The Interactive-Music Network

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Abstract:
This document explains digital, interactive and multimedia technologies and standards for music libraries (including music documentation centers, broadcasting and orchestra archives, archives and other collections), especially classification/identification (e.g., ISBN, GRid), cataloguing rules (AACR, RAK) and formats (MARC, MAB), information exchange (XML), search and retrieval (Z39.50, ZING), products/services (ALEPH, FESAD, Phononet), metadata (P/META, SMEF, DCMI, MPEG-7), including a general view on information retrieval (content-based vs. bibliographical); music-related digital library issues (digitisation, asset management, copyright/licensing, Digital Rights Management/DRM etc.)
Keyword List:
music, multimedia, digital and interactive technologies, standards, music libraries, archives, music distribution, music protection, protection, accessibility, education, music publishing, music classification, metadata, library systems, information management, music information management

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1 Introduction

Libraries are known as one of the most traditional forms of institution. Though music libraries are acting as service providers for a great number of patrons, they are often not regarded as part of the music business. But even from the outside, today's music libraries are worth a closer look. Used to digital information management from the 1980s onward, many of them start to embrace interactive technologies now. Many libraries are launching new services, including music download over the internet (e.g. several projects in Denmark) or ringtone download for mobile phones (e.g. at the British Library). Music libraries start to offer Print-on-demand, they are opening up book shops and sell records. While music libraries have various business models, many of them stay non-profit organizations.

As libraries are discovering the advantages of digital and interactive technologies, also individuals are exploring new means of search and retrieval, access and distribution. Even the term „Library" is increasingly being used for technology-enabled private collections – a Google search on „music library" will produce not only institutions that are addressing themselves as music library but also e.g. software for home CD collectors – „quickly catalog your collection by downloading CD data from the worlds largest music database." And the same Google search will quickly lead you to gadgets such as the Apple iPod as a music library to put into your pocket. Libraries are increasingly confronted with much more diversified user interests, many competing resources, an explosion of the number of possible documents, formats, technologies, recordings and sources, and a general decreasing of quality and interoperability in information about music.

At the same time, technology allows music libraries to improve search and retrieval, to share networked resources, to unify standards and to offer more comfortable entry points for librarians and patrons. But in promoting standards and identifiers, libraries and others experience the political rather than technical dimension of interactive technologies: even successful agreements can break (cf. CIP – Catalogue in Publishing), and it is very hard to build consensus for new rules and conventions. And while it is easy to enable remote access to music recordings from a technical point of view, social and legal aspects will render it impossible to put the concept of remote access into reality.

The process around the adoption of new rules and standards together with the increasing limitation of resources (in terms of staff and money) forces music libraries more and more often to ask a question they have not been used to ask: How good is good enough? Music libraries have been setting quality standards within the providers of metadata for ages. Thus the metadata standards of music libraries have been resistant to non-expert use to a large extent. But new developments such as the „downsizing" of complex MARC and MAB formats to the „minimum" Dublin Core Metadata Element Set for internet resources, or the partial simplification of Z39.50 to ZING „Next Generation" formats show that the library world is extending their traditional functions into the information society.

With this in mind, this document intents to provide an overview about the relevant standards, rules, and developments.

Functions of Libraries

Libraries have important functions within the society: they accumulate and preserve knowledge, provide access to the society's cultural artifacts, and foster communication, education and scholarship. Music libraries, archives, documentation and information centers etc. play a crucial role in the field of music: They preserve manifestations of music, make them accessible, produce large amounts of metadata of high quality and thus make it possible to retrieve music and music-related information far beyond the typically rather short life-cycles within the music industry. Libraries have a long tradition of „producing metadata" (cataloguing etc.) and „making accessible" (bibliography, lending, inter-library loan, research etc.). In order to keep the large amount of metadata generated by music libraries worldwide interoperable, there are many rules, standards etc. being maintained and developed for a long time within regional, national and international networks, umbrella organizations and communities.

1.1 Characteristics and Types of Music Libraries

There are significantly different types of music libraries. However, almost all of them have several important aspects in common:

- They use one of the biggest **varieties of media** within the library world
- They can use **connections between the different media**
- They produce a **great amount of metadata** within the music world
- They have specific, highly complex **cataloging/indexing** rules
- They depend upon a developed **infrastructure for identification and classification**
- They are mostly **integrated**: Often part of a library, orchestra, TV/broadcasting agency, university, ...

1.1.1 Public libraries

Technically characterized e.g. by a fast circulation of holdings. As public libraries are among the most traditional and established public infrastructure service providers with an explicit „Business-to-customer" (B2C) approach, their position allows also services as digital download platforms for music (instead of lending CDs to the public)

1.1.2 Scientific libraries

Serving mainly for research, development and higher education purposes, scientific libraries typically provide rich access to paid databases, manuscripts, and other expert resources.

1.1.3 Orchestra + Broadcasting archives

Typically an integrated part of orchestras and broadcasting agencies, these archives are focused on enabling productions.

1.1.4 Libraries in educational institutions

Integrated in universities, conservatories, music schools etc., these music libraries are service providers for education. Their patrons are music teachers, students and pupils, thus tey can use interactive e-learning services.

1.1.5 Documentation/Information Centers

In addition to documentation, these libraries are often serving for promotion and publishing purposes.

1.1.6 Others

Other types of music libraries are e.g. private collections, museums etc.

1.2 Development of (Music) Libraries

1.2.1 Timeline of Information and Retrieval Systems

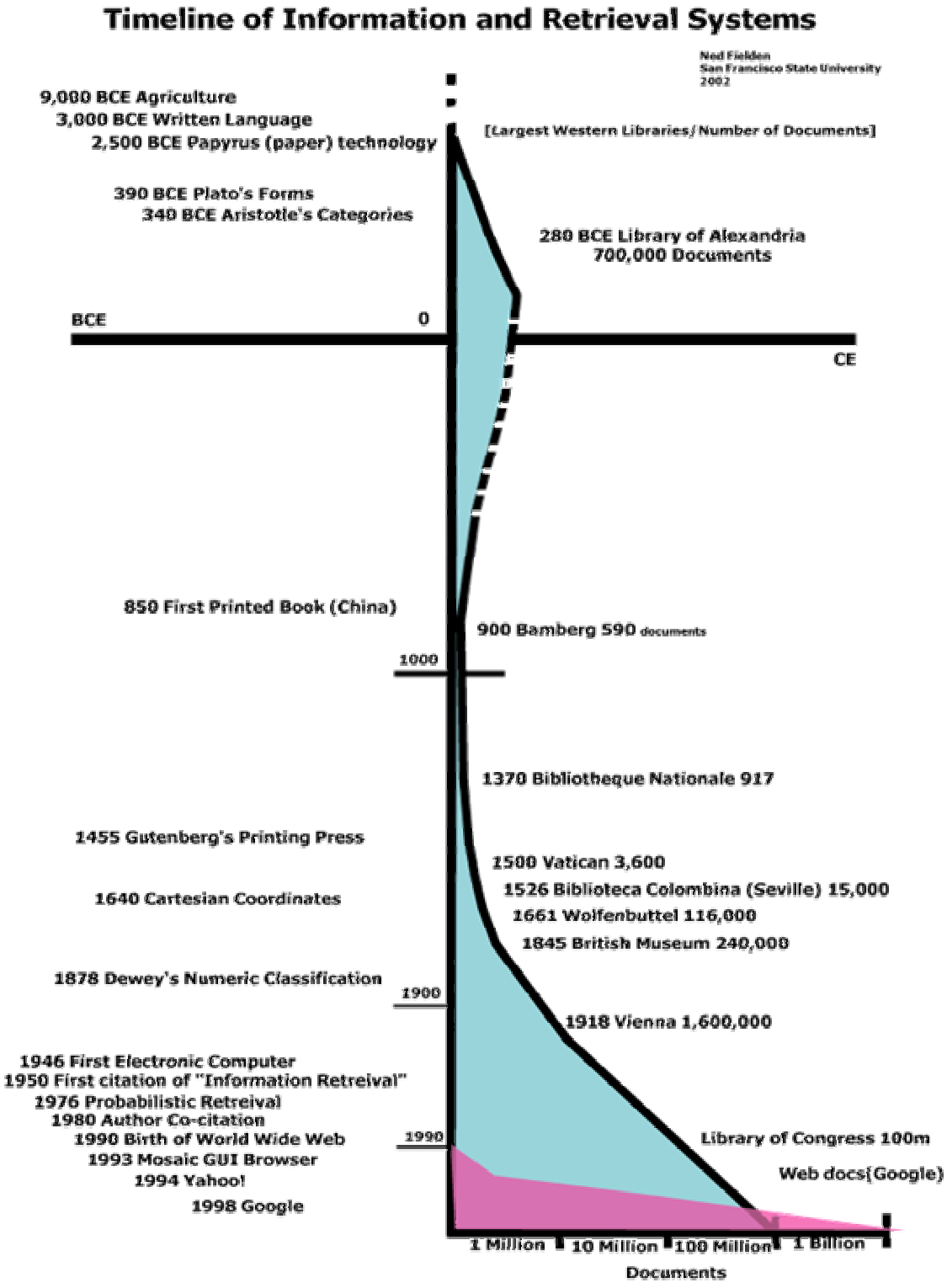

Figure 1: „Timeline of Information and retrieval systems". (Source: Ned Fielden: „Timeline of Information and retrieval systems", 2002)

1.2.2 Milestones of Information Retrieval

From the very beginning of institutions that were established to accumulate and preserve music, to make it accessible and to foster education and scholarship, music libraries had to cope with . Not only the size of collections and holdings (see chapter 1.3.1), but also the technological framework, conditions and possibilities have developed increasingly. Being one of the most significant and reliable sources for „metadata" (structured information about information, data about data), music libraries have always figured out new ways for the retrieval of information about music.

3000 BC: Written language
2500 BC: Papyrus
280 BC: Alphabetical index of the books in the Library of Alexandria (700.000)
1455- Printing press (Gutenberg)
1878- Dewey Decimal Classification
1910- Electric accounting machines (Hollerith punched card)
1930- Microfilm, microcards, and microfiche collections
1950- Term „Information retrieval"
1970- Computers with integrated circuits
1980- Mass market computers; OPACs/"Library systems"; IT included in librarians' education
1990- Internet, online information services
1998- Google

1.2.3 Network Resources

In addition to the diversity of formats that music libraries always have been familiar with, especially since the 1980s a wealth of Network Resources has been added. Organized as a large international community aiming at interoperability, music libraries are constantly developing new standards, guidelines and working files for the respective information management.

- Intangibles (decentral, digital resources vs. „holdings")
- Online research databases (RILM, New Grove, ProQuest, ...)
- Union Catalogues
- Online magazines / journals
- Virtual Catalogues (e.g. http://www.ubka.uni-karlsruhe.de/kvk.html: D, A, CH, F, GB, I, NO, S, E, USA)
- Online music services (www.classical.com, Byron Hoyt, ...)
- Search engines (Google, Verity Ultraseek, ...)
- Trade catalogs/databases (Books in Print, Phonofile, ...)
- Collaborative filtering (Amazon, Weblogs, ...)
- The World-Wide Web

1.2.4 Approaches to Information Retrieval

Following Clifford Lynch (Lynch, Clifford: "The New Context for Bibliographic Control In the New Millennium"/ Library of Congress. – January, 2001. – Online at: http://www.loc.gov/catdir/bibcontrol/lynch_paper.html), three main approaches can be differentiated as far as „finding information" in general is concerned:

• through **bibliographic surrogates** (intellectual description of aspects and attributes of a work)
• through computational, **content-based techniques** (compare queries to parts of the actual works themselves)
• through **social processes** that consider works in relationship to the user and his or her characteristics and history, to other works, and also to the behavior of other communities of users

While the library world is traditionally relying on the first approach, technological solutions are not only bringing the second (and, through „collaborative filtering" as used e.g. in Amazon.com etc., partially the third) approach

Currently, the standard library applications such as ALEPH are focussed on the classical library functionalities, while new services and applications are emerging which make use of a wider spectrum of digital and interactive technologies. For example, streaming/download services are being developed both by libraries themselves (www.musikbibliotek.dk) or as a commercial proprietary resource that can be subscribed/used by libraries (www.classical.com). At the same time, first evaluations show that new standards and technologies(such as the MPEG group of standards) are mostly unknown/unused by music libraries / librarians so far.

1.3 Main Tasks of Music Libraries

The following identification of the main areas of activity of music libraries has been developed and iterated within the MUSICNETWORK Working Group Music Libraries. It provides the structural basis for the monitoring and assessment of existing standards, rules and technologies (chapter 2). Both typical and emerging use cases within music libraries are listed to show the technological requirements.

1.3.1 A Acquisition

(1) Evaluation/selection/curating
(2) Acquisition
(3) Serials and service subscriptions

1.3.2 B Information Management

(4) Identification
(5) Cataloging (metadata: extracting/generating catalog entries)
(6) Catalogue format requirements (metadata: structuring catalog entries)
(7) Classification (metadata extraction/generation: keywords, thesaurus, ontologies, ...)
(8) Exchange of information
(9) Search and retrieval

1.3.3 C Circulation („Distribution", „Asset Management")

(10) Reserves
(11) Paging/placing
(12) Loan
(13) Interlibrary Loan

1.3.4 D Preservation (physical)

(14) Restoration
(15) Storage

1.3.5 E Digitization

(16) Coding
(17) OMR
(18) Digital preservation
(19) Storage

1.3.6 F Presentation and Marketing

(20) Physical presentation
(21) Events (exhibitions, concerts, ...)
(22) Online services (directories, portals, „virtual libraries")
(23) On-demand services (score printing etc.)
(24) Reviews and introductions
(25) Services for patrons/consulting
(26) Information center services
(27) Publications

1.3.7 G Management

(28) Licensing/Copyright
(29) Workflow management
(30) Project management
(31) Staff development
(32) Finance, controlling and administration
(33) Patrons‘ management („customers database", „CRM/Customer Relation Management")

2 Technology Overview

In this chapter the most relevant standards, rules and technologies are listed. According to their main functionality they are grouped and assigned to the respective field of activity of music libraries (cf. chapter 1.4)

2.1 Acquisitions (A)

2.1.1 EAN/UPC (European Article Number/Universal Product Code)

Started in 1973 by the grocery industry, the UPC (Universal Product Code) was the first standard bar code system for products. The EAN/UPC Composite Symbology contains bar code schemes like UPC-A, UPC-E, EAN-8, and EAN-13, which appear on most products including books, recordings etc., are a basic code system for trade and e-commerce. The EAN/UCC System is jointly managed by EAN International, based in Brussels/Belgium, and the Uniform Code Council (UCC) in the US.

