly found some users during the project - indeed, at certain moments, there appears to have been considerable interest in what is offered. However, I failed to detect any sense of a unified idea, or central Unique Selling Proposition that would motivate and sustain a business, or the kind of missionary enthusiasm that is essential to running a successful media-centred commercial activity today. The metrics relating to media businesses clearly show that there is money to be made, but there are many businesses operating in this area and commercial conditions demand high degrees of definition and application to market need to differentiate them from competitors.

Companies working in the consortium are used to performing high level tasks and appear to feel a little uncomfortable in dealing with the marketplace. In seeking to create a self-sustaining business, they seem naturally drawn to funding sources that would regard their offerings as social goods. In moving into a commercial environment, they will find numerous competitors already seeking to offer similar services. The key is an imaginative grasp of what can be offered, and a vision identifying potential customers and the means of reaching them.

The Commercial Environment
There has never been a time when the media world has been changing so rapidly - where there are so many threats to existing businesses and opportunities for new ones. For example, in television the traditional broadcast model is under assault from diminishing advertising revenues, declining viewership, and demographic shifts. Many of these are due to rapidly evolving technology – broadband internet, PVRs, increasing taste for interactive, games-type experiences. The recorded music industry is already in uncertain territory with piracy fears still alive and some USA business commentators predicting the end of the "paid-for" model. The movie industry has similar fears, fuelled by the possibility of illegal file-sharing on one hand, and huge domestic monitors creating "home" cinemas on the other. With high speed data access packet access of 14MBs soon to be a market reality, it is possible that mobiles will receive data much faster than PCs. However, it is not just technology that has changed. Modern people are behaving in hew ways, their tastes have changed, and their interest in technology is not driven by its scientific ingenuity but its ability to provide and deliver new experience at competitive cost.

For most businesses (including music) all this means uncertainty, and constant looking out for new opportunities. It is no surprise to me when this document reports that the project's most successful download has been on the subject of i-Tunes, or that its most important search category has been in the area of information. Business people

now see technology as a new field of opportunity, but lacking scientific expertise, they need mediators to present its implications simply and clearly.

MusicNetwork partners are clearly most experienced and comfortable in dealing with the funders of "social" goods – agencies like the EC, government, central research bodies. However, to sustain a business of this kind, they need to appeal to a much wider group who they can "lead" into a realisation of available, value-adding services, and with whom they can close sales.

The way forward
My own sense of how MusicNetwork might proceed is to draw on one particular discovery they have made during the project – namely that there is a great hunger for information – and use that to create a business with a web presence appealing to a range of operators in the music business. Such a site could offer-up accessible daily stories based on what is happening in the music world, making links to more specialist articles, educating users and promoting the kind of services on offer. The links would be from general information, to specific information/education, promotion of services.

Negative characteristics of existing website
- *Does not appeal to commercial (business) people*
- *Information and news are the most sought after categories of information*
- *Site does not appear to entice visitors into becoming regular users.*
- *Site is rather technical looking, not likely to appeal to someone looking for business ideas.*

Conclusion.
My impression on reading this plan is of a group of companies trying extremely hard – and a little reluctantly - to persuade themselves that they should go into business. Even the costings reflect a minimalism (just two people to run the business) that is at odds with the kind of expansionist energy needed for this kind of activity. Clearly, there is an enormous resource of specialist knowledge at the consortium's disposal, but very little commercial experience. The consortium needs to find a means of mediating its specialisms to the needs of the marketplace, to help potential customers realise what is on offer. This is highlighted in a statement by MICA.

"The highly theoretical and scientific discourse and outcomes of MUSICNETWORK needs to be translated into practical services and benefits for the potential customers. This can only be solved if this "translation" is done by marketing-savvy people, who are familiar with the needs and problems of their targeted customers and understand the specifics of communications within these different target groups."

The music industry has many needs but here are a few:
- *How to confront illegal file-sharing (tougher encryption/enforcing legal sanctions/adopting new "free" business models.*
- *What are the markets (and practicalities) of high bandwidth broadband to mobiles.*
- *What are the B2B models for the creation and sharing of music in interactive story telling.*
- *Better coding to increase quality, decrease bandwidth.*
- *What are the technical/commercial possibilities for mobile music provision.*
- *Reaching out through new devices to provide services to the handicapped*

MusicNetwork needs to look at the following questions:
- *What is the principle thing they are selling, ie what is their USP?*
- *To whom are they selling - are there enough customers to provide a profitable return or do they need to broaden?*
- *How can they best reach potential customers?*
- *How can they close sales?*
- *How can they differentiate themselves from competitors?*
- *Is the name of the business appropriate to what it is doing?*

PFK 23/06/2005

Comments from the MUSICNETWOR partners.
The comments provided in this case are very interesting and in some measure rights. In some cases, it seems that the experts was looking at the MUSICNETWORK as a tool for supporting the content producers in their work especially in the creative side of process. This new direction of work can be in effect very interesting and unfortunately not considered by the MUSICNETWORK that has been focused only to reducing the gap from industry and technology providers. Thanks again for the many questions and issues identified by PK that really

helped us to improve our work and better focus the exploitation of the MUSCINETWORK job of the last 36 months.

2.4 DE 4.1.1 and DE 4.1.2 on Music Notation Coding

2.4.1 General comments

2.4.1.1 Tim Crawford, City University (London, United Kingdom)

"*This is a long and detailed document presenting the justification for an initiative to propose an international standard for the encoding of music notation in electronic documents. It covers a very wide range of topics within that scheme, and is thus hard to assess as a whole, revealing as it does a situation of great complexity, both in technical content and in the multiplicity of application scenarios*."

Concerning the contribution to the EU objectives,

"*this document:*

- *demonstrates a high degree of scientific and technological quality and innovation, such as would be expected from the team which produced it*
- *significantly adds community value and contributes to European Union policies in very real ways; in one sense music notation is a 'language' that knows no cultural borders and can help to promote international understanding to a profound extent*
- *contributes to community social objectives, in that the main beneficiaries of the technology are likely to be in the education and cultural-heritage sectors*
- *presents some realistic prospects for EU economic development, being uniquely conceived and sited in Europe rather than in the USA, while offering some interesting investment opportunities for specialist companies within the music industry; the scientific and technological prospects are good, given the support of the industry*."

2.4.1.2 Jacques Steyn, Monash University (South Africa)

"*The efforts of the MUSICNETWORK deserves the necessary support and funding to be able to move quickly and produce the intended outcomes to the benefit not only of European communities, but to the world at large.*"

Concerning the contribution to the EU objectives:

1. scientific and technological quality and innovation

The main strong points of the Musicnetwork are its wide scope, covering the entire scope of music, its attempt to integrate music into the other digital media, and to do this within the framework of international standards. Although there may be isolated cases of advanced research on aspects of music, the Musicnetwork is a concerted one. The Musicnetwork thus operates within a framework of scientific and technological quality and innovation.

2. community added value and contribution to the European Union policies and
3. contribution to community social objectives

The outcomes of the work done by the Musicnetwork will have tremendous cultural advantages and thus be of great benefit to not only European communivites, but communities worldwide.

4. economic development and scientific and technological prospects

The novel work done by the Musicnetwork has the potential to put in place innovative and widely applicable technologies. The music industry is both socially and economically a very large one. The outcomes of the efforts of the Musicnetwork will impact on this.

Conclusion
The efforts of the Musicnetwork deserves the necessary support and funding to be able to move quickly and produce the intended outcomes to the benefit not only of European communites, but to the world at large.

In the detailed part reported in the following he provided some recommendations for improving the language, grammar and punctuation of the document. He also proposes to correct some statements for avoiding them from being wrong interpreted by the reader.

2.4.2 Comments from WG leaders

The general comments of the reviewer have been accepted and we share the opinion of the second one about the needs of extending the work at all the world.

The detailed comments and technical notes provided by the reviewers will be helpful in increasing the readability of the document and avoiding misunderstanding. Therefore, these suggestions will be taken into due consideration to improve the quality of the deliverable in next versions.

2.4.3 Detailed evaluation by Tim Crawford, City University (London, United Kingdom)

This is a long and detailed document presenting the justification for an initiative to propose an international standard for the encoding of music notation in electronic documents. It covers a very wide range of topics within that scheme, and is thus hard to assess as a whole, revealing as it does a situation of great complexity, both in technical content and in the multiplicity of application scenarios.

Music notation is a much more difficult area than is generally assumed, even when restricted to basic functionalities such as on-screen editing and printing. It developed over many centuries as a pragmatic solution to the problem of conveying some of the essential ‘semantic content’ of a piece of music by encoding multiple ‘parameters’ of musical elements such as ‘notes’ (parameters would include pitch, duration, volume, articulation, etc.) within a single graphical symbol, which is itself positioned physically in relation to other symbols in a graphical ‘score’. The relation between the positions of any of the symbols itself in general can hold a great deal of information about the semantic content of a score; deciding a hierarchy of significance of meaning for these relationships for a particular use of a score is surprisingly difficult. This process is just one of the important steps that is necessary before a universal music-notation encoding scheme can be proposed.

The shifting contextual nature of the semantic content transmitted to the human expert reader of a score means that attempting to express all the possible uses of a score-notation encoding scheme in the electronic domain is likely to be contentious. For this reason it is important to regard any such document as this one as provisional, and to encourage consultation and comment. The Interactive-Music Network have taken pains to ensure that effort has gone into contacting as many as possible of the important workers in the field of computer-based music notation for their input. They are all busy people, however, and there is some concern that the amount of input from the various parties does to a large extent depend on the time they had available.

For the proposition of an international standard, especially within the MPEG framework, as seems to be the ultimate intention of this document, it is necessary to demonstrate above all that there would be a very significant rate of uptake of the standard on its adoption. This depends crucially on the involvement of ‘industrial’ concerns and a clearly-identified client base. While the document makes reference to a number of scenarios which would implicitly involve the participation of such partners, it is not clear that an overwhelming case for an urgent need for a music-notation encoding scheme of such complexity has been made, when ad hoc solutions could quite readily be devised for such applications using currently-existing standards adapted to the task where necessary. Is it really necessary to have a single, all-embracing standard to cover all possible scenarios of interaction between all conceivable music-notation systems and all other multimedia representation schemes? This seems, frankly, unlikely, however desirable it may seem. While such a standard might theoretically solve many problems, its very complexity may render it useless in practice. Also, the involvement of the music industry is vital to ensure any widespread degree of uptake. Outside certain specialist areas (such as the film industry, or education) it is hard to see where a business case could be made for large-scale investment in music-notation encoding.

There is much of interest in this document, and in general it is extremely well presented. It is not clear what the intended readership is; if it is for the officers of companies in the music industry it is far too complex and detailed; if it is for technical people involved in the development of a formal proposal it is, inevitably, not detailed enough. It might be useful to consider the drafting of a much abridged non-technical ‘long abstract’ which summarises the conclusions and presents a more general case for the adoption of a standard. It would not be necessary to go into detail about graphical aspects of notation, nor the interaction with MPEG4, etc., but could present more ‘real-world’ scenarios where music-notation encoding is the only way to make something happen. At present the ‘political’ case does not really emerge with great strength.

None of the above should be taken to suggest that the writing of this document was not a thoroughly worthwhile exercise. It is extremely timely, with the emergence of the MPEG7 standard for multimedia content description as a

increasingly useful tool and the rapid expansion of digital music libraries as an important domain of the European cultural heritage.

Furthermore, it is evident that this document:

- demonstrates a high degree of scientific and technological quality and innovation, such as would be expected from the team which produced it
- significantly adds community value and contributes to European Union policies in very real ways; in one sense music notation is a 'language' that knows no cultural borders and can help to promote international understanding to a profound extent
- contributes to community social objectives, in that the main beneficiaries of the technology are likely to be in the education and cultural-heritage sectors
- presents some realistic prospects for EU economic development, being uniquely conceived and sited in Europe rather than in the USA, while offering some interesting investment opportunities for specialist companies within the music industry; the scientific and technological prospects are good, given the support of the industry.

However, a lot needs to be done, and it is vital that this project receives adequate continued funding to enable the current document to provide a basis for a full proposal for an international standard for music-notation encoding, even if it is not in precisely the form outlined here.

2.4.4 Detailed evaluation by Jacques Steyn, Monash University (South Africa)

These comments are not detailed, but present a general impression of the document, with specific reference to some issues.

1. Language, grammatical and punctuation
As it stands in its present form, the document definitely requires language editing. There is hardly a page without punctuation and grammatical problems. On the first few pages (4-6) there are 10 such errors.

There are instances where French syntax is followed: e.g. "music sheets", which in English would be "sheet music" (e.g. p8); or English words used in non-conventional manner. E.g. "annotation systems can be enlarged to other kind...." (p22). The more appropriate English word may be "annotation systems can be expanded to other kind...."

There are numerous spelling mistakes, e.g. "apropriate" instead of "appropriate" (p9), "sever" for "server" (p11), etc.

Some technical terms are not explained. E.g. "Piano reduction" (p11).

2. Typology
There is a general problem occurring right through the document with tags that were not processed by the program used. For example, the italics tag shows an i-caret character; and there are uppercase O-umlauts.

Paragraph leading is inconsistent. Most seem to have hard carriage return between them with one line extra whitespace. But there are many soft carriage returns where the new paragraph does not begin after sufficient white space.

3. On the Content

3.1. Domains of Music Notation
These domains are SMDL domains, but it is nowehere stated or acknowledged. There should be a sentence to acknowledge that this is borrowed from SMDL -- perhaps begin the section with (the first sentence): "As suggested by SMDL, music notation mainly comprises of four domains of represenation."