Uniform Code Council:
http://www.uc-council.org

EAN International:
http://www.ean-int.org

2.1.2 EDI (Electronic Data Interchange)

EDI (Electronic Data Interchange) is a proprietary commercial standard providing a collection of standard message formats and element dictionary in a simple way for the exchange of business information via any electronic messaging service. It is relevant mainly for data exchange between producers/publishers and traders. Phononet and large parts of the book trading area are using EDI.

2.1.3 EDIFACT (Electronic Data Interchange For Administration, Commerce and Transport)

EDIFACT (Electronic data interchange for administration, commerce and transport, ISO 9735) defines syntax rules for the preparation of messages (e.g. concerning payments) to be interchanged between partners. Prepared by the UN/ECE (United Nations Economic Commission for Europe) Trade Division, this international EDI standard is designed to meet the needs of both public and private partners. It was adopted by ISO/TC 154. The UN/ECE has also prepared Message Design Guidelines which are included in the UN/ECE Trade Data Interchange Directory. The standard was published in 1988 and amended with small changes in 1990. The implementation process in XML is hosted by W3C.

UN/ECE Trade Data Interchange Directory:
http://www.unece.org/trade/untdid/

EDIFACT Application level syntax rules:
http://www.nls.fi/ptk/standardisation/2.html

W3C Electronic Commerce Interest Group:
http://www.w3.org/ECommerce/Overview-xmledifact

2.1.4 ANSI X12

ANSI (American National Standards Institute) X12 standards define the structure, format and content of business transactions conducted through Electronic Data Interchange (EDI). ANSI X12 is produced by the ASC (Accredited Standards Committee) X12.

ASC (Accredited Standards Committee) X12:
http://www.x12.org

2.1.5 BISAC (Book Industry Standards And Communications)

BISAC is the main standards forum of the US-based „Book Industry Study Group" (BISG). It serves as a platform within the publishing industry to develop and maintain technology and electronic commerce standards, to survey industry trends, and to address business issues facing its members. BISAC intends to facilitate the administration of publisher/customer and publisher/manufacturer electronic data interchange formats for books and serials based on the international EDI standards created by the United Nations in conjunction with other national bodies and coordinated by EDItEUR, the international organization coordinating book and serial electronic commerce. Main activities of BISAC are:

- Development of publishing industry-supported bar code and EDI formats
- Publication and promotion of the correct use of standard numbering systems, including the ISBN, and forthcoming standards such as the ISTC.
- Incorporation of standards for telecommunication protocols
- Revisions of EDI coding for easier implementation for web-based transactions (using xCBL instead of X12)
- Development of new reporting format standards for e-book publishers based on XML to track e-sales
- Contributing a US perspective in the development of digital intellectual property identifiers and metadata elements

http://www.bisg.org/bisac/index.html

2.1.6 EDItEUR (International Group for Electronic Commerce in the Book and Serials Sectors)

EDItEUR (the International Group for Electronic Commerce in the Book and Serials Sectors) is an international group coordinating the development of the standards infrastructure for electronic commerce in the book and serials industries. EDItEUR provides its international membership with research, standards and guidance for EDI and other e-commerce standards for book and serial transactions, Bibliographic and product information, The standards infrastructure for digital publishing, Radio frequency identification tags and Rights management and trading. EDItEUR has 90 members from 17 countries, including most of the European countries. EDItEUR acts as an international umbrella body for the various national EDI book sector EDI groups.

http://www.editeur.org

2.1.7 Phononet

Phononet is a network of record producers, distributors and traders in the German-speaking countries connected to the IFPI International Federation of the Phonographic Industry. Phononet connects more than 100 record producers with more than 600 record traders (2000 outlets) in Germany alone, adding more in Austria and Switzerland. Phononet is using a proprietary cataloguing software (PNStamm), programmed by DE-Parcon/Germany. Phononet is mainly a Business-to-business service (B2B), providing order clearing and a search engine for recordings. It is connected to the end-user format MID (Music Info Disk) which is used to publish label catalogues on CD-Rom, etc.

There are other catalogues for available recordings which are regularly used within the record trading business, e.g. the „Bielefelder Katalog" for recordings in the classical genre.

http://phononet.de
http://phononet.at
http://www.phononet.ch

http://www.de-parcon.de

2.1.8 Books in print

„Books in Print" is the catalogue of books, audio and video recordings in print as well as out of print which is published regularly by R.R. Bowker (according to it's own website „the world's leading publisher of bibliographic information"). The online Business-to-business (B2B) portal with paid access only offers special services for libraries, bookstores and publishers.

http://www.booksinprint.com/bip/

2.1.9 VLB (Verzeichnis lieferbarer Bücher)

Like Books in Print for English-speaking countries, VLB (Verzeichnis lieferbarer Bücher, directory of available books) is one of the main catalogues for books which are available from book sellers. Unlike Books in Print, the VLB online portal is run by the Association of the German book trading industry (MVB Marketing- und Verlagsservice des Buchhandels GmbH), it is a Business-to-consumer (B2C) portal and offers free access to bibliographic information. There are other one-stop shops and distributors for books which issue their own catalogues, e.g. KNO.

http://www.vlb.de
http://www.mvb-online.de
http://www.buchhandel.de

2.1.10 CIP (Cataloguing in Publication)

CIP (Cataloguing in Publication) is a voluntary cooperative venture between publishers and libraries which enables books to be catalogued before they are published. This pre-publication cataloguing information is then distributed widely to booksellers and libraries, giving them advance information so that they can select, buy and process new books. The distinguishing feature of Cataloguing in Publication is that the catalogue record is created and disseminated prior to publication and is printed in the book itself. The CIP program is operated through a network of agent libraries in different countries that provide CIP services to the publishers in their respective areas.
However, in Germany the CIP program has been terminated in 2002 and is being followed by a separate „Neuerscheinungsdienst" in cooperation of Die Deutsche Bibliothek and the MVB Marketing- und Verlagsservice des Buchhandels GmbH.

National Library of Canada:
http://www.nlc-bnc.ca/cip/

Die Deutsche Bibliothek:
http://www.ddb.de/professionell/cip.htm

2.1.11 CDDB (CD Database)

The CDDB (CD Database) service provided by Gracenote describes itself as „the industry standard for music recognition services". It claims to run the largest online database of music information in the world (about 2.5 million CDs, 32 million songs), and to be used by over 1 million people in over 130 countries every day. Using the ISRC code, CDDB can provide information even on compilations. It provides expanded album and track fields, credits, genres, web-links and segments. CDDB is used in the Apple iPod/iTunes software in order to identify songs.

http://www.gracenote.com/
http://www.gracenote.com/gn_products/cddb.html

2.1.12 Gracenote MusicID

The Gracenote MusicID introduces audio waveform recognition technology, providing unprecedented success rates by extending Gracenote's legendary music recognition to the song level. Gracenote MusicID draws upon the world's largest database of fingerprints and the Gracenote CDDB music information database.

http://www.gracenote.com/gn_products/music_id.html

2.1.13 SoundScan

Nielsen SoundScan is an information system that tracks sales of music and music video products throughout the United States and Canada. According to Nielsen, sales data from point-of-sale cash registers is collected weekly from over 14,000 retail, mass merchant and non-traditional (on-line stores, venues, etc.) outlets. Weekly data is compiled and made available every Wednesday. Nielsen SoundScan is the sales source for the Billboard music charts.

http://www.soundscan.com

2.2 Identifier (B4)

2.2.1 Authority files (mostly national/language-specific)

Authority files are the most classical and typical tools for identification within the library community. They serve as a means e.g. for allocating several issues of a score or recording to the same work/composition (Uniform Title), which can allocated to the same author (Name Authority File), even if different spellings, wordings, or pseudonyms are used on the actual object/publication. This kind of identification is especially relevant for music libraries, as there are often dozens of variations e.g. for the title of the same symphony or string quartet composition. Thus, there are several authority files especially for music libraries, e.g. in German-speaking countries the „Personennamendatei" (Name Authority File) or the „Einheitssachtiteldatei" (Uniform Title File) maintained by the Deutsches Musikarchiv Berlin. Authority files are typically coordinated and maintained by national libraries/archives or by networks of national libraries/archives. The usage of authority files for correct cataloguing requires a librarian's education.

2.2.2 ISBN (International Standard Book Number)

The ISBN belongs to the most recognized identifiers worldwide. It serves as the main means for identification of books in the area of book trading. The ISBN is a ten-digit number comprised of the Arabic numerals 0 – 9. The last digit serves as a control figure and can also be „X".

2.2.3 ISSN (International Standard Serial Number)

The ISSN (International Standard Serial Number) is an internationally recognized identifier for publications issued in printed or other form (e.g. CD-ROM, Internet, etc.) on a consecutive basis. The ISSN is an eight-digit number comprised of the Arabic numerals 0 – 9. The last digit serves as a control figure and can also be „X".

The ISSN network contains national libraries and is coordinated by the International ISSN Centre in Paris. All national library centres report local ISSN and related title data to the International ISSN Centre, where they are made available in the international data pool „ISSN Online".

Data pool „ISSN online" (free trial):
http://online.issn.org/trial.html

2.2.4 SICI (Serials Item and Contribution Identifier)

The SICI (Serial Item and Contribution Identifier, ANSI/NISO Z39.56 – 1996 (R2002)) is a code of variable length that can be used to identify both print and electronic serial publications. The current edition includes a distinction of electronic, paper and microformat serials and the identification of derivative parts of a serial. It is also intended to accommodate proprietary numbering schemes.

Maintenance agency:
http://sunsite.berkeley.edu/SICI/

Free download of the SICI standard:
http://www.niso.org/standards/index.html

2.2.5 LCCN (Library of Congress Control Number)

The LCCN is used since 1898 for authority, bibliographic and classification records. It has at least 12 digits. The basic elements are prefix, year, and serial number.

http://www.loc.gov/marc/lccn.html
http://lcweb.loc.gov/marc/lccn_structure.html

2.2.6 ISMN (International Standard Music Number)

The ISMN (International Standard Music Number) is a unique number for the identification of all printed music publications from all over the world, whether available for sale, hire or gratis; whether a part, a score, or an element in a multi-media kit. The ISMN is designed to rationalize the processing and handling of printed music and the respective bibliographical data for publishing houses, the music trade and libraries. It is based on ISO 10975. ISMN is maintained by the International ISMN Agency hosted by the Staatsbibliothek zu Berlin.

International ISMN Agency:
http://www.ismn-international.org/

2.2.7 ISWC (International Standard Work Code)

The ISWC (International Standard Work Code) in development by the CISAC (International Confederation of Authors' and Composers' Societies) is intended to uniquely identify musical (and potentially other types of) works through the application of a unique alphanumeric code commencing with an alphabetic letter, followed by nine digits and a check digit. The ISWC identifies an abstract work, not its physical manifestations.

http://www.cisac.org

2.2.8 ISRC (International Standard Recording Code)

The ISRC (International Standard Recording Code, ISO 3901) is an international standard code for the unique identification of sound recordings and music video recordings. An ISRC identifies a recording throughout its life and is intended for use by producers of recordings as well as by copyright organizations, broadcasting organizations, media libraries and archives, etc. Each ISRC can be permanently encoded into a product as its digital fingerprint. Encoded ISRC provide the means to automatically identify recordings for royalty payments.

http://www.ifpi.org/isrc
http://www.riaa.org/Audio-Standards-3.cfm

2.2.9 GRId (Global Release Identifier)

GRid identifies releases of sound recordings for electronic distribution. Maintained by the IFPI (International Federation of the Phonographic Industry), GRId is intended to integrate identification systems deployed by key stakeholders from across the music industry.

GRid consists of:

- The identifier syntax for the fundamental unit of trade (the release of an audio recording)
- A metadata schema providing a minimum set of data needed to uniquely identify the release
- Definitions of, and data elements for, messages that will enable electronic data interchange between trading partners and others in the value chain

To begin allocating GRids, users must apply for an Issuer Code, which uniquely identifies the individual or company that will be identifying their releases with GRids. These are available from the IFPI appointed Registration Agency, RITCO, through a secure, web-based on-line application form.

http://www.ifpi.org/grid/

2.2.10 ISTC (International Standard Text Code)

ISTC (International Standard Text Code, ISO Project 21047 coordinated by ISO TC 46/SC 9 working group 3) is a new identifier currently being developed for individual textual works. The ISTC is intended to provide a way for textual works to be uniquely distinguished from one another within computer applications and for the purposes of administering rights to such works. A Request for Candidates for the future ISTC Registration Authority was issued in January 2004.

ISO TC 46/SC 9 working group 3:
http://www.nlc-bnc.ca/iso/tc46sc9/wg3.htm

2.2.11 DOI (Digital Object Identifier)

The DOI System provides a framework for the identification of items/objects in a networked environment. It is intended to ease the managing of intellectual property, to link customers with content suppliers, to facilitate electronic commerce, and enabling automated copyright management for all types of media. DOIs are names (characters and/or digits) assigned to objects of intellectual property (physical, digital or abstract) such as electronic journal articles, images, learning objects, e-books, images, any kind of content. They are used to provide current information, including where they (or information about them) can be found on the Internet. Information about a digital object may change over time, including where to find it, but its DOI will not change.
The system is managed and directed by the International DOI Foundation. Since 2003 the Conference of European National Librarians (CENL) with its members (43 national libraries in 41 European countries) is a member of the International DOI Foundation.

http://www.doi.org

2.2.12 SAN (Standard Address Number)

The Standard Address Number (SAN, ANSI/NISO Z39.43 – 1993(R2001)) is a seven-digit numeric identifier used to identify organizations and businesses interacting with the publishing industry (including book and serial manufacturers, libraries, publishers, etc.). Originally created to expedite paper-based transactions such as purchase orders and returns, the SAN has been designated as the organizational identifier for use in EDI transactions in the publishing industry.

http://www.niso.org/standards/index.html

2.2.13 OpenURL

The OpenURL Framework for Context-Sensitive Services (ANSI/NISO Z39.88-200X) is a standard syntax to create web-transportable packages of metadata and identifiers. It is being developed by NISO.

http://www.niso.org/standards/index.html

2.2.14 URN/URI (Uniform Resource Name/Uniform Resource Identifier)

The URN (Uniform Resource Name) is intended to be a persistent identifier for information resources.

IETF URN Charter:
http://www.ietf.org/html.charters/urn-charter.html

W3C Naming and Addressing:
http://www.w3.org/Addressing/

2.2.15 „Standalone identifier" (collection-specific)

Though identifier aim at interoperability between independent systems, there are countless collections of music and audiovisual material that don't use existing identifiers. Typical reasons for this kind of isolated collection and metadata generation are:

- high costs for the generation of metadata that is fully compliant to other networks and collections, especially if the community is relying upon complex rules and standards (as is the case with libraries)
- relevant identifiers have typically been set up by communities that do not necessarily provide incentives for use outside the community
- relevant identifiers might not have been promoted and disseminated effectively

2.3 Cataloguing Rules (B5)

2.3.1 AACR2 (Anglo-American Catalogue Rules)

The AACR2 (Anglo-American Cataloguing Rules, 2nd ed., 1998 revision, with Amendments 1999 and 2001) are the cataloguing rules prevailing in Anglo-American countries. They are „designed for use in the construction of catalogues and other lists in general libraries of all sizes. […] The rules cover the description of, and the provision of access points for, all library materials commonly collected at the present time." [Rule 0.1].

2.3.2 RAK (Regeln zur alphabetischen Katalogisierung)

RAK (Regeln zur alphabetischen Katalogisierung) are the cataloguing rules prevailing in German-speaking countries. There is a special subset of rules for the cataloguing of music (RAK-Musik), last revision 2003.

2.3.3 MMD-DRA (Multimediales Datenmodell der Deutschen Rundfunkanstalten)

In 2000 the German Broadcasting Associations ARD and ZDF started an initiative to define a binding multimedia data model for the digital production, broadcasting and archiving. The project aims at collating metadata in various formats.

http://mmd.dra.de

2.3.4 METS (Metadata Encoding and Transmission Standard)

The METS (Metadata Encoding and Transmission Standard) schema is a new standard (2002) for encoding descriptive, administrative, and structural metadata regarding objects within a digital library, expressed using the XML schema language of the W3C. The standard is maintained in the Network Development and MARC Standards Office of the Library of Congress, and is being developed as an initiative of the Digital Library Federation.

http://www.loc.gov/standards/mets

2.4 Catalog Formats / Metadata Profiles (B6)

2.4.1 MARC (Machine-Readable Cataloging)

MARC (Machine-Readable Cataloging) formats are metadata profiles for the representation and communication of bibliographic and related information in machine-readable form. MARC has several versions, variations and subdivisions (e.g., MARC21, USMARC, UNIMARC).
The primary purpose of UNIMARC is to facilitate the international exchange of bibliographic data in machine-readable form between national bibliographic agencies. UNIMARC may also be used as a model for the development of new machine-readable bibliographic formats. The scope of UNIMARC is to specify the content designators (tags, indicators and subfield codes) to be assigned to bibliographic records in machine-readable form and to specify the logical and physical format of the records. It covers monographs, serials, cartographic materials, music, sound recordings, graphics, projected and video materials, rare books and electronic resources. (*UNIMARC Manual*: Bibliographic Format)

MARC comprises data formats for:
- bibliographic data
- authority data
- holdings data
- community resource data
- ...

Library of Congress, Network Development and MARC Standards Office: "MARC to Dublin Core Crosswalk". – February, 2001. – Online at: http://www.loc.gov/marc/marc2dc.html

2.4.2 MAB (Maschinelles Austauschformat für Bibliotheken)

MAB (Maschinelles Austauschformat für Bibliotheken, Automated Library Exchange Format) is a cataloguing format equivalent to MARC that is prevailing in libraries in German speaking countries. MAB enables libraries to exchange bibliographic, authority and local data generated within the library context.

The MAB set of formats is being maintained by the MAB Committee under the auspices of Die Deutsche Bibliothek.

2.4.2.1 MAB2

The current MAB version MAB2 contains substantive, structural and technical modifications required for the application of MAB as an exchange format also in online environments. It comprises five distinct data formats based upon a uniform, integrated field structure:
- MAB format for bibliographic data (MAB-TITEL)
- MAB format for personal names (MAB-PND)
- MAB format for corporate-body names (MAB-GKD)
- MAB format for subject headings (MAB-SWD)
- MAB format for local data (MAB-LOKAL)

There are two more provisional MAB formats:
- MAB format for address and library data (MAB-ADRESS)
- MAB format for classification and notation data (MAB-NOTAT)

2.4.2.2 MABxml

MABxml is a new exchange format developed by Die Deutsche Bibliothek. It enables users to MAB2-records using a XML-structure and therefore is suitable for XML-based technologies like OAI, SRW/U and XSLT.

http://www.ddb.de/professionell/swd_e.htm

MAB documentation with binding rules and examples:
http://www.ddb.de/produkte/publ_gedr_e.htm#mab

Mapping of MAB2 and Dublin Core Metadata Element Set 1.1:
http://www.ddb.de/professionell/pdf/dublin_core-mab.pdf

2.4.3 EAD (Encodced Archival Description)

The EAD (Encoded Archival Description) DTD (Document Type Definition) is a standard for encoding archival finding aids using the Standard Generalized Markup Language (SGML). The standard is maintained in the Network Development and MARC Standards Office of the Library of Congress in partnership with the Society of American Archivists.

http://lcweb.loc.gov/ead/

2.4.4 ISBD (International Standard bibliographic description)

The ISBD (International Standard bibliographic description) developed by the International Federation of Library Associations and Institutions standardizes the descriptive portion of catalogue and bibliographical records produced in different countries; it prescribes the elements constituting the description, their order, and the punctuation between them.

2.4.5 FRBR (Functional Requirements for Bibliographic Records)

FRBR (Functional Requirements for Bibliographic Records) is a recommendation of the International Federation of Library Associations and Institutions (IFLA) to restructure catalog databases in order to meet the conceptual structure of information resources (1998). FRBR replaces the single record concept that serbes as a basis for current cataloging standards by an entity-relationship model of metadata for information objects. The FRBR model differentiates five basic entities for the correct description and identification of a bibliographic record:
- **Work**: a distinct intellectual or artistic creation
- **Expression**: the intellectual or artistic realization of a work in the form of alpha-numeric, musical, or choreographic notation, sound, image, object, movement, etc., or any combination of such form
- **Manifestation**: the physical embodiment of an expression of a work
- **Item**: a single exemplar of a manifestation
- **Person**: an individual. The entity defined as person encompasses individuals that are deceased as well as those that are living

To illustrate the gap between multimedia standardization groups and the library community, it is helpful to compare the FRBR entities to the respective items for MPEG-21, which are reduced to a basic differentiation of „objects" and „users".

IFLA, International Federation of Library Associations and Institutions: "Functional Requirements for Bibliographic Records. Final Report"/IFLA Study Group on the Functional Requirements for

Bibliographic Records. Approved by the Standing Committee of the IFLA Section on Cataloguing. – Munich: K. G. Saur, 1998 (UBCIM Publications. – New Series, Volume 19, September, 1997) – Online at: http://www.ifla.org/VII/s13/frbr.htm

2.5 Classification (B7)

Classification is one of the most important aspects of enabling search and retrieval of documents, objects and information. While libraries have a long-held and elaborate tradition of keyword and subject heading schemes, there typically is a more pragmatic and less systematic attitude towards "content classification" and metadata for online resources. The distinction of the bibliographic and the content-based approach (cf. Lynch 2001) of information retrieval can be shown in the area of classification very clearly: While "Content Classification Engines" by Search engine providers such as Verity Ultraseek aim at automatic classification as far as possible, drawing upon full-text search, filenames, URL patterns etc., the library community is relying on the manual application of consistent metadata schemes such as the Library of Congress Classification System, Dewey Decimal Classification or the Schlagwortnormdatei. For the future an integration of both approaches can be expected. For this process it is important to state the requirements for music libraries, in terms of quality, usability and workflow management.

2.5.1 Library of Congress Classification System

2.5.1.1 Subclass M Music

M1-5000 Music
M1.A1-1.A15 Music printed or copied in manuscript in the United States or the colonies before 1860
M1.A5-2.3 Collections
M2-2.3 Collections of musical sources
M3-3.3 Collected works of individual composers
M3.3 First editions
M5-1490 Instrumental music
M6-175.5 Solo instruments
M176 Instrumental music for motion pictures
M176.5 Instrumental music for radio and television
M177-990 Music for two or more solo instruments
M180-298.5 Duets
M300-386 Trios
M400-486 Quartets
M500-586 Quintets
M600-686 Sextets
M700-786 Septets
M800-886 Octets
M900-986 Nonets and larger combinations of purely chamber music
M990 Chamber music for instruments of the 18th century and earlier
M1000-1075 Orchestra
M1100-1160 String orchestra
M1200-1269 Band
M1270 Fife (bugle) and drum music, field music, etc.
M1350-1353 Reduced orchestra
M1356-1356.2 Dance orchestra and instrumental ensembles
M1360 Mandolin and similar orchestras of plucked instruments
M1362 Accordion band
M1363 Steel band
M1365 Minstrel music
M1366 Jazz ensembles
M1375-1420 Instrumental music for children
M1450 Dance music
M1470 Chance compositions

M1473 Electronic music
M1480 Music with color or light apparatus
M1490 Music printed before 1700 or copied in manuscript before 1700
M1495-5000 Vocal music
M1497-1998 Secular vocal music
M1500-1527.8 Dramatic music
M1528-1529.5 Duets, trios, etc., for solo voices
M1530-1546.5 Choruses with orchestra or other ensemble
M1547-1600 Choruses, part-songs, etc., with accompaniment of keyboard or other solo instrument, or unaccompanied
M1608 Choruses, etc., in tonic sol-fa notation
M1609 Unison choruses
M1610 Cantatas, choral symphonies, etc., for unaccompanied chorus (secular and sacred) with or without solo voices
M1611-1624.8 Songs
M1625-1626 Recitations with music
M1627-1853 National music
M1900-1978 Songs (part and solo) of special character
M1985 Musical games
M1990-1998 Secular music for children
M1999-2199 Sacred vocal music
M1999 Collections
M2000-2007 Oratorios
M2010-2017.6 Services
M2018-2019.5 Duets, trios, etc. for solo voices
M2020-2036 Choruses, cantatas, etc.
M2060-2101.5 Choruses, part-songs, etc., with accompaniment of keyboard or other solo instrument, or unaccompanied
M2102-2114.8 Songs
M2115-2146 Hymnals. Hymn collections
M2147-2188 Liturgy and ritual
M2147-2155.6 Roman Catholic Church
M2156-2160.87 Orthodox churches
M2161-2183 Protestant churches
M2184 Other Christian churches
M2186-2187 Jewish
M2188 Other non-Christian religions
M2190-2196 Sacred vocal music for children
M2198-2199 Gospel, revival, temperance, etc. songs
M5000 Unidentified compositions

2.5.1.2 Subclass ML Literature on music

ML1-3930 Literature on music
ML25-28 Societies and organizations
ML32-33 Institutions
ML35-38 Festivals. Congresses
ML40-44 Programs
ML47-54.8 Librettos. Scenarios
ML62-90 Special aspects Including writings of musicians
ML93-96.5 Manuscripts, autographs, etc.
ML100-109 Dictionaries. Encyclopedias
ML110-111.5 Music librarianship
ML112-112.5 Music printing and publishing
ML112.8-158.8 Bibliography
ML113-118 International
ML120 National
ML132 Graded lists. By medium

ML135 Manuscripts
ML136-158 Catalogs. Discography
ML158.4-158.6 Video recordings
ML158.8 Computer software
ML159-3775 History and criticism
ML162-197 Special periods
ML162-169 Ancient
ML169.8-190 Medieval. Renaissance
ML193-197 1601-
ML198-360 By region or country
ML198-239 America
ML240-325 Europe
ML330-345 Asia
ML348 Arab countries
ML350 Africa
ML360 Australia, Oceania
ML385-429 Biography
ML430-455 Composition
ML459-1380 Instruments and instrumental music
ML465-471 By period
ML475-547 By region or country
ML475-486 America
ML489-522 Europe
ML525-541 Asia
ML544 Africa
ML547 Australia, Oceania
ML548 Jews
ML549-1093 Instruments
ML549.8-649 Organ
ML649.8-747 Piano, clavichord, harpsichord, etc.
ML749.5-927 Bowed string instruments
ML929-990 Wind instruments
ML999-1015 Plucked instruments
ML1030-1049 Percussion instruments
ML1049.8-1091 Mechanical and other instruments
ML1091.8-1093 Electronic instruments
ML1100-1165 Chamber music
ML1200-1270 Orchestra
ML1299-1354 Band
ML1379-1380 Electronic music. Computer music
ML1400-3275 Vocal music
ML1499-1554 Choral music
ML1600-2881 Secular vocal music
ML2900-3275 Sacred vocal music
ML3300-3354 Program music
ML3400-3465 Dance music
ML3469-3541 Popular music
ML3544-3775 National music
ML3800-3923 Philosophy and physics of music
ML3845-3877 Aesthetics
ML3880-3915 Criticism
ML3928-3930 Literature for children

2.5.1.3 Subclass MT Musical instruction and study

MT1-960 Musical instruction and study
MT1-5 History and criticism
MT5.5-7 Music theory

MT20-32 Special methods
MT40-67 Composition. Elements and techniques of music
MT58-67 Forms
MT68 Improvisation. Accompaniment. Transposition
MT70-74 Instrumentation and orchestration
MT73 Band
MT90-146 Analysis and appreciation of musical works
MT95-100 Opera, ballet, etc.
MT110-115 Oratorios, cantatas, etc.
MT125-130 Orchestral music
MT140-145 Chamber and solo instrumental music
MT146 Popular music
MT170-810 Instrumental techniques
MT180-198 Organ
MT192 Electronic keyboard instruments
MT200-208 Reed organ
MT220-255 Piano
MT259-338 String instruments
MT260-279.7 Violin
MT280-298 Viola
MT300-318 Violoncello
MT320-334 Double bass
MT339-533 Wind instruments
MT340-359 Flute
MT360-379 Oboe
MT380-392 Clarinet (A, Bb, C, Eb, etc.)
MT400-415 Bassoon
MT418 Brass instruments
MT420-432 Horn
MT440-456 Trumpet
MT460-472 Trombone
MT480-488 Tuba
MT500-510 Saxophone
MT539-654 Plucked instruments
MT540-557 Harp
MT560-570 Banjo
MT580-599 Guitar
MT600-612 Mandolin
MT620-634 Zither
MT640-654 Lute, balalaika, etc.
MT655-725 Percussion and other instruments
MT728-728.3 Chamber music
MT730 Orchestra
MT733-733.6 Band
MT740-810 Instrumental techniques for children
MT820-915 Singing and vocal technique
MT825-850 Systems and methods
MT855-883 Special techniques
MT898-915 Techniques for children
MT918-948 School music
MT955-956 Musical theater

2.5.2 DDC (Dewey Decimal Classification)

DDC provides a system for classifying data and information since 1878. It is intended to organize knowledge represented in any form, e.g., books, documents, electronic resources. In the DDC, the

notation is expressed in Arabic numerals. The notation gives both the unique meaning of the class and its relation to other classes. Different words or languages may be used to describe the class.