3.2. I do not agree with the description given about XML on p7-8.
My take of the concept of XML and the context within which it developed is as follows:

As far as I understand it, SGML has always marked semantic content, while formating for presentation and style was handled by something else, such as DSSSL.
When HTML, a child of SGML was introduced, it 'wrongly' contained presentation aspects, but this was rectified with HTML 4.0 which distinguishes between document content (or structure) and style (which is handled with

CSS).

XML was develop to "extended" HTML, which has only about 80 elements. It is also a child of SGML, but designed specifically for the networking environment (such as the WWW).

XML is extensible by allowing one to extend the power of semantically marked entities/objects. The appearance of XML documents can also be handled by CSS. Appearance can mean different things. The structural appearance of a document can be manipulated by the DOM; as well as by one of the XML-family, namely XSLT (the T standing for "tree"). The formatting appearance (e.g. colors, fonts, alignment, etc) can be handled by CSS, or by one of the XML-family, namely XSL, in which the formatting (i.e. fo:) part derives from CSS 2.0.

So I would disagree with the statement that "A mark-up language consists of a set constructs ... with the main aim of text visualization." and especially with the statement "The visual aspects are specified by using standard tags which state the typographic features: spacing, font change, etc". This may be true of HTML 3.2, but that was an error - it should never have happened. In the world of SGML the semantic structure of the document are marked by tags, while any appearance aspects must be hanled by some or other style sheet language (DSSSL, JSS, CSS, or whatever).

In terms of SRM, this is important to keep in mind: an XML-based music description language should focus on the semantic structure of music objects and events, and leave appearance issues to some or other style sheet language.

3.3. On 6. Music Notation Models and Languages
In its present form 61. - 6.13 are in random order. Could I suggest either a chronological order, or an alphabetical one?

3.4. On 6.10 MML, Music Markup Language.
Perhaps the first sentence could be extended as follows:
"... events in general, while notation is just a subset."

I do not agree with the interpretation of MML in the last paragraph of the section on p42.
I suspect what the author tried to say was that MML pitch/duration of notes is encoded as XML content, and not encapsulated as specific tagged elements such as <octave>, <pitch>, <duration>, which may be true to some extend. It is true that in its instantiation such content is not tagged. But such content is nevertheless XML content, and semantically marked by preceding statements of octave (in MML parlance "noteset"), the meaning of which cascade down through inheritence to specific instances. In other words, the preceding statements provide the context for the interpretation of specific instances. One disadvantage of this would be that if a fragment is extracted from an MML marked document, the processer will need to fetch the context information and associate it with the fragment.

But all this is still XML.

3.5. On 8.1.3 Logical requirements
The detailed structure is debatable, but I do not want to raise this as an issue.

However, I am of the opinion that although there may be a logical component to aspects such as Horizontal Groups, they belong to Visual Requirements.

If my interpretation of SGML and XML is valid, then all forms of non-semantic presentation should be handled not on the logical level, but on another level. And most of the items in the Horizontal Groups are relevant to visual notation -- they are not audio aspects (although they may be visual clues for audio aspects). To illustrate what I mean, if a slur that may be required by music notation is absent, all other applications (MIDI, synthesizer, etc) can still make proper sense of the music events. To me the logical component should contain the universal aspects.

Having said this, I accept that on the level of analysis, these items can be marked logically. It just seems uneconomical.

2.5 DE 4.2.1 and DE 4.2.2 on Music Representation for Libraries

2.5.1 General comments

2.5.1.1 Matthew J. Dovey, University of Oxford (United Kingdom)

"*The report gives a broad overview of the current state of play for current standards of both practice and technologies in use in music libraries, archives and documentation centres. As such it does not contain any "innovative" work but provides the foundations of any future work, identifying a number of problem areas where future work should be concentrated.*"

Concerning the contribution to the EU objectives:

1. scientific and technological quality and innovation

The report gives a broad overview of the current state of play for current standards of both practice and technologies in use in music libraries, archives and documentation centres. As such it does not contain any "innovative" work but provides the foundations of any future work, identifying a number of problem areas where future work should be concentrated.

2. community added value and contribution to the European Union policies

Any policies relating to music libraries and collections must be rooted in current practice - the report provides an overview of such practices.

3. contribution to community social objectives,

One of the key goals of Music Network is to disseminate and distribute knowledge - the report meets this objective by providing a summary of practices and technologies with a very broad scope.

4. economic development and scientific and technological prospects

The report is primarily a survey of current practice so would form the basis of future prospects. The final section summarises problem areas where additional work is needed, in terms of both technological development and social issues. Economically, the survey identifies areas of cost and also the lack of business models. The report does not identify new funding models or sources of funding, but this is probably out of scope for this particular report, and as noted in the report libraries are typically "not for profit" and this causes tension when they are expected to be self-funding.

Concerning the services offered by Musicnetwork:

1. giving access to the largest database of music-related state of the art technologies and solutions

The report outlines current practice and standards which would form the basis for such a database in terms of technologies appropriate to music libraries. The report does hint that "state of the art" technologies may not be appropriate in music services given the high cost of entry and the disruption of existing practice and skills. The report observes that "reluctant decision [making]" is a more successful strategy

2. offering clear visibility for participants own research and technology innovations

As previously mentioned, the report provides a foundation and context for such activities - in particular indicating existing standards that should be ignored only at peril, possible areas needing activity and highlighting that innovation has to be tempered by applicability, and cost of entry (both financial and social).

3. offering training and updates regarding the latest technologies, standards and solutions

As a summary of the current standards and technologies ini music libraries covering the full breadth of music library activities, the report clearly meets this objective.

4. suggesting solutions for problems concerning multimedia music and innovative technologies

Whilst the report identifies problem areas, it is out of scope for the report to suggest solutions (it suggests areas where others may wish to develop solutions)

5. providing information and support on European Commission/FP6 activities in the area of multimedia music

The report covers a wider bredth than multimedia music, as it covers all activities of music libraries including physical media.

In the detailed part reported in the following he makes some recommendations for changing or adding some statements on specific formats.

2.5.2 Comments from WG leader

The evaluation by Matthew J. Dovey is very instrumental in providing specific comments and complements for the standards, technologies etc. listed in the paper. Together with feedback from other experts, all comments and complements of this evaluation will be taken into account for the next version. Following the comment on 2.3.4, the grouping and inter-relation of the respective sections will be reconsidered as planned according to DE3.0.0/Network Specification (objective O1.1.1+O1.2).

2.5.3 Detailed evaluation by Matthew J. Dovey, University of Oxford (United Kingdom)

Overall this seems a comprehensive piece of work - pulling in a lot of information. My specific comments by identified section are detailed below.

2.2.13 OpenURL

I don't think OpenURL belongs in this section - 2.8 (or possibly 2.7) would be more appropriate. OpenURL is not an identifier per se, but a mechanism for transferring metadata which uniquely identifies the item between systems. An OpenURL would either contain an existing identifier (if one exists for the item) or enough metadata (e.g. author, title, publisher, publication date, edition etc.) to uniquely identify the item. The rationale behind OpenURL is that it could be used by a library system to interrogate local repositories, external journal aggregators,
external content providers etc. to locate a copy of the require item for the user: the library system preferring copies in local repositories to external ones, cheaper ones over more expensive ones etc.

2.2.14 URN/URI

More ellaboration needed - e.g. URI's are mentioned in the title but not in the text. Something like: URI's are used for identifying items on the web/internet. URL's are the most common and are used to identify items
by their location. These are not persistent as an item might move (hence its URL would change) or be replaced (i.e. a different item would be at the same URL). URN's are persistent names for an item - i.e. will always
refer to the same item regardless of its location. Typically a URN resolver would return a URL for a given URN. There are a number of URN schemes e.g. HANDLES (http://www.handle.org) and DOI.

2.3.4 METS

I would argue that this is a catalog format/metadata profile i.e. belongs in section 2.4 (Whilst it also defines cataloguing rules, and METS is primarily the format + rules, as are many of the other formats
in section 2.4).

2.4.1 MARC

Also mention MARC XML (http://www.loc.gov/marc/marcxml.html)?

2.4 - no mention of MODS (http://www.loc.gov/standards/mods/, see also
http://www.jisc.ac.uk/uploaded_documents/tsw_03-06.pdf for a good overview/report)

2.5.2 DDC

Mention OCLC copyright restrictions on the use of DDC? Also mention UDC?

2.6.11 SOAP

I think I would talk of WebServices rather than SOAP alone - since SOAP is just part of the WebService stack. WS-I (http://www.ws-i.org) defines the Web Service Interoperability Profile which specifies SOAP, UDDI and WSDL as the basic technologies. XP was renamed XMLP (XML Protocol) so not to be confused with Windows XP. However, XMLP is now more of an abstract requirements with the XMLP working group concentrating on the

development of SOAP 1.2 (and future versions). An alternative protocol for doing WebService is called REST (http://www.xfront.com/REST-Web-Services.html) - Representational State Transfer [For info: SRW refered to in section 2.7.6.1 has both a SOAP binding called SRW and a REST binding called SRU]

2.6.12 .Net

You mention .Net which is really Microsoft's Enterprise architecture based on WebServices. Therefore you should also mention J2EE which is the Java/Sun equivalent and which is being taken up by a number of software vendors (e.g. Sun, IBM, Borland). Ironically .Net is more "open" in that Microsoft are taking it though the ECMA process for standardisation. I'd probably number these are example frameworks for WebServices i.e. 2.11.1 and 2.11.2 rather than a new entry. Many of the bullet points refer to WebServices (also known as Service Oriented Architectures) in general rather than .Net

2.6 Also mention CORBA as an alternative to SOAP/WebServices (although now out of favour with the advent of WebServices, many of the projects in the 90's used this)

2.7.7 - 2.7.12 - Dublin Core

These are really metadata formats rather than search retrieval. Most of these (Dublin Core, RDF, ONIX, possibly P/Meta) seem more at place in section 2.4 (Metadata). HyTime/SMDL and MPEG seem more at place in sectio9n 2.10 (digitization and coding).

2.7.6.1 SRW

http://www.ceridwen.com/srw/music-contextset.html is a better URL than http://www.ceridwen.com/immpwg for the work on index set and profile for Music Searching. The work of the MLA on metadata formats (and url) might also be referenced in section 4.2.22?

2.7 Reference should be made to Open Archives (http://www.openarchives.org/). Essentially whereas Z39.50 et al are designed for cross searching multiple databases, Open Archives is designed for harvesting the indexes of multiple collections into a single database. An example of it in use in music can be seen at http://digital.library.ucla.edu/sheetmusic/

2.9.2 NCIP

This is really a NISO standardisation intended (in part) to succeed the 3M SIP protocol. It is primarily intended as a circulation protocol rather than an ILL protocol (although there will be a necessary overlap). As such this belongs under section 2.8

2.10 Music XML (www.recordare.com) is absent but important due to its take up by industry.

2.11 doesn't seem to cover any DRM technologies currently under development?

2.12.1 LDAP

Strictly speaking LDAP is for authorisation (identifying what access a person has after the identity of that person has been authenticated) rather than authentication (a pedantic but important distinction). Authorisation protocols include kerberos, NIS etc. As regards single sign on technologies there are commercial offering such as Microsoft Passport, and academic offerings such as the UK ATHENS service (http://www.athens.ac.uk/) which provides a single account which can be used within UK universities for accessing a wide range of licensed materials, e-journals etc. There is a growing interest in the US and UK in Shibboleth as an open standard/framework for doing this (Athens is a proprietary protocol) - see http://shibboleth.internet2.edu/

Section 3

I suspect you should mention MikroMarc (http://www.mikromarc.no/) - small but used by RISM.

Section 4

Also include Cecilia (although this is standardisation for metadata describing music collections rather than items within a music collection - but important) http://www.cecilia-uk.org

2.5.4 Review of The Interactive Music-NETWORK document DE 4.2.2 "Music Representation for Music Libraries" by Dr Tillman Weyde

2.5.4.1 Comments on general aspects of the document

The document DE 4.2.2 of the Interactive Musicnetwork Workgroup on Music Libraries provides a comprehensive overview of music representations and related technologies as they are relevant to music libraries. In the first two and the last chapters, the role and functions of music libraries and their current situation in general are discussed, while in the other chapters provide a directory of technologies.

2.5.4.2 Scientific and technological quality and innovation

The document of the Interactive Musicnetwork Workgroup on Music Libraries provides a high quality survey of the technologies being used in Music Libraries. The character of the document is mainly descriptive. Potential areas of innovation are mentioned briefly in its last chapter.

2.5.4.3 Community added value and contribution to the European Union policies

The document provides a basis for orientation in the complex area of music libraries and archives and as such it is especially valuable to small enterprises and institutions, which do not have the means to compile such surveys themselves, e.g. public libraries.

2.5.4.4 Contribution to community social objectives

In the parts, that evaluate and discuss the current situation, the document reflects mainly the interests and viewpoint of public libraries. As is rightly pointed out in the document, public libraries can play a vital role in bridging the digital divide in Europe and the Musicnetwork Workgroup on digital libraries contributes to this objective. It also contributes to the development of music related technological activities in general by providing valuable information to all players in the market.

2.5.4.5 Economic development and scientific and technological prospects

The economic development of public Music Libraries is covered in the first and last chapter although no not explored in depth. It seems not yet clear how music libraries could define their role in the current situation. It could have been useful to study business models of commercial enterprises that recently provide services similar to music libraries as a comparison to public libraries to better understand to market dynamics and potential opportunities and problems of music libraries, but this kind of survey would have been out of the scope of this document.
The technological prospects are covered form an application perspective, concentrating on developments that are close market release. This is justified as the main problems faced by libraries are not due to a lack of technologies but rather the variety of available technologies and uncertainty about standards and future developments.

2.5.5 Comments on particular MUSICNETWORK objectives

2.5.5.1 Giving access to the largest database of music-related state of the art technologies and solutions

The listing of standards and technologies is comprehensive and therefore valuable to potential commercial and institutional users.

2.5.5.2 Offering clear visibility for participants own research and technology innovations

This document does not seem to intend to particularly promote participant's research or technology, but it mentions projects like WEDELMUSIC giving them proper credit.

2.5.5.3 Offering training and updates regarding the latest technologies, standards and solutions

The document as a result of Musicnetwork Workgroup provides up to date information relevant to music libraries. Special training or information services are not mentioned.

2.5.5.4 Suggesting solutions for problems concerning multimedia music and innovative technologies

The report indicates solutions for problems of music libraries. As it is discussed in the document libraries are currently facing difficult decisions as the economic, social and legal environment is in flux.

2.5.5.5 Providing information and support on European Commission/FP6 activities in the area of multimedia music

Substantial information on EU Music projects involving multimedia and music are provided.

2.5.6 Comments on particular issues

2.5.6.1 Information Retrieval

The review of Music Information Retrieval technologies is very brief, which is surprising given the great importance this topic has for music libraries, at least in the future. This may possibly reflect the state of libraries being detached from technology development and standards and still having to cope with more basic technological challenges.

2.5.6.2 Technologies

Generally, the document provides a comprehensive overview of current technologies in the world of music libraries. The value for the reader is much enhanced by the literature and web references that are provided for most entries of this list, but for some entries like TCP/IP, HTTP, SSL, HTTP-S, SMTP, HTML, SQL links are not provided although readily available. An area that seems relevant but is not comprehensively covered is Digital Rights Management.

The depth of coverage is varies, sometimes more technical detail is provided that seems necessary for the purpose of providing an overview. For many entries I would have to have found more information on its position in the market useful, but this kind of information is not always available and often subjectively biased, which makes the omission justifiable.

In some cases the terminology is not consistent. This seems unavoidable over the whole document, but within articles and between related articles it would provide more clarity. E.g. identifier and identifier scheme should be clearly distinguished.

2.5.6.3 ISBN

The description of ISBN is partly inaccurate, as the terms figure, number and digit are not used consistently.

2.5.6.4 URI/URN/URL

The role of URL and URN in the Internet as it is today is not described clearly. URLs as the by far most used addressing mechanism should be elaborated a little more.
The web-link www.handle.org <http://www.handle.org> should be www.handle.net <http://www.handle.net>.
What is referred to as URN schemes are according to the latest terminology actually URN Namespaces. ‘isbn’ is an important URN-Namespace that should be mentioned.

2.5.6.5 HTTP

I would not agree with the statement that the interactivity of web-sites is mainly hindered by the statelessness of HTTP. Rather, in my view, that is due to by its pull-architecture, HTTP being designed for documents rather than general messages, and the lack of functionality on the client side. Yet, these problems seem largely overcome now.

2.5.6.6 J2EE

It is at least debatable whether .NET is ‘more open’ than J2EE, especially as to my knowledge is it only partly being standardized. J2EE is treated as if it where a copy of .NET, although if at all the opposite is the case, since J2EE is older.

2.5.6.7 SMDL

SMDL has not been adopted by industry nor academia and the standardisation has been stopped.

2.5.6.8 Commercial music vendors

The company Sunhawk should be mentioned along with Musicnotes, Sheetmusicnow and Musicdirect.

2.5.6.9 Problems, Needs and Requirements

This chapter covers very interesting and relevant questions about the challenges currently faced by libraries. I agree with the position that many problems are not technological in nature, but they have technological consequences, like e.g. copyrights and DRM. Research into solutions and the development of new perspectives for libraries are not intended by this document, but many interesting aspects are pointed out.

2.6 DE 4.3.1 and DE 4.3.2 on Multimedia standards for music coding

2.6.1 General comments

2.6.1.1 Giorgio Zoia, EPFL (Switzerland)

Concerning the contribution to the EU objectives, *Giorgio Zoia* notes that:

1. scientific and technological quality and innovation

The document presents a general overview of multimedia formats and standards for music coding. The number and detail of the descriptions is satisfying, the major tools and related information are presented in a concise and precise way; the presentation is informative and neutral. The document can indeed contribute to good information in the domain. Being essentially a report it does not provide innovation, except for the fact that it is rather hard to find extensive overviews of tools and formats like done in this deliverable.

2. community added value and contribution to the European Union policies

The document contains a considerable added value in what concerns clear overview of formats and tools for music coding and descriptions. This is for sure rather valuable for the community overall, since it especially provides informative notes for users and implementers helping the choice of key technologies for their technical and cultural objectives in a better way.

3. economic development and scientific and technological prospects

The document does not allow a direct economic development but can help planning and specifying scientific and technological developments in order to better compare existing solutions to technical and economical requirements. Any party willing to quickly investigate the state of the art in tools for music and multimedia can find some benefit in reading the document in order to better plan more detailed research in the following.

Concerning the services offered by Musicnetwork

1. Giving access to the largest database of music-related state of the art technologies and solutions:

The document contributes in providing an extensive overview of current technologies and solutions by neutral description. In the particular case of music formats and standards it fulfill the objective

2. Offering clear visibility for participants own research and technology innovations

The document seems not intended to disseminate participants own research

3. Offering training and updates regarding the latest technologies, standards and solutions

The documents aims exactly at this purpose and reach a good informative level for standards and solutions. It is rather state of the art and contains useful links and references

4. Suggesting solutions for problems concerning multimedia music and innovative technologies:

The document seems not targeting the suggestion of new solutions, just overview of the state of the art.

5. Providing information and support on European Commission/FP6 activities in the area of multimedia music:

The community can benefit of the document to review the state of the art in multimedia music formats and standard in order to better evaluate candidate technologies and better assess their consistency.

In the detailed part he makes some remarks for refining terminology and description of some formats.

Comments received from Giorgio Zoia for the second version of the deliverable (DE 4.3.2):

Overall the document has much progressed from the version I saw some time ago, this is good !! I still noticed some gap in the updates of some parts (very new, like Longhorn stuff) and some others. I tried then to add some

descriptions at least to the MPEG Audio stuff, as it really was a bit "oldie". I also fixed some things about MIDI and MPEG and proposed some quick corrections in other parts. Some sections are in general much more detailed than others, but this can be understandable in many cases due to different importance.

2.6.1.2 Jaime Delgado, UPF (Barcelone, Spain)

"*Globally, this is a very interesting, useful and ambitious document. Some minor work on presentation, and some extra work on document organisation and decisions on level of detail could improve it very much. The focus should be made clear on music coding, and the way standards and products deal with this concept should be approached in a common way throughout the document*."

He proposes

"*to enhance the parts more relevant for music coding and to leave (or simply enumerate) parts that are marginal from the point of view of music coding*"

In the detailed part reported in the following he proposes some structural improvements.

2.6.2 Comments from WG leader

The evaluation by Giorgio Zoia has made several suggestions for improving the document. Noticeably, he has made suggestions to more clearly make the distinction between formats and file formats. This suggestion will be taken into account in the next version of the document. In the same manner, he made the suggestion to more clearly make the distinction between standards, de facto standards and proprietary formats. Even if that distinction is much more difficult, and if in the document, we have attempted to clearly define the conditions for a standard, particularly in §1.2.2, the distinction will be made clearer in the next version.

The evaluation made by Jaime Delgado made also suggestions of improving the document, and particularly by focusing more the topic on music. It was not clear for Jaime Delgado what was the reason of treating PDF or SVG in that document, and the reason of treating these standards in that document should be explained more in deep in the next version, noticeably with their relationships with Optical Music Recognition, Symbolic Music Representations which are graphics representations, and Distribution needs (use of PDF, for example, for distribution of music sheets). These aspects are also addressed in the WG on Music Imaging.

The evaluation made by the reviewers will be useful for improving next version of the document.

2.6.3 Evaluation by Giorgio Zoia, EPFL (Switzerland)

1. General remarks:

The document presents a general overview of multimedia formats and standards for music coding. The number and detail of the descriptions is satisfying, the major tools and related information are presented in a concise and precise way; the presentation is informative and neutral. The general assessment is then positive and the document can indeed contribute to a good information in the domain.

2. Given the purpose of the document and the good potential it has, in some parts the document is not clear or well structured; the main remarks are the following:

- In the first part of the document the language contains sometimes some mistakes and not precise wording. Some changes are suggested (see attached documents); the situation improves considerably after a few pages.
- There is an actual confusion in naming of things in the community, this document should help to clarify this, instead of supporting the usual confusion. A format is either a standard or a proprietary one; a proprietary format may act as a *de facto* standard, but not for this only becomes a standard in itself.
- A major issue is about sound representation, formats, compression, lossless and lossy. Somewhere the document does not present a clear distinction between formats and file formats. AAC (or mpeg1 layer 3) is a format, a way to represent sound depending or not on a model to interpret it. Wav or aiff (or even mp3) are file formats, they are just ways to embed formats into a file (they could be embedded as well into a stream, then the format would be embedded in a stream format, etc. It is also true that in practice MPEG-1/2 Layer III and mp3 have become synonyms, but in principle mp3 is only the file format, it is not neither a format nor, less than everything, a product or an application). All this could be better reshaped in a more clear structure, distinguishing between formats and file formats. The confusion comes from the fact that PCM is stored in

different file formats, while aac, ac-3 etc. are normally accompanied by their own formats which are unique. Again, this document ma help to clarify this.

    - A related issue is about PCM and lossy/lossless. PCM is a way to represent sound after sampling, it is actually a way of sampling sound, like DTS is in a different way. The fact of being lossy or lossless depends on the format in which it is coded in comparison to the quality of the original source. PCM at 8 kHz and 8-bits/sample is a lossy compression of a normal CD, but indeed it is a compression with high ratio and bad resulting quality. And it is not at all lossless. The concept of lossy-lossless is in comparison to the original source (we could say this is the master of the digital sound).

- In 3D sound there is again a bit of confusion between channel-oriented formats like 5.1 etc. with object-oriented formats like VRML or BIFS. They should be better distinguished, since they are two completely different ways to view 3D sound. One is passive, platform and speaker-configuration dependent. The other allows dynamic interaction at the object level, it is platform and speaker-configuration independent.
- I am not sure if Web3D is a part of W3C, but VRML is a standard of Web3D like X3D; this should be checked for consistency (in any case I am sure VRML and X3D are ISO standards, like MPEG).

2.6.4 Detailed evaluation by Jaime Delgado, UPF (Barcelone, Spain)

1. General Comments

Structure of the document

The document is very ambitious and for this reason it is not fully focussed.
Because the document is dealing with multiple topics, most of them are described in a very general manner, then not giving in some cases useful information (either it is too evident for experts or too short for naïve readers). In some cases, it is not clear why some formats are included (for example, Postscript and PDF, or even SVG).
A solution for this problem could be to enhance the parts more relevant for music coding and to leave (or simply enumerate) parts that are marginal from the point of view of music coding.
Concerning the Multimedia Frameworks in section 5, although it is really difficult to make a classification like that, it seems that different things are being compared. Clearly, the objectives of Flash or Director, as example of specific software products (not initially intended for music coding), are fully different from MPEG or SMIL two open standards, covering many aspects of multimedia.
On the other hand, section 3 on Actors, although short, seems better focussed.
An improvement could be to structure section 5 following what has been done in other sections, as the simple distinction between commercial products and standards on one hand, and the focus on music on the other.

Presentation

Some sections are justified while others are left aligned. A common layout (possibly better if justified) would give a more stable aspect.

2. Detailed Comments

- Section 1.2 is misleading, since the section on requirements (section 2) or that on multimedia frameworks (section 5) are not introduced.
- Last paragraph of section 2.1 is not finished.
- Even though section 2.3 is very useful and interesting, its size, compared with the rest of the document, should be justified. On the other hand, many interesting ideas presented here do not appear again.
- In section 3.2.1, the text on MPEG-21 should be updated (there are many new parts and more parts that are already at the FDIS or IS status).
- Section 4 is introducing audio-related concepts that have been already used in 1.2.3 (such as "lossy" or "lossless" compression). It would be better to introduce them (if really necessary) before they are used.
- Part of section 4.5 on Metadata (exactly 4.5.1 on RDF and 4.5.2 on Dublin Core) does not seem to relate to music coding at all, at least in the way it is written.
- Section 5.1 introduces Flash, which has already been introduced in section 4.4.3.
- The Comparison section on section 5 has no numbering. The word "here" is written as "heree". The table could be improved with some explanations.

- Section 6 is missing some conclusions.
- Section 7.1: 4th paragraph seems to have lost some words after "for which Eolas".
- Some general conclusions could be useful.

3. Summary Report

Globally, this is a very interesting, useful and ambitious document.

Some minor work on presentation, and some extra work on document organisation and decisions on level of detail could improve it very much.

The focus should be made clear on music coding, and the way standards and products deal with this concept should be approached in a common way throughout the document.

2.7 DE 4.4.1 and DE 4.4.2 on Distribution of coded music.

2.7.1 General comments

2.7.1.1 Paul Sire, Sociedad Digital de Autores y Editores (Spain)

"*This is a full and comprehensive survey[…]"*

Concerning the contribution to the EU objectives:

All the subjects mentioned are important and all the objectives are relevant, however, in view of the limited scope of resources, at some point they must be given priorities, i.e. which are the factors that will have the biggest impact on the development of the music industry? Identification of which are the key or critical areas that will influence the economic development in this industry is essential, at some stage of the project as the network must combine achieving this objective with the necessity of involving all the players and issues in the industry as you have corectly done so.