2.5.2.1 The ten DDC classes from 000 to 900

000 Generalities
100 Philosophy and Psychology
200 Religion
300 Social Sciences / Sociology
400 Languages
500 Natural Sciences & Mathematics
600 Technology (Applied Sciences)
700 The Arts, Fine and Decorative Arts
800 Literature & Rhetoric
900 Geography & History

2.5.2.2 Class 700 „The Arts, Fine and Decorative Arts“

700 The Arts, Fine and Decorative Arts
710 Civic & Landscape Arts
720 Architecture
730 Plastic Arts, Sculpture
740 Drawing & Decorative Arts
750 Painting & Paintings
760 Graphic Arts, Printmaking & Prints
770 Photography & Photographs
780 Music
790 Recreational & Performing Arts

2.5.2.3 Class 780 „Music”

780 Music
780.7 Education, performances, related topics
780.8 History and description of music with respect to kinds of persons
780.9 Historical, geographic,
780.92 musicians, composers
781 General principles & musical forms
781.1 Aesthetics, appreciation, taste
781.2 Elements of music
781.3 Composition
781.4 Techniques of music
781.5 Kinds of music
781.6 Traditions of music
781.7 Sacred music
781.8 Musical forms
782 Vocal music
782.1 Dramatic vocal forms Operas
782.2 Nondramatic vocal forms
782.3 Services (Liturgy and ritual)
782.4 Secular forms
782.5 Mixed voices
782.6 Women's voices
782.7 Children's voices
782.8 Men's voices
782.9 Other types of voices
783 Music for single voices; The voice
783.1 Single voices in combination
783.2 Solo voice
783.3 High voice
783.4 Middle voice

783.5 Low voice
783.6 Women's voices
783.7 Children's voices
783.8 Men's voices
783.9 Other types of voice
784 Instruments & instrumental ensembles
784.1 General principles, musical forms, instruments
784.2 Full (Symphony) orchestra
784.3 Chamber orchestra
784.4 Light orchestra
784.5 Pop music
784.6 Keyboard, mechanical, electronic, percussion bands
784.7 String orchestra
784.8 Wind band
784.9 Brass band
785 Chamber music
786 Keyboard & other instruments
786.2 Piano
786.3 Clavichord
786.4 Harpsichord
786.5 Keyboard wind instruments Organ
786.6 Mechanical and aeolian instruments
786.7 Electrophones Electronic instruments
786.8 Percussion instruments
786.9 Drums and devices used for percussion effects
787 Stringed instruments
787.2 Violin
787.3 Viola
787.4 Cello
787.5 Double bass
787.6 Other bowed stringed instruments
787.7 Plectral instruments, guitar
787.9 Harp and musical bow
788 Wind instruments
788.2 Woodwind instruments and free aerophones
788.3 Flute family
788.4 Reed instruments
788.5 Double-reed instruments
788.6 Single-reed instruments
788.7 Saxophone
788.8 Free reeds
788.9 Brass instruments (Lip-reed instruments)
789

Dewey, Melvil: “Decimal Classification and Relative Index”/Edition 22. Four volumes. – Dublin/Ohio: OCLC Forest Press, 2003. – ISBN 0-910608-70-9. (USD 375.00)

http://www.oclc.org/dewey
http://www.olc.org/pdf/TechKNOW-July2003.pdf
http://www.oclc.org/support/forms/pdf/dfwpro.pdf
http://www-lib.nearnorth.edu.on.ca/dewey/ddc_mine700.htm
http://www.ub.uni-mainz.de/dewey_decimal_classification_ddc.html

2.5.3 SWD (Schlagwortnormdatei)

The Schlagwortnormdatei (Subject Authority File, SWD) provides a standardised vocabulary with a controlled terminology. It contains standard and reference forms of subject headings established in accordance with the „Regeln für den Schlagwortkatalog“ (Rules for the Subject Catalogue, RSWK) and the „Praxisregeln zu den RSWK und der SWD“ (Rules for Application of the RSWK and the SWD). The subject headings encompass all subject areas and heading categories. The SWD is compiled by „Die Deutsche Bibliothek” in co-operation with several Libary Associations in Germany, Switzerland and Austria.

http://www.ddb.de/professionell/swd_e.htm

2.5.4 TV-Anytime Classification (MPEG-7)

The global TV-Anytime Forum is an association of organizations which aims to develop specifications to enable audio-visual and other services based on mass-market high volume digital storage in consumer platforms – simply referred to as local storage.
The TV-Anytime Forum was formed in 1999. It has started work to develop open specifications designed to allow Consumer Electronics Manufacturers, Content Creators, Telcos, Broadcasters and Service Providers to take advantage of their respective holdings and contents.
The Metadata Working Group is contributing to standards such as MPEG-7.

The TV-Anytime Forum has established four fundamental objectives for the organization:

- It wants do define specifications that will enable applications to exploit local persistent storage in consumer electronics platforms.
- The TV-Anytime Forum is network independent with regard to the means for content delivery to consumer electronics equipment, including various delivery mechanisms, the Internet and enhanced TV.
- It attempts to develop specifications for interoperable and integrated systems, from content creators/providers, through service providers, to the consumers.
- It tempts to specify the necessary security structures to protect the interests of all parties involved.

The TV-Anytime Forum invites participation from all interested organizations. Meetings are held approximately every two months in Europe, the USA, and Asia.

2.5.4.1 The TV-Anytime Classification scheme as far as relevant for music

3.1.6. Leisure
3.1.6.14 Music

3.1.7 Arts & Media
3.1.7.1 Music

3.2. Drama
3.2. 19 Musical Drama

3.3. Entertainment
3.3.21 Music variety
3.3.22 Musicals
3.3.23 Musical comedy
3.3.24 Musical romance

3.4. Music
3.4.1. Serious music (Example: Ballet „The Swan lake” should be classified as „serious music, classical/romantic”. Serious music including chamber, instrumental, operatic, symphonic, choral and sacred music)
3.4.1.1 Early (Music written before the middle of the 17th Century)
3.4.1.2 Classical and Romantic (Serious music from the middle of the 18th until the end of the 19th Century)

3.4.1.3 Contemporary (Serious music written during the 20th Century)
3.4.1.4 Light classical (Music by Strauss, Lehar etc.)
3.4.1.5 Opera
3.4.1.6 Classical
3.4.2 Jazz (Indigenous American popular music, born in New Orleans of African slaves social circumstances. The jazz idiom is characterized by certain syncopations over strongly reiterated rhythms in which improvisation plays an important part)
3.4.2.1. Jazz/fusion
3.4.2.2. Traditional
3.4.2.3. Modern
3.4.2.4. Pop Jazz

3.4.3. Middle-of-the-road (Music which, in varying circumstances, gives pleasure to the widest possible spectrum of the music-loving audience)
3.4.3.1. European popular traditional
3.4.3.2. World Music (Commercial music based on traditional music mainly from the Caribbean, and often using new instruments such as synthesizers)

3.4.4. Pop/rock/pop-rock (The most central and widely circulated types of popular music, in particular rock and roll, reggae, etc.)
3.4.4.1. World Music (Commercial music based on traditional music mainly from the Caribbean, and often using new instruments such as synthesizers)
3.4.4.2. Folk (Music that is the product of a tradition that has been evolved through the process of oral transmission)
3.4.4.2.1. Traditional (Music that is the product of a tradition that has been evolved through the process of oral transmission.)
3.4.4.2.2. Contemporary
3.4.4.2.3. Ballad

3.4.5. Country
3.4.6 Traditional
3.4.5.1. Ethnic (Music which has not changed throughout the course of history and is normally played on traditional instruments eg. Raga in India or koto in Japan)
Popular music
3.4.6.1. Foreign rock / pop
3.4.6.2. Japanese rock / pop
3.4.6.3. Japanese ballads / „Enka"
3.4.6.4. Live performances / concerts
3.4.6.5. Rankings / requests
3.4.6.6. Karaoke / singing contests
3.4.6.7. Folk music / (Japanese) folk music
3.4.6.8. Nursery songs / children's music
3.4.6.9. Culture-specific music / world music
3.4.6.10. Domestic Rock/Pop

3.4.7. Ballet (TV programmes (predominantly) consisting of music, dance or ballet)
3.4.7.1. Ballet

3.4.8. Dance
3.4.8.1. Dance (Programme performed by (ballet) dancers)

3.4.9. Live Concert
3.4.10. Hit-Chart/Song Requests
3.4.11. Traditional Folksong/TraditionalMusic
3.4.12. Children"s Song
3.4.13. Ethnic Music/World Music
3.4.14. National Music

3.4.15. Alternative
3.4.16. Events
3.4.17. Hip Hop
3.4.18. Soul Ritme and Bleus
3.4.19. Club and Dance
3.4.20. Others

3.6. Movies
3.6. 23. Musical

3.7. Animations / special effects
3.7.2. Animated musical

http://www.tv-anytime.org

2.5.5 European Music Navigator Classification (IAMIC)

The European Music Navigator (EMN) gives access to the comprehensive and wide-ranging collection of contemporary music information compiled by the members of IAMIC (International Association of Music Information Centres) for the promotion of contemporary repertoire in the respective country or region. The information includes biographies of composers, musicians and bands, lists of works, scores, festivals, scholarships, etc.

As a web-based information and communication platform, the EMN aims to serve the established local, national and international music world as well as a broader global audience. The EMN concentrates on enhancing and supporting the existing communication structures of Europe's musical life. It opens up new business and promotional opportunities, adapted for the non-profit sector. Furthermore, the EMN intends to develop innovative perspectives for e-commerce and distribution models in the field of music information and therefore it will provide the opportunity for test case development based on experts know-how. The EMN makes all those continuously updated collections and databases of the IAMIC members available by a search engine. From one single entry point users are thus able to search through European music catalogues and musical information.

The most important feature of the Web portal is the highly specialised search engine that offers an ontology-based, knowledge retrieval oriented search solution for the databases and Web sites of IAMIC members and EMN partner organisations. In order to enable a user-friendly information retrieval throughout the different databases, the participating partners are using a common metadata scheme for content classification based on Dublin Core. The classification is structured in a small, very basic and pragmatic ontology (EMN topics) covering the whole area of music. It was designed mainly with online usability in mind, and it enables both browsing and grouping search results on the EMN website. The underlying Verity Ultraseek Search engine provides the indexing of various data sources, full text search in combination with thesaurus/ontology-based search and offers pre-selection filters such as language, country, genre, file type, etc. Verity Ultraseek also offers relevance ranking of search results and the categorisation of search results enabling faster search result selection. It forms a hierarchical, multilingual thesaurus for the information one can find via the EMN. The Verity Ultraseek Search Content Classification Engine employs these semantics to create a tool for an intuitive combination of browsing and searching.

The European Music Navigator project is co-funded by the European Commission Culture 2000 support program and eight Music Information Centres. The project is coordinated by mica – music information center austria. After the initial development phase (2002–2004) the project is maintained by IAMIC.

2.5.5.1 EMN topics

The following list shows the basic "ontology" as it is being used for browsing the EMN partner websites/databases, as well as fo grouping the serach results. The use of the actual EMN Dublin Core DC.Subject tags (controlled vocabulary) is subject to an agreement on the quality requirements for the

classified/tagged information. The ontology is under constant development, being maintained by the EMN Search and Technology Group.

Artists
Composers
Performers

Bands and Ensembles
Bands
Chamber Music Ensembles
Choirs and Vocal Ensembles
Orchestras

Education, Research and Promotion Institutions
Associations, Unions, Foundations
Competitions, Prizes
Courses
Higher Education
Music Information Centers
Music Libraries, Archives
Music Schools
Subsidies, Grants

Events
Concerts
Fairs, Conferences
Festivals

Music Business and Media Companies
Broadcasters
Concert Production
Copyright Collection Societies
Instrument Manufacturers
Newspapers, Journals, Magazines
Publishers
Recording Production and Distribution
Stores and Retailers

Repertoire and Products
Literature and Texts
Recordings
Scores and Works

http://www.musicnavigator.org

2.6 Exchange of Information (B8)

From a library perspective, the development of generic digital communication net technologies from the 1960s onwards has triggered the multiplication of documents, collections, standards, communication channels and metadata systems. At the same time it has enabled libraries to exchange information much more effectively than ever before through network catalogues, virtual catalogues, ordering and circulation systems etc. While the basic protocols of the Internet have become almost normal for daily life exchange of information via e-mail and the World Wide Web, exchange of information between library information systems partly started drawing upon specialized generic technologies. Meanwhile most information management systems for libraries incorporate these common generic technologies.