Apart from identifying, or ordering priorities, I would add the following points relating to the general subjects mentioned but which are not, perhaps sufficiently covered.

This industry has developed over many years, influenced by a large number of players which are correctly identified, although I believe that rights collecting societies and cultural government bodies are also players who can have some important influence in some of the objectives of the network, as they can have influence over promotion, legislation, standards, etc. In general they are important for the coordination of European Union Policies in the large collective they work in.

Transaction models are included as one area of work but is really at the heart of the problem. An industry that had very clear business models is finding that all previous assumption on conducting its normal line of business are gradually becoming extinct, whilst, at the same time, many new opportunities are developing. However, many of the players in the industry are purely creative, lacking in many of the basic marketing, administrative or even technical skills required to take advantage of the new opportunities offered and, at the same time, unable to defent themselves from the challenges of a shrinking market in other segments.

This business area of work is, perhaps, insufficiently covered and, although not technical as such is intimately related. This would be a special contribution to community social objectives, as would be all kinds of initiatives that would be especially directed at helping authors and composers who are the weakest link in the industry and have been most affected by the current trend of illegal trading of music.

Apart from the direct help in using the new technologies to open up new market opportunities for the music business, general market trend analysis would be useful especially as trhe digital world is converting the mass market into a mass of niche markets. Also, opportunities for content from economically marginal groups or regions could be promoted with these kinds of economic studies and services.

Scientific and technological quality and innovation: Another critical technological aspect that must be studied in the project is the impact of the mobile revolution and how much content will be influenced by it. A German group

has already produced an LP aimed at being reproduced solely on the mobile. If the mobile becomes the consumer's first choice in how music is listened to, how will this change the whole industry value chain?

Concerning the structure of the document, he states that

"*I am not sure that the complexity of the industry's cross and conflicting interests are put in perspective and mapped clearly, although much of the information is there, the wood is not clearly visible, for the trees.*"

In the detailed part reported in the following he also proposes to further develop some parts of the document.

2.7.1.2 Juergen Nuetzel, Technische Universität (Ilmenau, Germany)

"*The paper is a snapshot of the state-of-art in digital music business technology. It is not fully complete. But I think this is not needed to provide an overview. Beside the not critical incompleteness I found very quickly several mistakes.*"

In the detailed part reported in the following he proposes some improvements concerning the structure and the content of specific parts.

2.7.2 Comments from WG leader

The report deliverable DE4.1.1 is not just a snapshot of technology but also a survey of the current situation of the market, of the main needs of music publishers, distributors, artists, and a collection and analysis of the expectations of end users and customers.
As pointed out from the very beginning of the activities of the WG, and as reported in the reviewed document, the scope of the work is very wide, involving a lot of correlated fields and topics. The main focus of the WG work is on the distribution of music and multimedia content by the Internet, meaning that the Internet is used to perform transactions and/or content delivery. Such a wide scope requires, as correctly found out by the evaluators, a strong effort in structuring and presenting the content of the paper, as well as on prioritizing and refocusing activities as the involved technologies, businesses, behaviors and markets evolve.
Some of the mistakes pointed out are just typos or tiny details which will be corrected starting from the next version, some others are instead different interpretations and views of the reality perfectly reflecting the high dynamics, heterogeneity and conflicting views on the topics addressed, especially concerning the long-lasting issue of protection of artist's intellectual property rights versus granting of usage rights to end-users. The related suggestions will be considered in order to give a wider view of the problems.
In general, most of the suggestions are very useful and helpful to improve the report, and often in line with the work planned for the final version of the report, hence they will be considered carefully for the next updates.
Finally, the WG leader will push and direct the WG work as to address more deeply and intensively some of the areas and aspects considered by peer reviewers as deserving more focus, as for instance the parts addressing emerging business models, market conflicts and politics, and interoperability of technologies.

The project partners agree that an harder work is needed in this area and that has to be integrated with the results of the WG on Protection of Coded Music.

2.7.3 Detailed evaluation by Paul Sire, Sociedad Digital de Autores y Editores (Spain)

This [The Deliverable DE4.4.1] is a full and comprehensive survey but, here are some comments with relation to the clarity of the overall picture:

1. It would be good to understand the extent to which the Digital revolution has hit the industry by making what was previously a series of relatively onerous unproductive tasks something of relative ease. This would help in understanding all the gaps that have been left in the traditional business models:
The digital revolution has facilitated:

a. Copy from disk to disk (carrier to carrier)
b. Music can be recorded digitally.
c. Distribution can be made on the internet or by massive copying of disks .
d. Music can be digitally produced or adapted (usually, a creative task?)

Anyone can now become publisher, distributor and music store (of other people's music) as well as reducing the cost of being a producer, adapter and author of one's (or partially) own music. The separation of the content from

the carrier has severely complicated the business model and the control of IPR implications to the extent that legal music sales have actually fallen, reversing a long growth trail

There are two different approaches to DRM. One protects how music is copied or listened to by using software restricting those tasks (usually through "players" such as Microsoft Media Player). Another model simply identifies, reports and monitors its use by means of fingerprinting, watermarking and monitoring use so to charge the user the corresponding royalties . This model is one which is being pushed jointly by a number of Collecting Societies, developing technology together in the Fast Track consortium for the Digital Management of Rights (DMR). The IPR information being carried by the content itself, as well as the international standardisation of metadata used for documenting all IPR information in general is another critical area of work.

Any type of security can be seen as the alternative between restricting entry, or allowing free entry but then making sure the intruder cannot get away. Both models can be used together or independently.

Another aspect would be portability features. :Current portable devices for listening to music are usually used in conjunction with carriers such as CD- Audio/ Rom, and memory chips which can also be used as a distribution medium of digital music. Here one must also contemplate the possible future use of limitations on the physical durability of the carrier. Furthermore, one must also examine the hardware and software features of all types of musical reproduction and management devices as well as those that also permit copying the content of the carriers. DRM features associated with players must bear in mind the requirements of users in wanting to reproduce music on devices other than those they have been downloaded on.

The large variety of software and hardware devices, players, DRM's and other software involved in the whole musical chain, particularly in the end-user side makes it very difficult to find a business model that will satisfy the needs of consumers, authors, publishers and soft or hardware device manufacturers and the traditional law of the jungle culture in the US dominated industry has left a traditional business model in tatters without giving birth to an accepted alternative, further complicated by the traditionally slow legal response of the lawmakers. A further issue is the difference between Anglo-Saxon and other European legal systems and tax laws which are partly the cause of the current restrictive music distribution policies. All these conflicting interests will make it difficult for a new model to emerge.

I am not sure that the complexity of the industry's cross and conflicting interests are put in perspective and mapped clearly, although much of the information is there, the wood is not clearly visible, for the trees.

2. Furthermore:
Corrections need to be made to the table on page 12 where from FIA to MMF, the collecting society name does not match its initials.

3. Furthermore:
Due to the paper on DRMs we believe information has been globally covered. However, we believe that it should be known that collecting societies are working together, and individually, towards using the digital revolution in favour of the full scope of tasks involved in IPR protection. The whole range of developments go beyond the scope of this paper and even that of DRMs due to the specialised nature of the technical work which is being done to limit piracy (a subject which also requires special analysis) . Authors have probably suffered the most damage from the digital revolution and many of those who were on the fringe have faced extinction, as the weakest link, even though it has brought new opportunities to a few. However, a possible creative deficit is likely to be observed in the future and this would affect the industry.

4. Lastly:
Further analysis of content for mobile phones would be advisable due to its enormous market potential, the challenges in producing such specific content, standardisation between software suppliers and Telecom companies and in how the mobile could become the main portable reproduction tool with its implications for P2P trading and DRM solutions.

2.7.4 Detailed evaluation by Juergen Nuetzel, Technische Universität (Ilmenau , Germany)

1. Scientific and technological quality and innovation

My remarks while reading the report:

The paper is a snapshot of the state-of-art in digital music business technology. It is not fully complete. But I think this is not needed to provide an overview. Beside the not critical incompleteness I found very quickly several mistakes. I think, with more time I will find more mistakes.
Here are some remarks in detail:
The mixture of recorded digital music distribution and digital music score distribution is a little bit confusing.
The capture 3.1.5 about the collecting societies includes some errors (i.e. GEMA in the table) and misinterpretations. A collecting society differs from organisations like the RIAA. Collecting societies are interested in revenues for their members. They are not interested in copyright protection in general.
I think the final end users (the customers) who want to hear the music are much more important, than the authors think. Musicians want to make music. Users want to hear music. I think it is not sure that the "protected way" (in 3.1.6) is the key issue in the digital music market.
The title of 3.1.7 is confusing. I found in the table again a mistake: OMA stands for Open Mobile Alliance. Later in the text it is correct. Table numbers would help. Why is the part for OMA much longer than the text for the other organizations?
What are the criteria for choosing the projects in chapter 3.2? Is this a list of European founded projects? Makes EU founding the projects relevant? Many questions arise.
What is about AES in 3.3? The subtitle of 3.3 "…and workshops" does not fit. I think it is a list of fairs. Workshops and conferences are completely missing.
Chapter 4 is highly informative but it misses an overall structure. I think much information comes from marketing material. Some detailed references would increase the scientific quality. The actual title does not really fits. "Online-Music-Shops in the US" would fit much better.
Chapter 4.1 describes the Apple's iTunes Music Store. But the chapter starts with a general statement. This is again confusing. I found some more strange sentences: "*Mac users seem to be ideal customers for online music distributions. On the contrary, PC users reflect the general population.*" The author does not accept that the Mac users already know the iTunes software. This makes it very easy to sell music via this software. A Mac user is not a different character.
In 4.2 SSL is not an important aspect. Every e-business site uses SSL. The author lists advantages ("*Users have not to pay for shipping.*") and disadvantages ("*Downloaded files are in a compressed format, so music quality cannot be as good as, for example, the traditional CD quality*.") for BuyMusic which are advantages and disadvantages for all online music shops.
In 4.3 I found some marketing phrases like that: "*Music tracks are priced at a flat rate of US $0.99.*" In my opinion pay-per-track is never a flat rate.
In Chapter 5 the authors try do make a big job. But it is not easy to list all "relevant" technologies from the marketing perspective. It would be a little bit easier to list the basic technologies which are independent from specific suppliers. The chapter tries not to bring technologies details.
In chapter 6 the reader has to wait for the future. Chapter 6 makes no big sense in this version.
In chapter 7 the requirements will be discussed. An interoperable and user accepted DRM is needed.
This sentences "*A fundamental feature of a system for the distribution of coded music according to the rights of the owners of the musical contents is the security, that is the capability to protect and avoid unauthorised uses of these contents*." and "… *keep control of the operations performed on the various objects downloaded.*" underlines a big misunderstanding. The traditional German and even international "Urheberrecht (author's law)" tries to balance the interests between the authors (and rights holders) and consumers. It gives not all rights to the authors. The author has not the right to allow and disallow every usage. The focus on the security issue does not reflect this balance of rights. For the most consumers und even for the most artists the full control of the consumers is a horrible scenario. The more control is applied the more consumers leave the (legal) music markets. I miss this discussion in this report. We have to balance the DRM technology.
In 7.2 I see a focus on the lack in new business models. New technologies need new business models. 7.2 is worth for a more intensive discussion.
7.3 is very good and brings to problem to the point.
A word to 7.4: The trial to use watermarks for client-side copy-protection was a big misunderstanding of the possibilities of the watermark technology.
Chapter 7.5 is also worth talking more about.
In 8.1 the B2B chapter is good and important. But P2P is not a business model, it is a communication scheme.
Chapter 8.2 seems to be the main chapter. It is a good description of MPEG-21. The digital item is very important in MPEG-21.
I am missing all the literature references in the text.

2. Community added value and contribution to the European Union policies
3. Contribution to community social objectives,
4. Economic development and scientific and technological prospects

I am not sure what target the report is addressing. The report is helpful for all persons in the digital music business. The scientific quality is not very high.

2.8 DE 4.5.1 and DE 4.5.2 on Protection of coded music

2.8.1 General comments

2.8.1.1 Eckhardt Koch and Niels Thorwirth, MediaSec Technologies

"The document provides the basic knowledge required to understand the fundamentals of Digital Rights Management. The first chapter gives the introduction to the relevance and extent of the subject with basic explanations of IPR and the general requirements of a DRM solution. The subsequent content outlines needs and requirements and is addressed to the various groups of the target audience (i.e. content and right owners, distributors and developers) followed by application level technological overview. The next sections introducing relevant DRM business models and addresses relevant technological matters. The following gives an overview of various content description identification and description standards. A large section thereafter is dedicated to the technological protection approaches of watermarking, encryption and fingerprinting. The final section before outlook and appendix provides a general overview of principle components of DRM systems."

Concerning the contribution to the EU objectives:

1. Scientific and Technological Quality and Innovation
The document provides a high technological quality and accuracy explaining several aspects of DRM applications in a clear yet technical correct and sufficiently exhaustive manner. Technical innovation on the other hand is likely not the main objective for a document that is targeted to explain the basic knowledge required to understand DRM technologies. Innovation in this context can be a novel composition of key factors or adoption to a new market such as the European context. The document brings indeed a unique composition of specific aspects of this subject. The relation to the European perspective is outlined below.

2. Community Added Value and Contribution to the European Union Policies
The impact of a document describing DRM technologies on community added value and contribution to European union policies can be the specific support for European DRM market participants, such as content owners, distributors and artists. Such support enables technological innovations through European collaboration in the creation of general systems created and used by European union participants.
As such the document subject is very well suited to encourage the use of DRM technologies to add value in commercialization of digital music, creating markets for all participants. This added value can range from fostering European technology innovations that find deployment in the market to support of individual artist that find a new stage for distribution and enhanced means of reaching their audience. This document is generally achieving these aims. To fully support the approach the document could provide more specific examples for each of the participants. While the document contains helpful sections tailored to general concerns of content creators, for consumers, and content providers in chapter 2, this approach can be extended by specific solutions and best practice approaches and recommendations. Although certainly it will be difficult to give precise recommendations in particular when taking the rapid development into account, an explanation of the available and required choices, for each participant can be helpful to create the added value of a common European approach. The hesitation to embrace new technology is largely due to a certain fear of making decisions for a specific technology and format as described in the project outline. Specific recommendations can help to accelerate the decision process and the development in the European market, thereby enabling a leading position of the European economy in this sector.

3. Contribution to Community Social Objectives
Taking the background of social objectives, a common approach to support European participant can be seen as a useful objective. To unify the market current standardization activities could be outlined that enable observation and participation of relevant efforts.
The power of DRM can also enable a shortcut for content creator to distribute their material. While the content is well suited to provide an overview and to empower this part of the market to understand the available technologies without a technical prerequisite here also a recommendation derived from best practices and real world examples can help to make a decision.
Besides pure technological decisions, the DRM market also has to take into account regional specifics such as consumer attitude towards usage limitations, privacy concerns and regional differences such as available Internet connections and consumer devises. While the content of the document in suitable for a wide range of regional participants, a highlight of specific companies that are active in the European market could help to make use of this

differences, enabling an approach tailored to the European market and help to profit from the proximity of European companies to regional concerns of technical and business matters alike. Such explanation could additionally outline the social impact with respect to specific properties of the European market in comparison to the US market, which provides many of the innovations and market initiatives in technological sectors and DRM in particular.

4. Economic Development and Scientific and Technological Prospects
In particular for the DRM market that challenges many non-technical participants to make technical decisions required to unleash the potential of digital music distribution the document in important to foster innovation. The content is well suited to introduce decision makers in the context and to enable them to make the required decisions. As mentioned in the project outline, current problems include the fear of content owners and distributors of losing their content or money by selecting non-standard, unstable and unsafe formats. A concrete comparison of current formats and their respective market properties such as:

- *current acceptance,*
- *expected future development,*
- *license fee, and*
- *access to and influence on decisions of future development*

as well as a comparison regarding technical properties such as

- *compression ratio,*
- *music quality,*
- *supported player applications,*
- *protection possibilities and support differentiated by protection technology,*
- *suitability for different end user devices such as PCs, WEB_TV, or mobile devices,*
- *support for different distribution channels and,*
- *conversion technologies*

would be helpful to help overcome this fear and enable decisions for stable technologies. This comparison is provided for protection technologies in chapter 9.3 that is particular useful in this respect.

Concerning the services offered by Musicnetwork:

1. Giving Access to the Largest Database of Music-Related State of the Art Technologies and Solutions
Not applicable.

2. Offering Clear Visibility for Participants own Research and Technology Innovations
Not applicable.

3. Offering Training and Updates Regarding the Latest Technologies, Standards and Solutions
The document provides an exhaustive review of existing technologies and applications. It also includes an outlook on some possible developments. This aspect is of particular importance, since much of the confusion comes from constant innovation that is changing the market space, customer behavior and market potential. With the outlook in mind that the document is subject to a regular and ongoing review, it can significantly increase it potential by adding current changes and activities as outlined in detail in the previous review.

4. Suggesting Solutions for Problems Concerning Multimedia Music and Innovative Technologies
The subject of DRM is a major concept for solutions to problems concerning music storage and distribution as well as innovative technologies. This document provides a good overview of these solution approaches and explains these to a level that they can be understood by a technical layman. In this respect it is an essential part of the musicnetwork initiative.

5. Providing Information and Support on European Commission/FP6
Not applicable.

Concerning the usefullness of the document, they note that

"*The document is very comprehensive and a valuable information for the targeted audience. It embraces almost all of the relevant issues involved in DRM and starts at an introduction level that will help to include readers that are less experienced in this domain to understand the relevant problems and tradeoffs. The DRM scene is observed from various angles and therefore useful for different audiences with an interest in DRM. The extensive list of references gives an excellent base for further information on the detailed subjects. The content is generally suited to support individuals and organizations in selecting or developing suitable technology for their specific requirements regarding protection of digital music and can indeed provide a contribution to the development of the European DRM market, if the distribution of this information is reaching the relevant decision makers.*"

Some corrections and additions are also proposed.

2.8.1.2 Andreas Kornstadt, it-wps (Hamburg, Germany)

"*Due to my outstanding position I can only conclude in a limited way. Thus I didn't compile a typical review document but summarized some points only in a list of issues which I consider as interesting and "bulky" including some ideas, which I think will further improve the document.*"

In the detailed part reported in the following few other corrections/additions are also suggested.

2.8.1.3 Martin Steinebach, Fraunhofer IPSI.

The document provides a rather complete overview on the area of DRM, its implications and many topics involved with it. It can function as a sort of map where interested readers can find other activities and documents which may provide a more detailed answer to their individual problems. In some cases the level of detail is too low to provide an insight into the topics which may lead to the confusion of the reader, so concentrating on a smaller number of issues could have been beneficial.

2.8.2 Comments from WG leader

The extensive evaluation by E. Koch and N. Thorwirth provides valuable hints in increasing the quality of this deliverable. The comments will be either integrated directly into or issues raised will be discussed in the next version of this deliverable.
In addition to the review received from MediaSec, which is well known in the field of DRM, the review received from a user will also be integrated in the new version resulting in a slightly modified structure of this deliverable to increase the readability for users.

2.8.3 Detailed evaluation by Eckhardt Koch and Niels Thorwirth, MediaSec Technologies (Essen, Germany)

1. Document Overview

The document provides the basic knowledge required to understand the fundamentals of Digital Rights Management. The first chapter gives the introduction to the relevance and extent of the subject with basic explanations of IPR and the general requirements of a DRM solution.
The subsequent content outlines needs and requirements and is addressed to the various groups of the target audience (i.e. content and right owners, distributors and developers) followed by application level technological overview. The next sections introducing relevant DRM business models and addresses relevant technological matters. The following gives an overview of various content description identification and description standards. A large section thereafter is dedicated to the technological protection approaches of watermarking, encryption and fingerprinting. The final section before outlook and appendix provides a general overview of principle components of DRM systems.

2. Comments by Chapter

Chapter 1: Introduction
The introduction provides a good overview, mentioning organizations and technologies.

Chapter 1: Introduction and Intellectual Property Rights
This section is well suited to give an overview of the involved components. The definition of rights management terminology might be reserved for a glossary while the definition of participants and their respective situation and needs could be more elaborated to provide orientation for different user groups, while giving an introduction to chapter 2.

The section regarding the introduction to technology could provide a more complete view of technology development and arising threat from LP's, tapes to CD's CDROMs and than file swapping, while reserving the details of files swapping and impact on the law suits for a later, separate in depth chapter.

Pg. 5: "*Rosenblatt et al. calls rights management systems existing before DRM "old rights management" (ORM), which mainly consists of different organizations that came into existence as an reaction of new technological menaces.*"
The use of the expression *new technologies is* somewhat misleading. The ORM organizations listed in [Rosenblatt2002] have been founded before the advent of the Internet, in the 40s, 50s, and 60s. Though partly as a reaction to technological developments, these menaces are not new from today's perspective.

Pg. 6:*"Although copyright defines under which circumstances copying is legal and when copying is illegal, copyright infringements are ubiquitous and most people infringing IPRs are aware of their malpractice.*"
As the rights a ubiquitous many users might not be aware of infringements of copyrights and education. To change this, is likely one of the aims of the MPAA campaign mentioned subsequently in the document.

Pg. 8: *"Rights can be negotiated either with the rights owner or with collection societies. Here a new level of complexity is introduced through technical developments."* This additional level is not necessarily introduced by recent technical development. E.g. a publisher, author relationship existed before digital technologies and DRM. If this refers to other specific developments, this should be specified.

Chapter 1.1.2 Music Copyright: This chapter can be completed by a more exhaustive argument why music copyright is different from other copyrights that can equally restrict others from using the copyrighted material. The chapter introduces a distinction between different kinds of copyright in the last sentence. A differentiation by name might be appropriate.

Chapter 1.3 Publishing rights and licensing: As mentioned in the introduction, security is not a focus of the document, yet an important issue. The document is treating security in the technology section and it should be. This could also be reflected in the introduction.

Chapter 2: Needs and Requirements
This chapter together with chapter 10 is the most important sections for all non-technical parties involved in DRM. The list of relevant subjects and questions is complete and accurate some of the relevant questions that are raised could be elaborated in more detail.

The document is targeted to different groups with different background and interests. They share the interest in the document content but a more specific elaboration on their needs could be helpful. This is done for content providers in chapter 2.3. Chapter 2.1 and 2.2 could equally address the individual issues of the groups addressed there in more detail.

Chapter 3. Technological Overview
Provides good top-level overview without prerequisite of technical in depth knowledge. Could be closer located to the more detailed elaboration in the bottom or provide links to this section in order to establish the connection between these two sections.

Chapter 4. Different Business Models and Possible Technological Support
This chapter is a helpful and complete overview of business models that is very helpful to the target audience.

Chapter 5. Content Identification, Content Description, and Content Management

Chapter 5.1 and 5.2: Very exhaustive list of possible identifiers that could be distilled to the most relevant ones. E.g. the connection to music and DRM needs to be outlined more clearly or the ISBN could be omitted from this list. Specific formats such as Mpeg-4 and Mpeg-7 could be placed in a separate section on encoding and compression formats if this is perceived to be within the scope of this document.

Chapter 6. Rights Management: Important section on rights description standards and languages. Since this is the major topic of this section the title *Rights description languages* could be used for this section.

Chapter 7. Encryption
This section gives relevant information on this important technology component. Some of the details on comparison of different encryption schemes could be omitted and left to further reading from the referenced material.
The expression: "the only possible protection mechanism is encryption." Should be completed by the limitation to confidentiality, in order to differentiate against protection against authenticity, security of communication, copyright protection etc.

Chapter 8. Watermarking
Explains the principle of watermarking and could refer in more detail on the fact that the content is actually modified while the aim is to introduce the most robust imperceptible information. While the current information is perfectly accurate, this additional information might help the laymen to grasp the principle even better.
The statement: *"As perceptible watermarking techniques influence the quality as well as they have limited robustness we will limit this discussion on imperceptible watermarking techniques"*. Should be limited to the visibility factor, since imperceptible watermarking techniques also have limited robustness.

Chapter 9. Fingerprinting
In the context of watermarking Fingerprinting is often used as a means of transaction tracking while the content is marked with a unique number identifying the recipient. Here, it refers to the practice of extracting inherent feature vectors that uniquely identify the content. The term fingerprinting should not be used or defined in the introduction in order to prevent confusion between these fundamentally different concepts.

Chapter 10. DRM Technologies
This chapter provides a very good high-level description of problems for involved parties and the compromises and limitations of technology.

Chapter 10.1: In connection with the trusted computing approach, the fact that Microsoft is planning to integrate this approach in their next OS release, currently called Longhorn, deserves a mentioning to indicate the power of this trend.

Chapter 11. Outlook
The future scenarios are a very helpful resource for the reader to observe future trends and to be prepared for possible future developments. The discussion might be expanded to the possible development of technologies (see comments in section: **Errore. L'origine riferimento non è stata trovata.** below).

Appendix
A glossary could help to allow a non-experts reading all sections of the document without the necessity to explain all terms within the text.

Appendix 2,Vendor list: Addition to entry MediaSec Technologies:

MediaSec Technologies	• Germany • USA	mediasec.com	• MediaSign Digital™ Authentication/ Authenticity • MediaSign Print ™ Printed documents • MediaBrand Brand protection solutions	Content and multimedia security using digital watermarking, digital labeling, self-authentication, and smart encryption technologies	• Image • Video	Yes	Yes	

3. Usefulness

The document is very comprehensive and a valuable information for the targeted audience. It embraces almost all of the relevant issues involved in DRM and starts at an introduction level that will help to include readers that are less experienced in this domain to understand the relevant problems and tradeoffs. The DRM scene is observed from various angles and therefore useful for different audiences with an interest in DRM. The extensive list of references gives an excellent base for further information on the detailed subjects. The content is generally suited to support individuals and organizations in selecting or developing suitable technology for their specific requirements regarding protection of digital music and can indeed provide a contribution to the development of the European DRM market, if the distribution of this information is reaching the relevant decision makers.

4. Structure

The introduction provides a good overview and touches several very relevant points. A few references to later parts of the document could be helpful for the reader to skip to these subjects.

The introduction combines business models and the technology overview in chapter 1.3. The business models could be considered distinct enough to have a separate sub-chapter, naturally between scenarios and technology.

This text is including a broad range of DRM issues. It is discussing technical as well as business and legal subjects. Though the current structure provides an approach from overview to specifics on the technical subjects, it might be desirable to group the technological issues closer together.

Depending on the envisioned scope, latest technology development and distribution might be included with a dedicated chapter (see **Errore. L'origine riferimento non è stata trovata.** below).