2.6.1 TCP/IP (Transmission Control Protocol/Internet Protocol)

The Internet Protocol (IP) had originally been developed to create a „Network of Networks" for the US Department of Defense. As the very basis for the development of the Internet, TCP/IP has quickly become the de facto standard for transmitting data over networks. As other communication protocols, TCP/IP is composed of different layers: IP defines the format of data units/packets, and provides a four byte address scheme for the identification of computers within the internet (IP Address). TCP enables computers to establish a reliable connection and exchange streams of data, verifying the correct delivery of data and guaranteeing that data units/packets are delivered in the same order in which they are sent and triggering retransmission until the data has been received correctly and completely.

2.6.2 HTTP (Hypertext Transfer Protocol)

HTTP (HyperText Transfer Protocol) is the basis for the World Wide Web of the Internet. HTTP defines how messages are formatted and transmitted, and how Web servers and browsers should response to commands. For example, entering a URL in a browser sends an HTTP command to the Web server to transmit the requested Web page. HTTP is a „stateless protocol" because commands are executed independently, without relation to the preceding or following commands. This is the main reason that it is difficult to implement interactive Web sites. This problem of HTTP is addressed by technologies such as Java, JavaScript, ActiveX, cookies etc.

2.6.3 SSL (Secure Sockets Layer)

SSL (Secure Sockets Layer) is a protocol developed by Netscape for transmitting confidential documents through the Internet. Data that is transferred over the SSL connection is encrypted with a private key. Most browsers support SSL, and many Web sites use SSL to transmit confidential information such as credit card numbers. URLs that require an SSL connection start with https: instead of http:. SSL has been approved by the IETF (Internet Engineering Task Force) as a standard.

2.6.4 HTTP-S (Secure Hypertext Transfer Protocol)

Secure HTTP (HTTP-S or S-HTTP) is a protocol for transmitting data securely over the World Wide Web. It is a complement to SSL: While SSL defines a secure connection between client and server, HTTP-S defines the secure delivery of individual messages. Also HTTP-S has been approved by the IETF (Internet Engineering Task Force) as a standard.

2.6.5 SMTP (Simple Mail Transfer Protocol)

SMTP (Simple Mail Transfer Protocol) is the main protocol for sending e-mail messages between servers. While SMTP is used to send messages from one server to another, these messages can be retrieved with an e-mail client using POP or IMAP.

2.6.6 HTML (Hypertext Markup Language)

HTML (Hyper-Text Markup Language) is the main authoring language for documents on the World Wide Web. HTML defines the structure and layout of a Web document by using a variety of tags and attributes. HTML is the main language to define how Web pages are formatted and displayed.

2.6.7 SGML (Standard Generalized Markup Language)

SGML (Standard Generalized Markup Language, ISO 8879) is a meta-language for organizing and tagging elements of a document, developed and standardized by the International Organization for Standards (ISO) in 1986. Basically comparable to the newer language XML it provides a standard basis for industries, oganizations and individuals to agree how to exchange information, using their own vocabularies and structures. SGML does not specify any particular formatting; rather, it specifies the rules

for tagging elements. These tags can then be interpreted to format elements in different ways. SGML helps especially to manage large documents that undergo frequent revisions and need to be printed out in different formats. Due to its complexity, SGML itself is not a very widespread language. However, HTML as the currently most common markup language of the World Wide Web is a structured definition and interpretation of tags according to SGML rules.

Cover Pages. The Online Resource for Markup Languages, hosted by Oasis:
http://www.oasis-open.org/cover

International SGML/XML Users Group:
http://www.isgmlug.org

2.6.8 XML (Extensible Markup Language)

XML (Extensible Markup Language) is a markup language for documents containing structured information. A markup language is an abstract syntax to identify structures within documents. The XML specification defines a standard way to add markup to documents. Thus XML is a very basic, generic and extensible standard which is being used more and more frequently for the definition of rules for the structuring of documents.

In HTML both the tag semantics and the set of tags are fixed, and any changes and extensions have to be agreed upon by W3C, browser vendors and the WWW community. In comparison, XML specifies neither semantics nor a tag set, but it provides a standard to define tags and the structural relationships between them. Thus, XML enables communities to build a structure for documents that meet their semantic requirements, while it keeps up a basic interoperability within communities.

Also in the area of library standards XML is replacing earlier syntaxes; e.g. ZING (Z39.50 International: Next Generation) is based on XML, while the original Z39.50 used ASN.1/BER.

Walsh, Norman: „What is XML?"/www.xml.com. – October, 1998. – Online at:
http://www.xml.com/pub/a/98/10/guide1.html

http://www.w3.org/XML
http://www.xml.com/

2.6.9 SQL (Standard Query Language)

SQL is the most common standardized query language for requesting information from databases. The first version SEQUEL (structured English query language) was designed by IBM in 1974/1975. In 1979 SQL was introduced as a commercial database system by Oracle Corporation. In 1986 a rudimentary version of SQL was approved as an official standard by ANSI (current version 1991: SAG SQL). SQL supports databases distributed over different servers.

2.6.10 ODBC (Open Database Connectivity)

ODBC (Open DataBase Connectivity) is a standard for accessing databases that has been developed by Microsoft Corporation. ODBC allows to access data from any database application, regardless of the respective database management system. This is done by inserting a middle layer (database driver) between a database application and the database management system. Since version 2.0 ODBC is compliant to SAG SQL.

http://msdn.microsoft.com

2.6.11 SOAP (Simple Object Access Protocol)

Currently the main contender for an XML based client/server protocol is SOAP 1.1 (Simple Object Access Protocol). SOAP provides an XML messaging framework for defining higher-level application protocols offering increased interoperability in distributed, heterogeneous environments. SOAP is a lightweight protocol intended for exchanging structured information such environments. SOAP uses XML technologies to define an extensible messaging framework, which provides a message construct that can be exchanged over a variety of underlying protocols. The framework has been designed to be independent of any particular programming model and other implementation specific semantics. A more versatile W3C recommendation is under development called XP.

http://msdn.microsoft.com
http://www.w3.org/2000/xp/Group/

2.6.12 .NET

.NET (Dot-Net) is a Microsoft operating system platform that incorporates applications, tools and services and a change in the infrastructure of Microsoft's corporate Web strategy. .NET is intended to enable Internet users to integrate fax, e-mail and phone services, to centralize data storage and to synchronize computing devices to be automatically updated. .NET mainly draws upon four Internet standards: HTTP, XML, SOAP and UDDI.

From a user perspective, .NET has four main aspects:

- It erases the boundaries between applications and the Internet. Instead of interacting with an application or a single Web site, .NET is built to connect the user to an array of computers and services that will exchange and combine objects and data.
- Software is seen to be rented as a hosted service over the Internet instead of purchased on a store shelf. The Internet is intended to house the users' applications and data.
- Users should have access to their information on the Internet from any device, anytime, anywhere.
- .NET also envisions new ways to interact with application data, such as speech and handwriting recognition.

http://msdn.microsoft.com

2.7 Search and Retrieval (B9)

2.7.1 Z39.50

The Z39.50 standard specifies a client/server-based protocol for Information Retrieval/searching and retrieving information from remote databases. It specifies procedures and formats for a client to search a database provided by a server, retrieve database records, and perform related information retrieval functions. The protocol addresses communication between information retrieval applications at the the client and server; it does not address interaction between the client and the end-user. „Z39.50" refers to the International Standard ISO 23950: „Information Retrieval (Z39.50): Application Service Definition and Protocol Specification", and to „ANSI/NISO Z39.50 -2003 Information Retrieval: Application Service Definition and Protocol Specification".
The Library of Congress is the Maintenance Agency and Registration Authority for both standards, which are technically identical (though with minor editorial differences). Z39.50 is the main protocol for library software applications in the area of information retrieval such as ALEPH/ALEPH 500 or DABIS.

http://www.loc.gov/z3950/agency

Free downloadable copy of the Z39.50 standard:
http://lcweb.loc.gov/z3950/agency/document.html

2.7.2 Z39.50 Profile for Access to Digital Collections

The Z39.50 standard has many optional features, which have different relevance for different user communities. To meet the different functional and user requirements for search and retrieval, implementers within a given community typically agree on relevant subsets for their respective systems. These „profiles" for Z39.50 have been developed by several national and international library groups and communities in order to provide guideline for library systems vendors and buyers.

The aim of this profile was to enhance the navigation of digital collections, especially in cases where digital objects in different technical formats, stored on different servers, organized semantically with thematic focuses etc. have to be retrieved. This profile was intended to provide a higher level enveloping structure for different finding aids, encoded archival descriptions, and exhibition catalogs. While „databases" are defined here as an aggregation of records, a „collection" is addressing an aggregation of objects, some of which may be physical objects. While separate databases might be used for digitized books, serials, maps, photos, sound recordings and movies, the kind of collection for which this profile is intended to ease navigation might contain objects from all of these categories.

Library of Congress: "Draft Seven (Final Draft for Review)", Z39.50 Profile for Access to Digital Collections. – May, 1996. – Online at:
http://lcweb.loc.gov/z3950/agency/profiles/collections.html

2.7.3 CIMI Profile

Release 1.0H (November 1998) – „A Z39.50 Profile for Cultural Heritage Information", prepared by the Consortium for the Computer Interchange of Museum Information (CIMI), CIMI Z39.50 Working Group „Cultural Heritage" is broadly defined here as including art, architecture, cultural history, and natural history. Music is not being mentioned explicitly in the Release 1.0H; though the profile claims to fit any type of digital resource including audio, video, and images, all these types are addressed as „images".

http://www.cimi.org/public_docs/HarmonizedProfile/HarmonProfile1.htm
http://lcweb.loc.gov/z3950/agency/profiles/cimi1.html

2.7.4 Z39.50 Bath profile

The Bath Profile (The Bath Profile: A Z39.50 Specification for Library Applications and Resource Discovery (Release 2)) is the result of an ongoing process of international collaboration, and builds upon existing work in Europe, North America and Australia. The profile is intended to evolve as the environment and the standard change, and is intended to facilitate global resource sharing. Initial development of the Profile was undertaken with financial assistance from the Joint Information Systems Committee (JISC). The ongoing role of Maintenance Agency is assumed by the National Library of Canada (NLC).

The Bath Profile is an ISO Internationally Registered Profile (IRP) of the Z39.50 Information Retrieval Protocol. It defines a subset of specifications from the Z39.50 Information Retrieval Protocol (ANSI/NISO Z39.50/ISO 23950) for use in Z39.50 client and server software. The aim is to provide a basis for effective interoperability between library and cross-domain applications. Conformance to this Profile's specifications are intended to improve international or extranational search and retrieval among library catalogues, union catalogues, and other electronic resource discovery services worldwide.

http://www.nlc-bnc.ca/bath/bp-current.htm
http://www.ukoln.ac.uk/interop-focus/bath/

For Z39.50 profiles in general cf.:
http://lcweb.loc.gov/z3950/agency/profiles/

2.7.5 U.S. National Z39.50 Profile for Library Applications

This standard specifies the use of Z39.50 in library applications. It specifies Z39.50 client and Z39.50 server behavior for search and retrieval across online library catalogues. The specifications use the Bath Profile as its foundation. Conformant use of this standard is intended to improve interoperability between Z39.50 implementations.

Free download:
http://www.niso.org/standards/index.html

2.7.6 ZING (Z39.50 International: Next Generation)

Z39.50 is a highly complex matter; it's implementation requires a specific librarian's education. ZING, „Z39.50-International: Next Generation" is a follow-up initiative to make the intellectual/semantic concept of Z39.50 more broadly available and to make Z39.50 more attractive to information providers, developers, vendors, and users, by lowering the barriers to implementation while preserving the existing intellectual contributions of Z39.50 that have accumulated over nearly 20 years. Current ZING initiatives are:

2.7.6.1 SRW (Search/Retrieve for the Web), including SRU (Search/Retrieve URL Access Mechanism)

SRW provides semantics for searching databases containing metadata and objects, both text and non-text. Building on Z39.50 semantics enables the creation of gateways to existing Z39.50 systems while reducing the barriers to new information providers, to make their resources available via a standard search and retrieve service. SRW is based on both REST and SOAP. It incorporates many of the concepts used in Z39.50, especially the abstract database models and extensible index sets. According to Matthew Dovey, one of the activities still remaining is the establishment of an index set and profile designed for music searching and taking in the work of the MLA on music metadata formats.
(http://www.ceridwen.com/immpwg/)

http://www.loc.gov/z3950/agency/zing/srw/

Dovey, Matthew: "MPEG and Music Cataloguing and Retrieval"/Matthew J. Dovey, Oxford University. [Presentation given at the 3rd MUSICNETWORK Open Workshop, Munich, March 13/14, 2004]. – Online at http://www.interactivemusicnetwork.org

2.7.6.2 CQL (Common Query Language)

CQL is the query language for SRW and SRU, and may be used by other protocols as well. CQL is designed to be human readable and writable, while maintaining the expressiveness of more complex languages. XCQL, an XML form of CQL, is also available for use with SRW.

2.7.6.3 ZOOM (Z39.50 Object-Orientation Model)

ZOOM is an abstract object-oriented API (Application Programming Interface) to a subset of the services specified by the Z39.50 standard An API (Application Programming Interface) is a limited set of functions, classes, and variables that can be used by programmers in order to create a specific software application, in this case Z39.50 clients or client-based services.