5. Suggested Additions

Despite its briefness the document achieves an admirable exhaustiveness for the main topics. The following possible additions are suggested:

Depending on the live span and future maintenance of the document, the recent development in the music distribution should be of greatest interest to the envisioned audience, despite that fact that this information might be out-dated soon.
P2P file swapping is a major concern and threat to the music industry, with as one billion shared files every month (according to Eric Garland, CEO of Big Champagne). The P2P technology is constantly evolving, providing new challenges for the music industry. The countermeasures include disturbance, by introducing wrong and manipulated files (a popular example set by Madonna) and legal measures. P2P technology is keeping up with constant innovations such as improved privacy that can prevent identifying and suing single users. However, P2P also provides opportunities as popular music artist like George Michael embrace this technology as an exclusive distribution channel and companies like BigChampagne use P2P traffic to monitor consumer interest and derive information highly desired by the music industry.
See BitTorrent, Kazaa, Gnutella, and http://www.bigchampagne.com/

The analogue hole might deserve an explicit mentioning as an example that the distribution will never be perfectly secure, although technologies like BlackNoise claim to overcome this problem.

Another valuable addition might be a more elaborate and separate discussion on the conflicts between secure technologies and user experience and respectively ease of use (touched throughout chapter 10), citing examples on Macromedia's copy protection scheme, and Sony's proprietary format. The technology description could refer to the specific advantages and disadvantages related to DRM in a subsection for each technology (e.g. disruptiveness, user acceptance, degree of protection, known attacks, current popularity within DRM systems and future trends). This characterization and the specifics of each technology could be summarized in an overview table.

An interesting addition to complement the business models could be the recent development of business models in the US that Apple made popular with it's ITune service, that sells music for download for 99c and proves that users are willing to pay for service they may get free otherwise. Apple has set a trend that even large retailers like Walmart are following.

One item that has been mentioned several times throughout the document is the ambiguity of copyright law and the difficulties in drawing a line with pure common sense. This important concept could be complemented by the explicit examples of creating a single personal backup copy vs. a personal copy for the car vs. a free copy for friends vs. a free copy in the Internet vs. a copy for sale.

2.8.4 Detailed evaluation by Andreas kornstadt, it-wps (Hamburg, Germany)

Due to my outstanding position I can only conclude in a limited way. Thus I didn't compile a typical review document but summarized some points only in a list of issues which I consider as interesting and "bulky" including some ideas, which I think will further improve the document.

Interesting:

- broad content
- good flow of reading (?) in the last part
- fingerprinting
- chapter 10: DRM
- appendix: standardization
- appendix: vendors

"bulky"

- A lot of theory at the beginning. Especially the long property lists and open questions which are not addressed substantially again.
- Core terms are regularly defined slightly differently without comparison (e.g. rights holder, agent, user)

Ideas/suggestions:

- central definition instead of multiple definitions

1. (Only) at the beginning a simple scenario containing the main actors

2. (only at the beginning) explaining the problem of perfect copies and the results for rights holder

3. explanation of the aims of DRM

4. (only there) a definition of terms with comparison of different notions (rights holder, agent, ...)

- A structuring of chapters avoiding anticipations: E.g. starting detailed explanations of the possibilities of watermarking and fingerprinting. After that description of business models and technologies from the surface to details (encryption, rights description languages, ...)

2.9 DE 4.6.1 on Music coding for print impaired people

2.9.1 General comments

2.9.1.1 Richard N Tucker, FORCE Foundation (The Hague, Netherlands)

"*Any paper that is to be read by people outside the project or research group must be easy to read. It must convey the central issues clearly. Even allowing for the need to use specialised language the paper is uneven. Parts are clear, others are obscure or woolly. There are parts which appear to assume specialised knowledge and others which explain their content in a logical and clear fashion. This may be the result of there being several contributing authors […]. However it does suggest that the paper could do with some stringent unifying text editing. In many parts the text is over-written and can be simplified to make the meaning clear without losing anything of the message. There is also a need for a thorough grammar and spelling check. There are not many faults but they do let down the general quality of the paper*."

Concerning the contribution to the EU objectives:

1. scientific and technological quality and innovation

Since this is a review of the state of the art in music coding for print handicapped people, much of it can be expected to be a review of existing information. This is generally well presented. My earlier comments on the text have already been submitted. There was little demand for a rigorous technical treatment of the subject. The innovative aspects of the subject were reported in the section on talking music and in Section 4 on the overview of creating accessible music.

2. community added value and contribution to the European Union policies

By implication the report adds to the argument for the right of access to information by people with handicaps. This supports the policy of access for all as propounded by the European Union.

3. contribution to community social objectives

Although the potential beneficiaries are only a small proportion of society the developments described in the report present the best known possibility for visually and print impaired readers to have access to printed music.

4. economic development and scientific and technological prospects

Although there will be some commercial development within and for the print impairment sector, the generalise approach to access for all should have benefits for all people wanting to access music in its various forms.

Concerning the services offered by Musicnetwork:

1. Giving access to the largest database of music-related state of the art technologies and solutions

Not relevant to this report

2. Offering clear visibility for participants on research and technology innovations

The relevance of previous music related projects (not only those funded by the European Commission) is well demonstrated.

3. Offering training and updates regarding the latest technologies, standards and solutions

Not relevant to this report

4. Suggesting solutions for problems concerning multimedia music and innovative technologies

Several approaches are well described in this project especially in Section 4. However it should be kept in mind that paper was reporting on work being conducted in other parts of the project and outwith the project itself.

5. Providing information and support on European Commission/FP6 activities in the area of multimedia music

This report provides the information required.

The detailed evaluation proposes to correct some specific points.
As a conclusion, he states that

"[…] *While almost all the required information is in the paper as presented, the manner and order of presentation work against good communication. This reduces the effectiveness of the paper. It is recommended that the paper be radically re-edited to present the undoubted knowledge in a more accessible form.*"

2.9.2 Comments from WG leader

The comments received from the external reviewer were generally helpful in improving the deliverable. All the appropriate changes have been made to the document and it has been revised accordingly. A number of comments were not considered to require any changes.

2.9.3 Detailed evaluation by Richard N Tucker, FORCE Foundation (The Hague, Netherlands)

Having been involved both centrally and then later peripherally in the area of development described in this paper, it should have been easy for me to read and understand the arguments it presents. Unfortunately this was not the case.

1. General Reaction
Any paper that is to be read by people outside the project or research group must be easy to read. It must convey the central issues clearly. Even allowing for the need to use specialised language the paper is uneven. Parts are clear, others are obscure or woolly. There are parts which appear to assume specialised knowledge and others which explain their content in a logical and clear fashion. This may be the result of there being several contributing authors (this reviewer even recognised something close to part of his own text from an earlier project. If the authors found this a suitable explanation of an issue then that is pleasing). However it does suggest that the paper could do with some stringent unifying text editing. In many parts the text is over-written and can be simplified to make the meaning clear without losing anything of the message. There is also a need for a thorough grammar and spelling check. There are not many faults but they do let down the general quality of the paper.

2. Text
In general the text is too complex. This is not to say that the ideas expressed are not complex. This is criticism of the style. The application of a FOGG Index[1] might be salutary. The text is sometimes sloppy. There are also problems

[1] FOGG Index – Frequency of Gobbledygook – a measure used by the Plain English Campaign. See http://www.hop.man.ac.uk/Academic/researchdevelopment/Ethics/WordDocs/THE%20FOGG%20INDEX.doc

of the order in which parts of the paper are assembled. Knowledge is assumed in parts, which is only later explained. It would serve the purposes of the authors to have a good English Mother-tongue editor go over the paper. It is not the job of this reviewer to re-edit the paper but some examples will be given in the more detailed treatment of the paper.

3. Context in General
The subject dealt with is of great importance even if it is currently only of direct concern to a minority of the visually and print impaired readers of this world. However with the likely increase in the percentage of visually impaired readers in our aging society the potential audience for accessible music in all its forms is likely to be far greater than the current number of blind musicians.

The elements of the report have been well chosen to cover all the main issues. There are however some questions about the order in which the information is presented.

4. Detailed comment.
For this part of my review I will treat the various aspects of each section of the report rather than try to gather together the comments about language, content and opinion.

Text presentation: even though this is a draft version some care should be taken with the presentation of text. The justification both left and right leaves some lines with odd spaces. There are also rather too many double spaces which are just carelessness.
Page three penultimate paragraph “emphasises first” – it is not clear whether this means that priority is being given or whether there was to be a second point of emphasis. There is no second point.

The next paragraph is an example of the care that is needed in editing
“In relation to print encoding a description of the current status” can be parsed in at least three different was depending on whether it has no comma, a comma after “print” or a comma after “encoding”. If description is the main subject then the verb should be singular; “is” rather than “are”. The next sentence promises that a description will be discussed. It isn’t.

Such comments can be made about a lot of the text. This is not just nit-picking. Careless writing gets in the way of communication. Sometimes the jargon seems to be flowing while the author is searching for the point to be made. We all suffer from this overwriting, especially in project reports. The question is whether we correct them before issue to a broader readership.

Page 4. 2.1 “For music, this refers to anyone who cannot read a music score”. This is patently not so for the vast majority of literate (and illiterate) people who never in their lives have the need or desire to read a music score. One might suppose that they are music-handicapped, but they are not relevant to this research. This should indicate those who can read music but can no longer see or those who are visually impaired and need to learn to read music.

The third paragraph is key to the argument. It begins with music access and then goes on to general access calling each of these “niche markets”. Access, in developed society, is anything but a niche market. There have been campaigns for years to get the issue out of a niche market and have the philosophy integrated into all aspects of life and design, hence the title of the Accessibility for All movement. I suggest that this paragraph be turned round to start with the general and move to the specific within the general context. It should also have its own title rather than being buried in a section on print impairment. The idea of *piggyback* development should be better explained since it is relevant to a lot of the developments that are cited later in the report.

There is a list of potential users. This mixes people and institutions which is a bit uncomfortable but acceptable. However, it makes one question what the difference is between, on the one hand “Visually impaired people; Print impaired people” and on the other “Visually impaired musicians; and Print impaired musicians”. Are musicians suddenly not people? This is not a call for jokes about Viola Players. If there is meant to be a distinction between those who need to read music and those that need to read music in order to play it, then this should be made explicit.

The penultimate paragraph refers to *real music* with no satisfactory definition. This is an odd term in this context. Is music that is not audible not *real* and is all that is audible automatically music by definition. The term is sloppy.

Page 5. when referring to enlarged character is it worth drawing a distinction between characters that have been enlarged as part of the (re)production process and those that are enlarged as a result of the intervention of the reader; using a lens or a CCTV reader for example. The first is relevant and inherent to the developments described. The second is relevant to access but falls outside the production process.

"and at no additional cost to the individual to avoid social exclusion" appear to need a comma to stop it being nonsense. There are lots of such examples and the paper needs careful editorial checking.

I suggest that *digitisation-on-demand* be termed *conversion-on-demand* because digitisation is not the only useful process and equally a user may have a digital file which they need converted to another digital form or even to analogue formats for convenience.

The following paragraph is jargon ridden and has such statements as *much of the existing expertise[..] is of a highly distributed nature,* when I think what was meant that the experts are spread across Europe rather than being in working contact with each other. It would help the paper if fewer words were used to describe things.

Fortunately emerging [.] standards or *Fortunately, emerging [..] standards*. There is a difference.

Page 6
When discussing Braille producers the writers criticise some for using presentation methods (what are these) that were rejected 45 years ago. Who rejected them and on what authority? As it happens I know what this refers to but a reader not familiar with the different methods of presentation or piano and organ music will be mystified.

The next paragraph starts the `So, ---`. The use of So and Therefore should really be restricted to cases where there is actually a logical consequence from what has been stated immediately prior to the expression. Otherwise it looks like spoken rather than written language.

Page 7
The report should be consistent in its use of *print music* or *printed music.*

Instead of *We can therefore surmise that* start the sentence; *To cut the cost of Braille…*
This will maintain the argument. The reader does not need surmises and there is no direct implication from the foregoing words.
The need for only specially trained transcribers needs a different explanation. It is common to demand that transcribers are already fully trained musicians for example. The reader should be informed and if necessary told why.

Automation of the transcription processes would immediately reduce the need to check and correct transcriptions. I know why, but the reader might not. In addition there are institutions that do not trust the accuracy of automated transcription and still check everything. There is also a political dimension because they have always done it that way and employ people to do the work. These will either lose their jobs or need to be retrained for other work. This is not relevant to the technical argument but is a real factor for the libraries concerned.

Print impaired users, who in the past have either had no access [to] *scores, or have had to contend with the logistical problems of traditional production…..*
What are the logistical problems? You might know, but the reader will have to guess.

Page 8
3.2.2. FNB is singular, therefore it *has* been researching.
This means that the Talking Music Scores can be navigated through by the user using a hardware or software DAISY Player.
The sentence needs reconsidering, as does the whole of this section. It is packed with jargon and assumes a huge amount of information. For example, what does it mean to *synchronise the consumption and production opportunities*?

Page 9
3.3 The section should have cross-head to identify the different formats, such as "Large Print Music". It will make the section easier to follow. The first paragraph deserves to be rewritten.

3.4
The Wedelmusic description is good and is of a different style. If this has been taken from some other document then is could perhaps be used as a used as a model for some of the other parts of the document.

3.4.2
BME is conceptually a real file editor with normal facilities like input facilities. This is somewhat careless

Page 11. The first paragraph seems to suggest that the blind user can follow the rules of Braille Music notation without knowing written music notation. This deserves a little more explanation.
Otherwise the description of PLAY is good and concise – and objective.

3.5 Bettye Krolick (note the capital letters)
This section hardly justifies its place in the new technologies. The piece is of a totally different style. Being written from a personal viewpoint it conveys important background information which might be more useful if presented to the reader earlier in the paper. In fact it might be a good opening section. This would also obviate strange things such as Mr Vassio being mentioned a page and a half before it is explained who he is.
Page 15 – The section on creating accessible music starts well. However the section is very long and could benefit from some cross-heads to guide the reader.
The clarity of the explanation seems to vanish in the 4th, 5th and 6th paragraphs of page 16. There are a lot of unexplained terms. While it would be tiresome to explain each and every term it is crucial in this important section that the reader is not hindered by jargon. The fourth paragraph needs clarification. It discusses the delivery of items that cannot be changed by the user. In a later section on extensible solutions there is discussion of the users' ability to develop the materials. The difference is implicit if you already know what is being discussed. An effort should be made to make more of the terms explicit.

For example *would in turn relieve the producers of their responsibility for content preservation quality.* This is far from clear. The same applies to *producers could invest this new source of responsibility in logistics, research and development….* A closer rereading might lead the authors to reconsider some of the phraseology of much of this section and the paper as a whole.

Page 17. The first paragraph is a bit obscure (*The tool for verification would also be the consumption tool).* Looked at from the outside that is a confusing statement and it is not clear what the user actually receives.
4.3 Here there is one of the several uses of the term *set back.* This is apparently used to mean different things, usually something to do with resistance or failure. But the term is neither clear nor consistent. It should either be explained or other more appropriate phrases used.

5 Music Coding and Accessibility
This section is quite good. Concise pieces with good identification. However this is in the wrong place. Had it been placed earlier in the piece, say after the opening piece by Betty Krolick then some of the earlier sections would have made more sense.
5.1.1.3
Unlike the preceding sections which seem to me to be clear without losing the necessary technical level, this section gets obscure and a bit jargon-ridden. It could be simplified.

5.1.2
This is a good concise treatment of the complexities of XML. After the list there is a paragraph in which the second line is very strangely spaced but which contains the term *An OASIS TC.* This needs a short explanation or footnote for those not familiar with OASIS or what a TC is.

Page 21 The MPEG description is good. In the last paragraph the term *set back* appears again and appears to mean something like coming up against a barrier or having difficulties.
Page 22
Use cross heads to guide the reader.
In paragraph 5 the point about short term development and the affect this has on long term development deserves to be made more explicit.

Page 23 Braille Music Decoders
This is a good section but could be improved by making each of the elements in the argument more explicit - again cross-heads and some editing would help.
The sentence *Much of this hardware is OS specific* is unnecessary jargon and should be more specific to remove any doubts.

5. End matter
It is surprising that there is no reference to the Russian music Braille developments. Although they are outside the EU they should have the same treatment as the Americans and Australians

ICEVI is cited twice. Could these not be combined?

References
This needs a spelling checker
It is surprising not to see references to the websites (if not specific documents) of the preceding EC funded Music Projects. These are referred to in the text but should be given specific reference here.

6. Conclusion
This is supposed to be a "State of the Art" summary for public consumption. As such it must assume that the reader, though interested, has less detailed knowledge than the authors. It is not a research paper and the language register should reflect the public nature of the document.
While almost all the required information is in the paper as presented, the manner and order of presentation work against good communication. This reduces the effectiveness of the paper. It is recommended that the paper be radically re-edited to present the undoubted knowledge in a more accessible form.

2.10 DE 4.7.1 and DE 4.7.2 on Coding images of music sheets

2.10.1 General comments

2.10.1.1 Roland Goecke, Fraunhofer IGD Rostock (Germany)

"*The presented document is well-structured and generally appropriate for a progress report, if the aim was to more or less only report on the literature and the general 'state of the art'. It would lack some more results, if the aim was to also already present developments in the current project. It clearly reports the applications and current practices in the field of coding images of music sheets and shows an extensive bibliography of the field. The document is easy to read and concise*."

Concerning the services offered by Musicnetwork:

1. Giving access to the largest database of music-related state of the art technologies and solutions

This objective is clearly described in the document. Such a database can be expected to have a very strong impact on bringing together research institutions ("technology providers") and the music industry (technology users"). As is stated in the documents, the music industry has been largely shy so far of using state of the art technology to provide music – in its various forms - over the internet due to an uncertainty about standards and technologies. The MusicNetwork is an excellent position to improve the position of the European music industry, if key players of the industry can be made aware of the existing technologies and the providers thereof. The documents clearly contribute to these objectives.

There have been some difficulties in reaching the MusicNetwork website www.interactivemusicnetwork.org lately. Is this known? Also, in the document, the creation of a WWW site for the database is mentioned several times. Is this the same URL or another one? Does it already exist? If so, perhaps provide a link.

2. Offering clear visibility for participants own research and technology innovations

The previously reviewed document gave a detailed account of the current and coming research performed by the partners of the MusicNetwork project. If desired, it can be pointed out more strongly, which partner(s) provide(s) which research. It is to be considered carefully, what structure the intended database should have and whether your own research and that of external stakeholders shall be put together with or without clear distinctions of who did what. My suggestion would be to make a decision early on, on how you will achieve the best visibility for the participants on the website.

Other forms of outreach have been described in the latest document, such as trade fairs, scientific conferences, workshops etc. The more specific you can be about this, the better! Dot point i) is a good example.

3. Offering training and updates regarding the latest technologies, standards and solutions

While I can see how the documents relate to the updates on the latest technologies, standards and solutions, I fail to find details about providing training. Perhaps I am overlooking something? If the training (direct person-to-person or indirect through the dissemination of information?) is meant to be a core part of the MusicNetwork, it needs to be pointed out more strongly. In any case, I think, this point needs clarification.

4. Suggesting solutions for problems concerning multimedia music and innovative technologies

In my opinion, this is really the core part of the previously reviewed document and hence this objective has been dealt with in great detail. I don't think you need to elaborate on the detail already given but the linkage of the various parts could perhaps be improved. Further ideas have also been presented in the current document (subpoint g) on page 3). A suggestion would be to link the various parts together even more. Also, in the subpoint g) a sublist of the items in bold face would improve the readability of the text. At times, you mention that some piece of information is available on the MusicNetwork website. I think it would be helpful to be more specific.

The ways of disseminating the solutions and technologies have been described well and clearly. If there are already any specific ideas, i.e. joint workshops with participants from industry and research institutions etc., you might want to give more specific details about which way might be most appropriate in your eyes for certain stakeholders.

5. Providing information and support on European Commission/FP6 activities in the area of multimedia music

This seems so far to be only mentioned with respect to the WWW site. Do you intend other ways of providing information and support? Personal coaching? Mentoring? What sort of structure do you intend for this? I think more information is needed here.

In the detailed part reported in the following he also proposes some specific structural/spelling corrections.

Comments sent by Roland Goecke regarding the second version of the deliverable :

I very much enjoyed reading it and I think it has improved significantly since I last saw the document. It provides a comprehensive overview of the current state-of-the-art in OMR and the various issues associated with it.

I would perhaps suggest to highlight the research done by members of the MusicNetwork a bit more, as I think you have no need to be shy there. But overall, a very nice document.

2.10.2 Comments from WG leader

The comments received from the external reviewer were helpful in improving the deliverable. All the appropriate changes will be made and revised accordingly for the next version of the document.

On the issues of training and providing information, these activities have mainly been performed via two channels:

1) the MUSICNETWORK online forum
2) the MUSICNETWORK Open Workshop. This WG has organized several sessions and also involved in other related WG session both within and outside MUSICNETWORK events, such as ICMC (International Computer Music Conferences) and others.

There will be a subsection 6.2 on research OMR systems (non-commercial) which represents the work in hand and will be in the next version of the report. As noted by the external reviewer, we will be "more specific" on the referencing with more details, e.g. referencing to the corresponding sub-section/part.

The OMR QuickTest is indeed a result of this project, and it will be make clear in the next version. Thanks to the reviewer for the complement of the MUSICNETWORK OMR bibliography. We aim to continue to keep it the most comprehensive collection of literature for this domain.

2.10.3 Detailed evaluation by Roland Goecke, Fraunhofer IGD Rostock (Germany)

Overall Comment

In my opinion, a lot of the necessary information is already there in the documents and in sufficient detail. Be more specific were needed but otherwise the documents are OK. As the major improvement I would suggest some more structuring and linking between the various documents, whether they are available online or in printed form, and in particular referencing of corresponding parts of documents, so that it becomes absolutely clear which part you talk about, rather than referring to the whole document and leaving it up to the reader to find the relevant bit of information.

Detailed evaluation:

1. Overall Comment

The presented document is well-structured and generally appropriate for a progress report, if the aim was to more or less only report on the literature and the general 'state of the art'. It would lack some more results, if the aim was to also already present developments in the current project. It clearly reports the applications and current practices in the field of coding images of music sheets and shows an extensive bibliography of the field. The document is easy to read and concise.

2. Structure

The structure is generally good and appropriate. My recommendation would be to string the pieces together more strongly by summarising the individual sections, where appropriate, and in particular in Sections 1 and 2 to give the reader a brief summary of what is to follow in the remaining sections (outline of structure). Such an outline, together with the table of contents, would help the reader to follow the 'story' even better.

Is subsection 6.1 really necessary? Will there be a subsection 6.2 'Non-commercial OMR Systems? Otherwise, I suggest to remove or rephrase the heading of 6.1.

3. Clarity

Sections up to and including Section 6 lay the foundation for the remaining sections and the work in this project (or subproject) in general. Such a sound base is certainly useful and gives the reader a good overview of the 'state of the art' in the field of coding images of music sheets.

As already mentioned, an outline or a stronger cohesion and cross-referencing between the sections would improve the structure of the report. Also, some conclusions at the end would be great.

In general, I notice that it is sometimes not clear in the document whether you talk about your own work in this project or about other projects referenced in the literature. I suggest that you try to clarify this. For example, if the OMR Quick Test is a result of this project, make that clear!

4. Content

I am a little unsure what the scope with respect to the content of this document is meant to be. Is it really just meant to be a 'state of the art' report? If so, the content is fine. If it is also meant to be a report on your own achievements in this project, point out those achievements more strongly than so far and compare your results to the literature (where possible and comparable).

With the description of the hardware in Section 5, I was wondering what you based your selection of mentioned hardware on. Do you claim that this is a comprehensive overview of the most important systems? If so, how was most important defined? If not, is this simply a collection of possible hardware? Again, the end of Sec 5.1 is kind of hanging in the air, so the report would be improved by linking it to Sec 5.2. In 5.2, I would suggest to also check the guidelines by the DFG (Deutsche Forschungsgemeinschaft, German Research Council, www.dfg.de) for the so-called 'retro-digitisation'. I can't find a link right now but I know that there is information about it somewhere on that website.

In Sec 5.2 para 2 line 5 you mention that Fujinaga and Riley suggested a resolution of 600dpi to be sufficient. Did they give any reasons for that? Do you agree with them? If so, why? If not, why? Also, the next bit about thresholding doesn't seem to fit in there. Why do you talk about there? If you do, give some literature references.

Page 8 para 2 lines 4-8 "The results of the comparison…": This is not clear to the reader. Try to phrase this better.

Sec 7.2 is again begging for an introduction! What is this OMR Quick-Test? Where does it come from? Whys was it developed? Is it the first such attempt worldwide? If not, what sets it apart from other approaches? I would suggest a figure to go with the list of basic musical features. Perhaps you can take those from the Quick-Test? In the third last paragraph of Sec 7.2 you talk about the comments you wish to get from OMR system developers. What sort of comments to you expect? I would also move the very last sentence of 7.2 to the start of that section, so that the reader can look it up if he wants to.

Were the 13 people mentioned in para 1 Sec 7.3 professionals in the relevant area?

I want to urge caution when using percentage comparisons as in the final paragraph of 7.3. The differences are 13.54 and 56.77, resp., in percentage 'points' but not percents! This is an often made mistake. If you want to talk about the relative 'betterness' of O^3MR, you need to set its percentage score to 100% and then compute the differences.

Sec 8 contains a number of repetitions. For example, SVG is twice explained and it is also mentioned twice that Flash is a proprietary format. This seems redundant. Also, what do you mean by "Postscript is not absolutely free."? The part of Sec 8 at the end (top of page 14) is a bit unclear. Can you please clarify what you mean?

Sec 9, page 15 What do you mean by "expressive rendering"? I don't recall this term being introduced before in this report and I don't think it is that clear to everyone. Some more detail may help.

5. References and OMR Bibliography

The references are comprehensive and contain both early publications in the field as well as recent ones. To the best of my knowledge, Kia's OMR bibliography is the most comprehensive collection of literature on this, so this is OK in my opinion.

6. Other Suggestions

- It appears that different font sizes were used in Section 4.
- Check grammar (missing articles) in last para of Sec 2
- Check spelling throughout the report. There often typos, like doubled or missing letters
- Check singular and plural (p.5 "For examples" -> "For example")
- Sec 4, para 1, last line "…and sometime overlaid part other music symbols." Not sure what this is meant to be.
- Page 5, Even though the table floats in the text, I would still suggest a caption line, as it currently looks a bit 'lost'.
- An introduction and a summary would be good for Sec 6.
- Check Sec 7.1 for correct spelling (e.g. "Despite to…" -> "Despite…", "…declared by the each distributor…" -> "…declared by each distributor…", "inputted" -> "input")
- Sec 7.3 para 2 "The missing of a ground truth databases…" -> "The lack of ground truth databases…"
- The "Figures" on page 11 appear to be rather "Tables" than figures.