2.7.6.4 ez3950 (Simple Implementation of Z39.50 over SOAP Using XER)

XER (XML Encoding Rules) provides a mechanism for Z39.50 support over an alternative „internet" protocol without any additional amendments to the current ASN.1 standard. This would also allow any future amendments or additions to Z39.50 over this alternate protocol. At present the main contender for an XML based client/server protocol is SOAP 1.1 (Simple Object Access Protocol), more versatile W3C recommendation is under development called XP.

http://zoom.z3950.org/index.html
http://asf.gils.net/xer/

2.7.6.5 ZeeRex (Z39.50 Explain, Explained, and Re-Engineered in XML)

The ZeeRex specifications at explain.z3950.org attempt to solve two separate but related problems in the Z39.50 world. The first is that of finding Z39.50 resources – servers and their databases – for a client to use. The second is that once a resource is known, it's necessary to figure out exactly what it's capable of doing.

http://explain.z3950.org/

Some of these ZING initiatives (for example, SRW/U) are aiming at the transformation of Z39.50 to a more mainstream protocol, while for others (e.g. ZOOM) the purpose is to preserve the existing protocol but hide its complexity.

http://www.loc.gov/z3950/agency/zing/zing-home.html

2.7.7 Dublin Core

Dublin Core (DC) metadata is used to supplement existing methods for searching and indexing Web-based metadata, regardless of whether the corresponding resource is an electronic document or a „real" physical object. The Dublin Core Metadata Element Set (DCMES) was the first metadata standard deliverable out of the DCMI (IETF RFC 2413, ANSI/NISO Z39.85 – 2001 Dublin Core Metadata Element Set). DCMES provides a semantic vocabulary for describing the „core" information properties, such as „Description" and „Creator" and „Date". It is a set of 15 descriptive semantic definitions. It represents a core set of elements likely to be useful across a broad range of vertical industries and disciplines of study. The Dublin Core Metadata Element Set was created to provide a core set of elements that could be shared across disciplines or within any type of organization needing to organize and classify information.

However, as most existing description schemes, Dublin Core provides only limited capability to describe the multi-faceted metadata as it is relevant especially for music. To illustrate this problem, a quotation from the presentation of Werner Kriechbaum at the 3rd MUSICNETWORK Open Workshop, Munich, March 13/14, 2004: *"Who is the Creator (Author sensu Dublin Core ["An entity primarily responsible for making the content of the resource." (ISO 15836:2003(E))]) of Arturo Toscanini's NBC recording of Hector Berlioz's Roméo et Juliette? Hector Berlioz, Eustache Dechamps, Shakespeare, Arturo Toscanini, or the NBC Symphony Orchestra. Or are they all just contributors ["An entity responsible for making contributions to the content of the resource"]? Since there is no standardized ontology for the roles of all the persons involved in the creation of a multi-faceted music object, any decision is valid and role-specific searches for a piece of music ("Are there any recordings of Leonard Bernstein performing one of his own works") are impossible."*

Kriechbaum, Werner: "On (the Impossibility of) Finding Music (with current Standards and Metadata)"/Werner Kriechbaum, IBM Development Lab Böblingen [Presentation given at the 3rd MUSICNETWORK Open Workshop, Munich, March 13/14, 2004]. – Online at http://www.interactivemusicnetwork.org

http://dublincore.org

2.7.8 RDF (Resource Description Framework; cf. MUSICNETWORK DE4.3.1)

The RDF (Resource Description Framework) is a general framework for describing the metadata of a website. It provides interoperability between applications to exchange machine-understandable information on the Web. RDF details information such as a site's sitemap, the dates of when updates were made, keywords that search engines look for and the Web page's intellectual property rights.

Developed under the guidance of the World Wide Web Consortium, RDF was designed to allow developers to build search engines that rely on the metadata and to allow Internet users to share Web site

information more readily. RDF relies on XML as an interchange syntax, creating an ontology system for the exchange of information on the Web.

The Resource Description Framework (RDF) integrates a variety of applications from library catalogs and world-wide directories to syndication and aggregation of news, software, and content to personal collections of music, photos, and events using XML as an interchange syntax. The RDF specifications provide a lightweight ontology system to support the exchange of knowledge on the Web.

The RDF suite includes the following specifications (currently all W3C Proposed Recommendations):
- RDF/XML Syntax Specification (Revised)
- RDF Vocabulary Description Language 1.0: RDF Schema
- RDF Primer
- Resource Description Framework (RDF): Concepts and Abstract Syntax
- RDF Semantics
- RDF Test Cases

The RDF is enabling technology for projects such as:

2.7.8.1 CORC (Cooperative Online Resource Catalog)
CORC (Cooperative Online Resource Catalog, also called OCLC Connexion) started as a research project exploring the cooperative creation and sharing of metadata by libraries. It became a production service in 2000.

2.7.8.2 Open Directory Project
The Open Directory Project is the largest, most comprehensive human-edited directory of the Web. It is constructed and maintained by a global community of volunteer editors.

2.7.8.3 MusicBrains Metadata Initiative
The MusicBrains Metadata Initiative is designed to create a portable and flexible means of storing and exchanging metadata related to digital audio and video tracks based on RDF/XML and Dublin Core.

http://www.musicbrainz.org/MM
http://www.w3.org/rdf

2.7.9 MPEG-7

MPEG-7 „Multimedia Content Description Interface" is an ISO/IEC standard developed by MPEG (Moving Picture Experts Group). The fourth standard by MPEG is the first MPEG metadata standard, aiming at the standardized representation of multimedia metadata in XML. It has been developed for describing the multimedia content data that supports some degree of interpretation of the information's meaning, which can be passed onto, or accessed by, a device or a computer code. MPEG7 comprises indexing and searching (metadata, semantics) as well as access and delivery (media personalization, adaptation, usage environment). Version 1 has been published in October 2001.

As of 2004, MPEG-7 incorporates several descriptors for music, mainly within the "MelodyDS" Melody Description Scheme:

2.7.9.1 MPEG-7 MelodyDS
MelodyType
Meter
Scale
MelodyKey
MelodyContourType
contourType
beatType
MelodySequence

Being focused on content-based information retrieval for a limited scope of musical repertoire, MelodyDS is not very flexible in terms of musical diversity. To illustrate the limitations, a quotation from the presentation of Werner Kriechbaum at the 3rd MUSICNETWORK Open Workshop, Munich, March 13/14, 2004: *"In the last movement (Le gaillard-boiteux) of his 18e ordre, François Couperin uses the somewhat unusual meter of 2/6. Such a meter can not be expressed in systems that are prescriptive instead of descriptive and subscribe to the post-Matthesonian theory of meter that restricts the denominator of the time signature to powers of 2. The MPEG-7 definition of meter [ISO 15938-4:2001(E), 6.6.3] shares this restriction with many score editors and therefore Couperin's piece can neither be described nor searched for in an MPEG-7 based archive."*

While the MPEG-7 descriptors for melody and genre (cf. TV-Anytime, 2.5.4) are not meeting the demands of high-quality classification and retrieval yet, other descriptors are still missing, e.g. descriptors for difficulty (perfomrance, education) or for instrumentation and voicing. Also the possibilities for describing bibliographical data are still quite poor, compared e.g. to the Functional Requirements for Bibliographic Records (FRBR, cf. 2.4.5)

MPEG-7 Overview version 9 (March 2003):
http://www.chiariglione.org/mpeg/standards/mpeg-7/mpeg-7.htm

MPEG-7 Applications Document v.9, MPEG Requirements group/ed. By Adam Lindsay. – n 2861, Vancouver: July 1999

Kriechbaum, Werner: "On (the Impossibility of) Finding Music (with current Standards and Metadata)"/ Werner Kriechbaum, IBM Development Lab Böblingen [Presentation given at the 3rd MUSICNETWORK Open Workshop, Munich, March 13/14, 2004]. – Online at http://www.interactivemusicnetwork.org

2.7.10 P/META

P/META is an 1999 EBU initiative for Metadata exchange standards, aiming to establish understanding between EBU members of the media-related data interchange requirements of media commissioner/publishers (broadcasters), suppliers (producers) and consumers, using the BBC Standard Media Exchange Framework (SMEF) as the core information architecture.

http://www.ebu.ch/pmc_meta.html

2.7.11 ONIX (Online Information Exchange)

ONIX (ONline Information eXchange) is a standard format that publishers can use to distribute electronic information about their books to wholesale, e-tail and retail booksellers, other publishers, and anyone else involved in the sale of books. It is aiming at a standardized transmitting of product information so that wholesalers, retailers and others in the supply chain will all be able to accept information that is transferred electronically in ONIX International format.

ONIX was developed from within the book trading community to solve two problems of the information society:

- the demand for richer book data online
- the multitude of format requirements of the major book wholesalers and retailers

http://www.bisg.org/onix/index.html

2.7.12 HyTime

Hypermedia/Time-based Structuring Language (HyTime, ISO/IEC 10744) is an application/extension of ISO 8879, the Standard Generalized Markup Language (SGML). It supports the classic bibliographic model of information referencing, whereby it is possible to represent links to anything, anywhere, at any time, in a variety of ways.

http://www.hytime.org/

2.7.13 SMDL

(Standard Music Description Language) is a HyTime application that is compliant to International Standard ISO/IEC 10744. SMDL is intended to represent all music that can be expressed in common practice notation in a variety of representations. It can include multimedia time sequences such as slide show control tracks or automated lighting information, and is designed for extensibility.

2.8 Circulation (C)

2.8.1 3M SIP

The Standard Interchange Protocol (SIP) developed by 3M is the de facto industry standard for patron checkout of library materials. It supports a significant portion of the inquiry and update transactions to be defined. Version one enables communication between the self-checkout station and the library's circulation module. The current version (3M SIP2) also allows library vendors to provide libraries with more features and capabilities.

2.8.2 SMEF (Standard Media Exchange Framework)

The SMEF (Standard Media Exchange Framework) has been designed by the BBC to support and enable media asset management („MAM“) as an end-to-end process across its business areas, from commissioning to delivery to the home. One aspect of this is the SMEF Data Model (SMEF-DM) consisting of a set of metadata definitions for the information required in production, distribution and management of media assets, currently expressed as a data dictionary and set of Entity Relationship Diagrams. SMEF is the subject of a patent application, but the SMEF Data Model is being made available to enquirers without charge, subject to a no-signature license.

http://www.bbc.co.uk/guidelines/smef

2.8.3 P/META

P/META is a 1999 EBU initiative for Metadata exchange standards, aiming to establish understanding between EBU members of the media-related data interchange requirements of media commissioner/publishers (broadcasters), suppliers (producers) and consumers, using the BBC Standard Media Exchange Framework (SMEF) as the core information architecture.

http://www.ebu.ch/pmc_meta.html

2.8.4 MPEG-21

Multimedia Framework to enable transparent and augmented use of multimedia resources. The fifth standard by MPEG, commenced in 1999, creates a sort of general environment for users (including companies etc.) interacting with digital items. It makes use of the earlier MPEG resource standards (mainly MPEG-2, MPEG-4), of the metadata standard MPEG-7, and adds a number of new aspects like

registration etc. It is an open framework for multimedia delivery and consumption, with both the content creator and content consumer as focal points.

MPEG-21 Overview version 5 (2002):
http://www.chiariglione.org/mpeg/standards/mpeg-21/mpeg-21.htm

2.9 Interlibrary Loan (C12)

2.9.1 ISO ILL (Interlibrary Loan)

ILL comprises several Interlibrary Loan Application Standards like ISO 10160, ISO 10161-1 and ISO 10161-2. While Z39.50 retrieves the bibliographic record, ISO 10160/61 allow to place a hold on the record. The Interlibrary Loan Application Standards Maintenance Agency is hosted by the National Library of Canada.

http://www.nlc-bnc.ca/iso/ill/

2.9.2 NCIP

The NISO (National Information Standards Organisation) „Circulation Interchange Part 1: Protocol" (NCIP, ANSI/NISO Z39.83 -2002) defines the transactions needed to support circulation activities among independent library systems (patron and item inquiry and update transactions such as hold or reserve, check-out, renew, and check-in). The protocol is expected to support the circulation of printed and electronic materials and should facilitate direct patron borrowing, remote patron authentication, on-line payment, and controlled access to electronic documents. The „Circulation Interchange Part 2: Protocol Implementation Profile 1" defines a practical implementation structure for NCIP.

The NISO Standards Committee will base its work on the Standard Interchange Protocol (SIP) developed by 3M to support self-checkout systems, aiming at enhancing this de facto standard to a US national consensus standard.

NCIP free download:
http://www.niso.org/standards/standard_detail.cfm?std_id=728

2.10 Digitization and Coding (D)

The MPEG group of standards is due to data reduction and compression not the first choice for archive digitization, although audiovisual consumer formats that are also important for libraries etc. use these standards. For reasons of comparison with the metadata framework MPEG-7 and the quite general MPEG-21, also the preceding standards MPEG-1, MPEG-2 and MPEG-4 are listed here.

2.10.1 MPEG-1

Coding of moving pictures and associated audio for digital storage media at up to about 1,5 Mbit/s; the first standard by MPEG, dealing with digital compression of audio and visual data.

http://www.chiariglione.org/mpeg/standards/mpeg-1/mpeg-1.htm

2.10.2 MPEG-2

Generic coding of moving pictures and associated audio information; the second standard by MPEG, still dealing with digital compression of audio and visual data. Applications are e.g. the MP3 file format and the DVD.

http://www.chiariglione.org/mpeg/standards/mpeg-2/mpeg-2.htm

2.10.3 MPEG-4

The third standard by MPEG is still a resource standard. It defines standardized technological elements enabling the integration of the production, distribution and content access paradigms of Digital television, Interactive graphics applications (synthetic content), and Interactive multimedia (World Wide Web, distribution of and access to content).

http://www.chiariglione.org/mpeg/standards/mpeg-4/mpeg-4.htm

2.10.4 SMIL

The Synchronized Multimedia Integration Language (SMIL, pronounced „smile“) enables authoring of interactive audiovisual presentations. SMIL is typically used for „rich media“/multimedia presentations which integrate streaming audio and video with images, text or any other media type. SMIL is a HTML-like language, and many SMIL presentations are written using a simple text-editor.

http://www.w3.org/AudioVideo

2.10.5 MEI (Music Encoding Initiative)

The MEI (Music Encoding Initiative) draws upon the design of the Text Encoding Initiative (TEI) and other standards in its goal of creating a markup-based music encoding standard. The MEI notation is formalized in a Music Encoding Initiative (MEI) Document type definition (DTD) (alpha version .98a, 2002/09/07). It focuses on western common music notation. The Acoustical Society of America (ASA) system is used to record pitch information, performancespecific data is encoded using elements which have similar names and functions as those in the Musical Instrument Digital Interface (MIDI) standard, most of the markup for text is similar to HTML, and TEI header and Dublin Core elements form the basis of the metadata components.

http://www.isbn.org
http://www.oasis-open.org/cover/xmlMusic.html

2.10.6 NIFF (Notation Interchange File Format)

NIFF (Notation Interchange File Format) has been designed to allow the interchange of music notation data between and among music notation editing and publishing programs and music scanning programs. It is intended to preserve the significant amount of detail that is normally lost when translating through MIDI files.

http://musitek.com/niff.html

2.10.7 WEDELMUSIC

Developed as a result of the WEDELMUSIC project, this is a XML compliant format that includes constructs for the description of integrated music objects. Digital music objects compliant with the WEDELMUSIC format are called WEDEL objects. These are focussed on a specific music piece or concept. Each WEDEL object presents sections about its: identification, classification, protection, printing, symbolic music (fonts, formatting rules, versions), image score, performance, documents, lyric, audio, video, and color image.

http://www.wedelmusic.org

2.11 Licensing/Copyright

2.11.1 INDECS Metadata Framework

The INDECS Metadata Framework is an international initiative of rights owners creating metadata standards for e-commerce. Indecs was an European project (1998-2000) that delivered an analysis which is being used by EDItEUR/ONIX, the International DOI Foundation and Muze, Inc, a supplier of descriptive data to global e-commerce vendors.

http://www.indecs.org

Rust, Godfrey and Bide, Marc: "The Indecs Metadata Framework: Principles, model, and data dictionary". – June, 2000. – Online at: http://www.indecs.org/pdf/framework.pdf

2.12 User authentication (G33)

2.12.1 LDAP (Lightweight Directory Access Protocol)

LDAP (Lightweight Directory Access Protocol, RFC 2251) is designed to provide access to directories supporting the X.500 models, while not incurring the resource requirements of the X.500 Directory Access Protocol (DAP). This protocol is specifically targeted at management applications and browser applications that provide read/write interactive access to directories. When used with a directory supporting the X.500 protocols, it is intended to be a complement to the X.500 DAP.