3 The evaluators

Tim Crawford worked for 15 years as a professional lute player. Since 1989 he has been using computers for music printing and musicological investigation. He has developed his own WYSIWYG program for editing music written in lute tablature and has also been involved with the Macintosh music-notation program Nightingale® for several years as beta-tester and developer. In the US/UK music information retrieval project OMRAS (Online Musical Recognition and Searching, 1999-2003) he devised a novel and highly robust probabilistic method for harmonic
description of music. This has particular application in musicological work such as his ECOLM project (Electronic Corpus of Lute Music), which also is investigating optical character recognition techniques for historical musical notations. He is a Member of the Musical Data Group of the International Musicological Society. Tim Crawford has been active in all of the ISMIR (International Symposium for Music Information Retrieval) conferences (2000, Plymouth, Mass; 2001, Bloomington, Indiana; 2002, Paris, France; 2003, Baltimore, Maryland; 2004, Barcelona, Spain) and will be General Chair of the 2005 ISMIR conference, to be held in London. After more than a decade at King's College, London, in October 2002 Tim Crawford moved to City University, London, and in October 2004 will be moving to Goldsmith's College, University of London.

Prof. Jaime Delgado
Ph. D. in Telecommunication Engineering since 1987. Telecommunication Engineer since 1983.
Professor of Computer Networks and Computer Architecture at the Technology Department, Universitat Pompeu Fabra (UPF), Barcelona (Spain), since 1999. Dean of the Faculty of Informatics. Head of the Distributed Multimedia Applications Group (DMAG).
Previously, Professor at the Universitat Politècnica de Catalunya (UPC) (1987-1999), European Projects Manager for Logic Control, S.A. (1995-2000), Director for Media Technology Group, S.L. (mtG) (1998-2003).
Project Manager of several European and national research projects in the areas of electronic commerce, multimedia publishing, security, digital rights management and distributed applications.

Active participation, since 1989, in international standardisation, as editor of standards and chairman of groups in ISO/IEC, EWOS, ETSI, ITU-T and CEN/ISSS.
Evaluator and reviewer for the European Commission in different programs since 1989.
Author of close to 100 published papers and books, and member or chairman of many Conference International Programme Committees.

Mr. Matthew J. Dovey studied Mathematics and Philosophy, and Computation at Corpus Christi College, Oxford. He is currently Technical Manager for the Oxford e-Science Centre having previously been employed as R&D Manager in Oxford University Libraries Systems. In his role as R&D Manager he has worked on a number of national and international projects including CEDARS (developing an architecture for long term preservation of digital objects), MALIBU (developing models of the hybrid library), BookHAD (a cross-searching interface for Book History and Design resources), Ensemble (a project for increasing access to UK Music Conservatoires collections) and was director of the JAFER project which developed Z39.50 tools for integrating library resources into web sites and VLEs.

Mr Dovey has consulted on a number of projects including the European Union funded projects RENARDUS and SCHEMAS; the UK Joint Information Systems Committee/US National Science Foundation funded OMRAS project (developing content based music retrieval) as a Research Fellow, the British Library funded projects CIRCE (on online community information services) and Cecilia (on online Music Collection descriptions) and the UK Arts and Humaninities Board funded project to develop an online database for RISM-UK (Repertoire International des Sources Musicales). In his spare time Mr Dovey is an amateur pianist with a special interest in late romantic Russian music.

Roland Goecke is a research fellow at the Fraunhofer Institute for Computer Graphics, Division Rostock, Department of Human-Centered Interaction Technologies. His research interests include human-computer interaction, image analysis, computer vision, and speech processing. Roland Goecke received a PhD in computer science from the Australian National University and a Masters in computer science (Diplom-Informatiker) from the University of Rostock. He is a member of the IEEE and ISCA. Email contact roland.goecke@ieee.org

Dr. Eckhard Koch is founder and CEO of MediaSec Technologies GmbH, , a leading products and solution provider in the field of content and multimedia security, based on digital watermarking and other digital security technologies.. He is also co-inventor of MediaSec's watermarking technology.

Before founding MediaSec, Dr. Koch managed the headquarters of Secunet Security AG, a leading European IT-security consulting company. Prior to Secunet, he was Director of Product Development with Brokat AG in Stuttgart, where he was responsible for the complete product development of secure online-transaction and payment-systems.

Dr. Koch began his career as head of the department for "Security Technology for Graphic- and Communication Systems" at the Fraunhofer Institute for computer graphics (Fraunhofer IGD) in Darmstadt. He was in charge of diverse major projects in IT security on a national and European level.

He has published several international papers, holds various patents in the field of digital security, has participated in standardization activities such as DAVIC, and was co-organizer of several international conferences (e.g., IFIP).
During the past 10 years Dr. Koch has participated in several European Projects dealing with security and digital watermarking, such as ACCOPI (RACE), OKAPI (ACTS), TALISMAN (ACTS), OCTALIS (ACTS), Android (IST), Imagen (IST) and Certimark (IST).

Andreas Kornstadt is a software architect at it-wps at Hamburg. He is into music informatics since 1994. He made his JRing system for computer assisted musicological analysis the topic of his doctoral thesis at Hamburg University. In the course of this project, he spent 2 years as an invited visiting scholar at the Center for Computer Assisted Research in the Humanities (CCARH) at Stanford University. There, he developped a converter form SCORE to Humdrum. In co-operation with Walter Hewlett he wrote another converter from MuseData to SCORE. Working with David Huron and Craig Sapp, he extended the music analysis toolkit Humdrum and started the Themefinder project for online queries into a database of musical themes.

After **Jürgen Nützel** received his diploma in electrical engineering at the University of Applied Science in Schweinfurt, he joined in 1991 the company Siemens AG. In 1990 he started in parallel his studies at the Technical University of Ilmenau. In 1994 he received his diploma and joined the University for his PhD thesis in computer science. After acquiring his PhD in 1999 with object-oriented design of embedded real-time systems he shifted his research focus to virtual goods. He started his "Habilitation" in this field. In 2000 he founded the company 4FrindsOnly.com Internet Technologies AG (4FO). 4FriendsOnly.com Internet Technologies AG

(http://www.4fo.de) develops and runs payment services and content management systems for virtual goods. This company develops and runs payment services and content management systems for virtual goods. Jürgen Nützel currently works as an "assistant professor" at the University in Ilmenau. He is also CEO of the 4FO AG. In 2003 and 2004 he organizes the international Workshop "Virtual Goods".

Paul Sire was Born the 4-5-58 in Madrid, Spain. Nationality: British/ Spanish. Languages: English and Spanish. Work Experience:

- Rights protection in E-business**:** Since 2000 to present: International Project manager at Sociedad Digital de Autores y Editores (SGAE group), Madrid, Spain, working on projects that research and develop content production, distribution, protection and commercialisation models that take into account the intellectual property rights of the authors, editors and publishers.
- Teaching: Currently: Lecturer in content management practices at UNED. He has also had a further two years experience organising business training for companies and lecturing at The European University.
- Publishing: 7 years in journalism and editing for Spanish and U.S. media and book publishing firms.
- Management Consulting: He has worked a further four years as a Consultant at Business and Technological Consultancy firms with some major multinational clients.
- Education: MBA from City University, London, and a B.A.(Economics) from the University of Kent at Canterbury.

Jacques Steyn is presently senior lecturer in Multimedia at Monash South Africa, and previously was Associate Professor in Multimedia at the University of Pretoria, both positions in the School of Information Technology. Prior to that he was Senior Advisor to the University of South Africa for about a decade where he focused on technological solutions. In 1995 he established a consultancy on web technologies and participated in the development of the largest South African e-commerce solutions, notably for the banking group Standard Bank. He taught markup languages since 1997, and in 1999 he developed an XML-based language for music, called Music Markup Language. He has also developed markup languages for other disciplines, such as the travel industry. He holds a PhD in language and complex systems.

As music performer he has been involved in many different genres, ranging from classic opera, and musicals, to continental cabaret and rock festivals. His current band, 2B2, performs his compositions at local arts festivals in the rock and blues genre as multimedia productions.

Niels Thorwirth is Director of Professional Services and Business Development of MediaSec Technologies and as such is responsible for strategic product development and planning. He received his M.Sc. in Computer Science Applied Business Administration from the University of Nice-Sophia Antipolis, France, in 1997 and his M.Sc. in Computer Science and Business Management from the University of Mannheim, Germany.

Mr. Thorwirth participated in the development of MP3 watermarking and partial encryption for secure delivery of MP3 over IP at Fraunhofer Society. Before that he worked as a Research Assistant at Institute for Business Administration, University of Mannheim, Germany, in the areas of user interface design, database, and speech recognition.

Mr. Thorwirth has published several international papers and holds various patents in the field of digital watermarking. He is chairman of the SIA Digital Evidence Subcommittee and has participated in the European Projects Android (IST) and Certimark (IST).

Richard N Tucker. b. 1942. British

After serving in the Merchant Navy and a short period as a Press photographer, he took a first degree in English and Philosopy at Liverpool and a second at Bristol in Radio, Film and Television. He taught Film, TV and modern theatre at Bristol University before moving to the Scottish Film Council (later the Scottish Council for Educational Technology) as senior assistant director. In 1984 he took up the post of Director of Educational and Information Technology at the Netherlands Institute for Audio Visual Media. From 1992 to 1998 he was head of the Project Department at the Students Library for the Blind in Amsterdam. Here he was responsible for internal, national and international projects including the European Commission projects EXLIB, leading TESTLAB, CANTATE, HARMONICA and setting up and starting MIRACLE before taking up his current post of Deputy Director of the FORCE Foundation in The Hague. He has written or edited more than twenty books and produced more than a hundred audio-visual programmes.

Dr. Giorgio ZOIA received the Diploma in Electronic Engineering from the Politecnico di Milano, Italy, in 1996, and the PhD ès Sciences Techniques from the Swiss Federal Institute of Technology (EPFL) in 2001, with a thesis on fast prototyping of multimedia architectures. After some important experiences in video encoding (MPEG-2) and

design of digital circuits (VHDL), in 1997 he began his research at the EPFL-LTS3 on multimedia systems design, with a particular interest for Audio. At the end of 1997 he joined the MPEG-4 committee, where he is still active with contributions concerning Structured Audio, Audio Composition, 3D scene descriptions (Systems) and related analysis of computational complexity and Quality of Service. In 2001 he was awarded the ISO Certificate of Appreciation for his work on MPEG Audio. Starting in 1999 he developed one of the first efficient MPEG-4 SA decoders, based on a virtual DSP architecture with a vectorial instruction set. He collaborated in IST Projects since 1995, including COUGAR, ATLANTIC and EMPHASIS. He is currently collaborating to manage the Multimedia group at LTS3 and leading the work for Audio activities and for the IST project CARROUSO, aiming at developing a complete MPEG-4 encoding, transmission, decoding and rendering chain for interactive 3D acoustical environments. Among his research interests there are also the techniques and languages for content representation, and the development of interactive intelligent systems.

Paul Kafno is a British Producer and the Managing Director of HD Thames. His productions have won international awards including the Prix Italia, Golden Gate Awards, and craft awards at BAFTA and the Royal Television Society. A pioneer of digital television, Paul has been responsible for a number of new technology projects, given papers at many international conferences, consulted for the EBU and the International Television Symposium, is an assessor for the UK's Link Project, and Professor of Production Planning at the International Academy of Broadcasting in Montreaux of which he is a founder.He has been recently appointed new President of IBC, the world's leading electronic media event, Widescreen Festival.

Dr. Martin Steinebach is a senior research associate and division head at Fraunhofer IPSI (Integrated Publication and Information Systems Institute). His main research interest is digital audio watermarking. He has developed algorithms for mp2, MIDI and PCM data watermarking, content fragile watermarking and invertible audio watermarking. He has also introduced concepts for applying audio watermarks in eCommerce environments and for transaction watermarking. Dr. Steinebach studied computer science at the Technical University of Darmstadt, where he completed his diploma thesis on copyright protection for digital audio in 1999. In 2003 he received his PhD from the Technical University of Darmstadt for his work on digital audio watermarking. He held the organising committee chair of CMS 2001 and co-organized the Watermarking Quality Evaluation Special Session at ITCC International Conference on Information Technology: Coding and Computing 2002. He was a program committee member of the ICME 2004 and acts as a reviewer for various international journals and conferences. Since 2002 he has been the head of the MERIT division (Media Securtiy in IT) at IPSI. He is a member of the ecrypt EU-IST Network of Excellence in Cryptology.

Dr Tillman Weyde is researcher at the University of Osnabrück - State Examination (equivalent to Master's degree) in Music and Mathematics (1994), Thesis : Automatic Generation of Musically meaningful Chord Sequences using formal Grammars and Prolog. State Examination in Informatics (1999). Doctorate in Systematic Musicology (2002), Thesis : Analysis of Rhythm based on Learning and Knowledge. Assistant Researcher and Lecturer in Systematic Musicology at the University of Osnabrück (1994-1997), Assistant Researcher in Projekt OSIRIS (Osnabrück Intelligent Research Information System) funded by the DFG (German Research Foundation) (1997-1998), freelance consultant for information and tuition systems (1998-2001). Technical leader of the project Computer Aided Music Instruction, development of the CAMI-Talk language for music instruction. Co-author of Computer Courses in Music - Ear Training (Schott 1999/2001), which was awarded the Comenius Medal for Exemplary Educational Media in 2000. Since 2001, researcher and coordinator in the DFG-project MUSITECH (Music and Sound Objects in Information Technology) at the research department of music and media technology at the University of Osnabrück.