LDAP RFC 2251 Memo:
http://www.faqs.org/rfcs/rfc2251.html

3 Applications / Products / Services

3.1 Library systems (including bibliographical information management)

More than 250 companies provide software packages especially for libraries. The classical applications are based on the **bibliographical approach for information retrieval** (cf. Clifford Lynch). Typically these systems are compliant to Z39.50 for bibliographical metadata. As the typical library application is highly specialized it integrates many other standards for the other main areas of library activity. Names for this kind of products are varying: The terms „Information management systems“, „Library systems”, „Integrated Library Systems”, „Library automation software”, „(Music) information systems” etc. are almost equally in use. Some of the most frequently used providers/products are listed below.

3.1.1 ALEPH/Ex Libris

ALEPH 500 is an integrated system that manages all aspects of libraries, for both staff and patrons. The modules include Web and GUI PAC (Graphical User Interface/Public Access Catalog), Circulation, Cataloguing, Serials, Acquisitions, ILL (Inter-Library Loan), and SDI (Selective Dissemination of Information). Additionally there are numerous “housekeeping” functions such as statistical analyses.
ALEPH 500 consists of modular components that can be combined in several ways to accommodate the most complex models, from single libraries to large consortia. All components are fully customizable, allowing the clients to create their very own library management system.
The system has a transparent interface with other systems and databases provides the ultimate in resource-sharing capabilities. ALEPH 500 is a scalable system that suits libraries of any size, including large consortia that manage as many as 100,000,000 records.
ALEPH 500's multilingual, multi-script, and multidirectional text capabilities handle content and interface in 20 languages and many scripts. A multi-tier client/server architecture based on an underlying Oracle database combines with an open-system, API-based design.

http://www.aleph.co.il

3.1.2 Allegro

Allegro is an autonomous system: No additional software, such as a standard database system, is needed to run it. The program is platform-independent (MS-DOS, UNIX, Linux, Windows). The file structure is the same in all cases. Therefore, it is possible to copy a database to make it usable on another patform.
An Allegro database may hold records of various types. The behavior of a record, as for example its indexing or its appearance in the display, is governed by the parametrization, not by built-in functions. The Windows programs have a macro language called FLEX. This can equip records with all sorts of functions.
A proprietary database server named avanti is part of the package. It may be installed in an intranet but it is not necessary. Besides this database server, there's a second method to make databases accessible by Web browsers in the internet or intranet. This method is called „RuckZuck”. It is explicitly meant for quick shots and available only for Windows-95/98/NT. No work in Perl or similar scripting languages is needed for this method, but it uses a ready-made package of HTML files and some FLEX makros and parameter files.
For the administrator, there is the Systemhandbuch (system user’s guide,in German only). The Windows programs, a99 and alcarta, come with help texts.
Allegro can be employed for library tasks but it was not developed with just that aim. The package comes with a standard parametrization enabling a library to begin cataloging right away and establishing a local OPAC. There are more standard parameters for functions like circulation and book ordering, but these functions, too, are open for every kind of local adaptation.

http://www.allegro-c.de

3.1.3 CARL TLC

With library automation experience and determination since the 1970s, TCL offers service and technological solutions to libraries of all sizes and types throughout the world:

- Integrated Systems: Library.Solution, CARL.Solution, Library.Solution for Schools
- Cataloging Tools: ITS.forWindows, ITS.MARC, Databases
- Public Access Catalogs: Net.PAC, CARLweb, PAC.2000, KCweb, YouSeeMore
- Acquisitions: Online Selection Assistant
- Interlibrary Loan: Library.Request
- Library Tools & Enhancements: Data Clean Up, Patron Cards, Barcode Labels

Library.Solution includes features such as Inventory Control, Oracle database management system, Integrated interface to OCLC, Course reserves, GSA contract, Self-Check-Out protocol, Serials control and acquisitions, Children's interface and multilingual interfaces

- Use CD-ROM based materials in conjunction with Library.Solution's OPAC and record their findings in a word processor on the same station
- View information about items checked out to them, fines they owe and the status of previously recorded holds requests. They can even place hold requests for items that are unavailable, all through the OPAC module.
- Renew items through the OPAC.
- Configuration of PAC stations to access a wide variety of information resources and other tools.
- Enjoy automatic authority control with global change capabilities for all authority-controlled fields and the ability to move authority links (i.e., authority record merge). Included is security in MARC tag editing (holdings fields).
- Create a fully customizable Web interface.
- Link electronic resources, including files, images and documents.

http://www.carl.org

3.1.4 Dynix Horizon

Since 1983, Dynix ILS is providing information management systems. The Integrated Library System (ILS) has a simple user interface with a design that allows data sharing and promotes efficiency. The main functions of Horizon Information Portal are:

- sorting and filtering capabilities
- a consistent, graphical searching interface across databases
- Horizon Enriched Content capability to retrieve cover art, book reviews, summaries, biographies, and tables of content
- Capability to pre-formulate searches (with limits and sorts) and store them as HTML links, executable from any of the library's web pages
- Booklists that can be created and e-mailed in standard MLA or Chicago bibliographic formats

Cataloging/Authority Maintenance

- Features word-processor style MARC editing
- Checks syntax, validation and spelling
- Tracks record ownership
- Prints spine and pocket labels
- Delivers Unicode compliance
- Can redefine MARC tags as needed
- Inputs diacritics easily using customizable
- shortcuts and buttonbars

Circulation

- Tracks borrower records and the circulation
- of library materials

- Accesses records quickly and easily
- Provides flexible, customized views
- Speeds checkout with efficient workflow
- Manages payments quickly
- Offers efficient batch edit capabilities
- Interfaces with self-check workstations

In addition to the core information management functionality of Library Systems, Dynix provides also software for digital collections: Horizon Digital library offers unlimited accessibility to digital images, access to fragile materials and priceless artifacts available to searchers online. Horizon Digital Library's core software enables libraries to store, catalog, edit, search, and retrieve digital content and metadata. The web editor makes digital content visible during the cataloging process. With an integrated web editor it is possible to create and update Dublin Core fields, even from a remote location.

http://www.dynix.com

3.1.5 Endeavor Voyager

Voyager aims to deliver accessible library data through simplified staff workflows. Voyager's design offers access to images, full text, and other local and remote resources. It integrates interlibrary loan (ILL) and document fulfillment management modules. The Voyager ILL module features functions such as patron-initiated requests and real-time status updates; proven tracking and reporting capabilities; built-in interfaces to OCLC, RLIN, DOCLINE, and other mediating agencies; and more.

http://www.endinfosys.com

3.1.6 GEAC

Geac Library Solutions provide library and information management tools for Libraries, Archives, Museums and Information Centres of all kinds all around the world. The systems are installed in over 2,000 individual; customers include institutions as the Vatican Library, l'Université de Montréal, Alexandria Public Library and Oxford University. Geac has been supplying and supporting library systems around the world for 25 years.

Vubis Smart is an information management system used in media centres, information centres, archives and museums. Vubis Smart uses a database system pre-eminently suited to the management of very large quantities of information of all kinds, using library defined record formats. The program provides an outstanding Web based search interface.

Vubis Smart Features

- Flexible database format based on a data dictionary. Multiple standard formats such as UNIMARC, USMARC, MARC21 and XML are available and can be modified as required. Users can also define their own record formats
- The Web OPAC features automatic spelling corrections and fuzzy logic
- 32 bit client (one single browser for all modules with options for defining personal settings)
- Support for Unicode
- Support for standards such as SIP2, Z39.50, XML
- Full integration with desktop applications and email
- OpenURL support via VLink – seamless intelligent linking to external web resources

http://www.geac.com

3.1.7 Innovative Interfaces, Inc.

Since 1991, INN-Reach systems have been used in consortial settings by libraries of all types and configurations. Some of these consortia are the result of statewide initiatives. INN-Reach is a database product that connects multiple systems in a seamless integration and allows patrons from one library to request and borrow materials belonging to another library – virtually expanding the library's catalog without having to spend resources on new acquisitions.
The Union Databases Department co-ordinates the consortia experience between central administrative staff and their member sites, some with hundreds of participating libraries. All other Library Service offerings are also available to INN-Reach libraries, including Web-based support, automated system monitoring, training, personalized consultation, and user group participation.
Innovative's Library Service Division is comprised of Customer Services, Implementation and Training Services, and INN-Reach Services.

http://www.iii.com

3.1.8 ISIS (UNESCO)

CDS/ISIS is an advanced non-numerical information storage and retrieval software developed by UNESCO since 1985. It is used by many institutions, especially in developing countries. From the outset, CDS/ISIS was created as a multi-lingual software, providing integrated facilities for the development of local linguistic versions. Thus, although UNESCO distributes only the English, French and Spanish versions of the package, user-developed versions exist in virtually all languages, including special versions which UNESCO helped in developing, for Arabic, Chinese and Korean.

The major features of the CDS/ISIS software are:

- the handling of variable length records, fields and sub fields, with the aim of saving disk space and making it possible to store greater amounts of information
- the handling of repeatable fields
- a data base definition component allowing the user to define the data to be processed for a particular application
- a data entry component for entering and modifying data through user-created data base specific worksheets
- an information retrieval component using a powerful search language providing for field-level and proximity search operators, in addition to the traditional and/or/not operators, as well as free-text searching
- a powerful sort and report generation facility allowing the user to easily create any desired printed products, such as catalogues, indexes, directories, etc.
- a data interchange function based on the ISO 2709 international standard used by leading data base producers
- an integrated application programming language (CDS/ISIS Pascal and the ISIS_DLL), allowing the user to tailor the software to specific needs
- functions allowing the user to build relational data bases, though CDS/ISIS is not based over a relational model
- powerful hypertext functions allow to design complex user interfaces.

A Windows interface between CDS/ISIS and IDAMS, the UNESCO software for statistical analysis, has also been developed.

http://www.unesco.org/isis

3.1.9 Polaris

The Polaris Integrated Library System (ILS) allows data sharing and aims to promote efficiency.

It is possible for patrons to search simultaneously the library´s catalogue, the web, other library´s catalogues and and Z39.50 databases. Anything „new“ since the last run can be reported to the patron via e-mail.
Library consortia can set parameters and permissions for their members so that every library has autonomy over her own policies yet is still able to benefit from being part of a group with uniform policies. Permissions can be set to establish what records a user can view, create, modify and delete.
The Polaris integrated library system offers simultaneous searching of catalogues, the Web, other library databases and Z39.50 databases from every subsystem, not just from the PAC. And because of the full integration of Z39.50 and XML, a search of the Web returns a MARC record that can then instantly be added to the library's catalog.

http://www.gisinfosystems.com

3.1.10 Virtua ILS

Virtua is an ILS (Integrated Library System) compliant to standards such as FRBR (Functional Requirements for Bibliographic Records), Update Notifications through SDI, User Reviews & Ratings, a peer review feature, and a Smart Device (PDA) interface to the catalog.

Virtua ILS claims to be the only system on the market that fully complies with the Unicode standard on both the client and server levels. Unicode is an integral part of Virtua's design. The system stores data natively in Unicode. With the system, it is possible to import, catalog and display records in any language. Users can also change interface languages on-the-fly and store multiple scripts within the same MARC tag or sub-field.

Custom profiles can be created for each library and staff member, allowing or restricting access to over 600 functions throughout the system with the Virtua System Client. Library staff may also customize the entire system by setting parameters in the System Client.
VTLS Inc. has a scalable license model that makes it possible to provide a 4-user license or a 4,000-user license without compromising any of Virtua's functionality. Virtua's SLE – Small Library Edition is a multi-user system designed for a typical desktop or notebook PC that includes the Oracle Server, Windows client and the Chameleon iPortal.

http://www.vtls.com/Products/virtua

3.2 Broadcasting Network Applications

Especially among of broadcasting networks there is a tradition of specialized software applications for information management different from that of music libraries. While the European Broadcasters Union (EBU) is aiming at standards for interoperability, there are many legacy standards often valid for only one or a few broadcasting agencies alone.
Among the most widely used systems in the German-speaking countries are MUSAD and FESAD.

3.2.1 MUSAD (Musikarchivdatenbank)

MUSAD was created in 1982. It facilitates the cataloguing, the online search, the loan and the administration of music.

Krueger, Wolfgang: Presentation at the AIML Annual Conference Tallinn 2003. – July 2003. – Online at: http://www.aibm-france.org/congres_internationaux/tallinn_2003/ci03_compte-rendu_11.htm

Brockmann, Knud: “SWR Audio Mass Storage System”/SWR Stuttgart, Documentation and Archives; Department Digital Systems. – Presentation at the Joint IASA/FIAT/DELOS Meeting, Helsinki, April 3-5, 2003. – 2003. – Online at: http://www.iasa-web.org/brockmann.pdf, S. 6.

3.2.2 FESAD (Fernseharchivdatenbank(

Fernseharchivdatenbank, proprietary TV archival database used by German TV stations within the ARD (HR, SWR). After the modernisation (2001/2002) it comprises multimedia files as well as rights management information.

Institut für Rundfunktechnik: "Modernisierung der Fernseharchivdatenbank FESAD"/Symposium Neues Content Management. – November 2001. – Online at:
http://www.irt.de/IRT/veranstaltungen/cms-pdfs/cms-Emmel.PDF

3.2.3 ARCHIMEDES

ARCHIMEDES Audio Wort is a database used by the German Broadcasting Agency WDR (Westdeutscher Rundfunk) for metadata about spoken word in broadcasting productions.

http://mmd.dra.de
http://www.wdr.de

3.3 Text-content-based search and retrieval applications

A completely different set of technology providers than the library system vendors is developing solutions based on the **content-based approach** for information retrieval (e.g. search engines). In this document, only solutions retrieving text-based content are mentioned. Most search engines have no possibility to incorporate any standards for bibliographic information management and thus to link up to the library community. Among those that justify an assessment in the context of music libraries (e.g. due to Dublin Core compatibility) are UltraSeek and additional classification tools like OntoPrise OntoBroker.

3.3.1 Verity Ultraseek

Verity Ultraseek is one of the few search engines which is compatible to Dublin Core metadata. Content classification is being done by defining rules based on full-text, URL, Title tags, Meta tags etc. By classification, the search results are assigned to "topics" that can be grouped in a hierarchical "topic tree" (ontology/taxonomy). The Verity Ultraseek "Content Classification Engine" organizes content into topics for easy searching as well as browsing. Search and browse capabilities are integrated. Focused queries within a topic are possible. The search results can be grouped by topics related to the returned documents.

http://www.verity.com/products/ultraseek/index.html
http://www.verity.com/products/ultraseek/cce.html

3.3.2 OntoPrise OntoBroker

OntoBroker is an ontology-based „inference engine" which acts as a semantic middleware, delivering explicit and implicit information from various data sources and applications. OntoBroker uses distribution and integration of commercial database systems.

http://www.ontoprise.de/products/ontobroker_en

4 Projects and Organizations for Research and Standardization

4.1 Research and Development Projects

Please note: Standard development projects such as MPEG7 are listed under „Main technologies“, general standardization bodies under „Most important research groups, organizations, and standardization bodies“

4.1.1 HARMONICA (Harmonised Access & Retrieval for Music-Oriented Networked Information)

The HARMONICA project (Harmonised Access & Retrieval for Music-Oriented Networked Information; EU, 1996-2000) aimed to provide a solid strategic framework for networked access to music and related multimedia services, including technologies, existing and emerging standards, exploration of network options and improved interfaces. The main aim of the HARMONICA initiative as a whole was to improve access through libraries to music collections of different types, while taking into account the needs of various groups of users in the evolving world of networked information and multimedia. By bringing together of all interested parties through forums, studies and surveys, the Concerted Action aimed to achieve consensus on the areas and topics to be developed to the benefit of both users and producers of music.

http://projects.fnb.nl/harmonica/default.htm

Deliverables:
http://projects.fnb.nl/harmonica/harm_deliv.htm

4.1.2 CANTATE (Computer Access to Notation and Text in Music Libraries).

The objective of CANTATE (Computer Access to Notation and Text in Music Libraries; EU, 1995-1997) was to investigate how sheet music could be accessed from libraries using a networked approach, examining in particular the suitability of SMDL for encoding sheet music. This was carried out in conjunction with the design of a hardware and software system which led to the development of a working demonstrator. The project has researched the current state of music libraries and music publishers, ascertaining the extent to which music is currently encoded and the coding programs used. The project has examined the encoding of music in Standard Music Description Language (SMDL) and has encoded a number of pieces of music. This has been carried out in conjunction with the design of the complete hardware and software system. The project deliverables include a series of reports on the current context affecting the storage and transmission of printed music, a system specification and a demonstrator together with a plan for additional development work.

http://projects.fnb.nl/cantate/default.htm
http://www.cordis.lu/libraries/en/projects/default.html

Deliverables:
http://projects.fnb.nl/cantate/cant_deliv.htm

4.1.3 PULMAN (Public Libraries Mobilising Advanced Networks)

The objective of the PULMAN (Public Libraries Mobilising Advanced Networks, EU, 2001-2003) Network of Excellence was to strengthen the performance of public libraries in innovative new roles by:

- consolidating, packaging and translating relevant social and technical standards and best practice guidance in the form of Digital Guidelines Manuals;

- providing policy support and stimulating cross-sectoral strategic development between public libraries and cultural institutions, especially those operating at local level, within member and associate states at the European level;
- disseminating information on innovation in public libraries and encouraging the transfer of knowledge about good practice in library policy making, service development and delivery and access for all.

http://www.pulmanweb.org

4.1.4 DELOS Network of Excellence on Digital Libraries

The DELOS Network of Excellence on Digital Libraries (EU, 2000-2002) claims to provide an open context in which an international agenda for research activities in the digital library domain can be developed and continuously updated. DELOS constitutes a reference point for all digital library projects funded by IST-FP5, stimulating the exchange of experiences and know-how. However, the activities are open to all the Digital Libraries research world, with the aim of also establishing close contacts with the relevant application communities (electronic publishing, libraries, cultural heritage, archives, etc.). The project provides a Research Forum, an Evaluation Forum, a Standardization Forum, a Training and Technology Transfer Forum and an International Cooperation Forum.

http://delos-noe.iei.pi.cnr.it
http://www.delos-noe.org

4.1.5 CUIDADO

CUIDADO is a European project for music & content that uses MPEG-7 for content-based multimedia indexing. The two main tools developed during the project duration (2001–2003) are „The Music Browser" as a tool to find music (Sony CRL Paris) and „The Sound Palette" as a tool for editing music and sounds (IRCAM Paris).

http://www.cuidado.mu

4.1.6 MINERVA (Ministerial Network for Valorising Activities in digitisation

The objective of MINERVA (MInisterial NEtwoRk for Valorising Activities in digitisation; EU, 2002-2005) is to create a network of Member States' Ministries to discuss, correlate and harmonise activities carried out in digitisation of cultural and scientific content, for creating an agreed European common platform, recommendations and guidelines about digitisation, metadata, long-term accessibility and preservation. Due to the high level of commitment assured by the involvement of EU governments, it claims to co-ordinate national programmes, and its approach is strongly based on the principle of embeddedness in national digitisation activities. It will also establish contacts with other European countries, international organisations, associations, networks, international and national projects involved in this sector, with a special focus on actions carried out in the DigiCult action of IST. The project will organise an advisory Group, relying on existing actions to identify and integrate best practices in a pan-European framework, to facilitate the adoption of the Lund action plan. Planned activities of the working groups: Benchmarking and Best Practices; Inventories, discovery of digitised content, multilingualism issues; Interoperability and Service Provision; Identification of user needs, content and quality framework for common access points; Strategic impact and enlargement of the network / Dissemination.

http://www.amitie.it/minerva

4.1.7 COVAX (Contemporary Culture Virtual Archives in XML)

COVAX (Contemporary Culture Virtual Archives in XML; EU, 2000-2001) aimed to combine document descriptions and digitised surrogates from libraries, archives and museum, to build a global system for

search and retrieval. It will allow the widely distributed primary documents to be accessed regardless of their location. The deliverables include market studies as well as a review of standards, products, tools and similar projects related with COVAX and specially with the field of access to libraries, museums and archives. The latter study includes the collection of data about standards, tools, products, etc., their description according different properties useful for COVAX, availability, functionalities, costs, software and hardware requirements, interoperability, experiences of application, etc.

http://www.covax.org

4.1.8 AMICITIA (Asset Management Integration of Cultural Heritage In The Interexchange Between Archives)

AMICITIA (Asset Management Integration of Cultural heritage In The Interexchange between Archives; EU, 2000-2002) aims at building the base for a continued and viable digital preservation of and access to television and video content through the construction of various vital components enabling a digital archiving system to serve all required roles in ingest, management, access and distribution of audiovisual material. A special focus is placed on enabling remote, multilingual access to archive content stored in a distributed environment. The system will be designed to serve both the needs of professional users (regarding preservation, quality, access flexibility and usability) and the needs of public access (regarding simplicity of use, security and availability).

http://www.amicitia-project.de/

4.1.9 FAETHON (Unified Intelligent Access to Heterogeneous Audiovisual Content)

FAETHON (Unified Intelligent Access to Heterogeneous Audiovisual Content; EU, 2001-2003) develops an integrated information system that offers enhanced search and retrieval capabilities to users of digital audiovisual archives. FAETHON makes use of MPEG7.

http://www.cordis.lu/ist/ka3/iaf/projects/faethon.htm

4.1.10 TEL (The European Library)

TEL (The European Library, EU, 2001-2003), a 30-month co-operative project of 9 European National Libraries, claims to provide the groundwork on which to build a pan-European service. The project uniting 10 European partners including the Conference of European National Librarians (CENL) will make recommendations on how to improve 'interoperability' across national boundaries.

http://www.europeanlibrary.org/

4.1.11 EMN (European Music Navigator)

European Music Navigator (EU, 2001-2004) is a search engine and destination site covering a wealth of information on the European musical scene, involving IAMIC (guided by the project leadership of MICA) and several cooperating umbrella organisations. The European Music Navigator concentrates on enhancing and supporting existing communication structures of Europe's musical life. It uses the world wide web and opens up new business strategies that are especially cut out to cater for cultural needs. The European Music Navigator should serve as an information and communication platform for interaction and exchange between the existing local, national and international European real-life-communities in the music world and the European and global audience.

http://www.musicnavigator.org

4.1.12 European Music Database

European Music Database (EU, 1998-2000) mica – music information center austria, the German Music Information Center MIZ, Stichting Donemus Netherlands, the Iceland Music Information Centre and the Slovakian Music Information Center carried out a detailed analysis of the current situation concerning databases within the Network of IAMIC. The project included a comparison of the existing databases, an analysis of the methods of information collection and an analysis of the density of the represented data. The result of this project, which was completed in 2000, is a best practice comparison and a non-redundant data model.

4.1.13 Music Libraries Online

Music Libraries Online (GB, 1998-2000) received three years funding as part of the Joint Information Systems Committee's (JISC) Electronic Libraries Programme (eLib) phase 3. The aims of the project were:

- creation of a virtual union catalogue for music materials of all kinds in British libraries, through a Z39.50 gateway
- testing of inter-operability issues arising from a diversity of systems
- development of an appropriate model for interface design
- identification and assessment of potential benefits of this project to the UK higher education community
- dissemination of results to the widest possible audience
- agreement of a strategic plan for sustaining the activities of the clump beyond 2000

http://www.musiconline.ac.uk

4.1.14 IMS Global Learning Consortium, Inc.

IMS started 1997 as a project within the US National Learning Infrastructure Initiative EDUCAUSE. While it was focussed initially on higher education, the current metadata specifications address requirements in a wide range of learning contexts, including of schools, corporate and government training.
The scope for IMS specifications, broadly defined as „distributed learning," includes both online and off-line settings, taking place synchronously (real-time) or asynchronously.

http://www.imsproject.org/

IMS Learning Resource Meta-data Specification:
http://www.imsglobal.org/metadata

4.1.15 Ensemble

Ensemble (GB, 1999-2001) constitutes a strategic alliance between a sub-set of members of CURL, with the most substantial university music research holdings, and a sub-set of members of British conservatoires represented in the Music Libraries Online grouping. Together, these CURL and conservatoire libraries are committed to the development of a long-term partnership to enhance and sustain the research library base for music, initially within higher education but ultimately cross-sectorally.

http://www.is.bham.ac.uk/rslp/ensemble.htm

4.1.16 Variations II

The VARIATIONS project at Indiana University Bloomington provides online access within the William and Gayle Cook Music Library to over 5,000 sound recordings from the library's collections.

VARIATIONS began building its digital collection from standard musical repertoire identified as central to the teaching mission of the Indiana University School of Music.
The William and Gayle Cook Music Library has been designed to combine new technologies with access to traditional materials in support of all levels of music research and study. VARIATIONS provides access to an average of 500 sound recordings per day for library users and the database is growing at a rate of up to 75 hours of music per week. Selections from a broad range of musical material including operas, songs, instrumental music, jazz, rock, and world music make up the VARIATIONS database. Although VARIATIONS primarily serves as an electronic reserves system for sound recordings at present, development efforts are underway to complete the original vision of the project as a database containing a variety of music information objects, both local and global, accessed through a graphical user interface. It is planned to add sound recordings from the Hoagy Carmichael Collection held by the IU Archives of Traditional Music to VARIATIONS as part of a project funded by a grant from the federal Institute of Museum and Library Services.

http://www.dlib.indiana.edu/variations/

4.1.17 PATRON (Performing Arts Teaching Resources Online)

PATRON (Performing Arts Teaching Resources ONline) has been designed for the School of Performing Arts at the University of Surrey, UK, to deliver digital audio, video, music scores, and dance notation across a high-speed network to the desktop. An emphasis has been placed on providing a working environment which enables users to find and retrieve the items needed, to navigate their way about the items and to make links between different items. A generalized approach has been adopted in order to make the system suitable for any subject matter.

The system is based on distinct modules: a library resource with audio, video, and scanned images; metadata for retrieval and navigation; a user interface to enable users to retrieve, view, and listen; and a context layer or profile and associated tools to build personal compilations of links to related items.
The electronic library consists of a resource independent of database access methods, server, network, and client. It contains images and photographs, video, audio, and text, which are maintained in industry standard formats. To maintain the integrity of the sources throughout their life, the material has been digitized, and it is not possible for the users to make any alterations.

Detailed information is maintained about each work and is used for search and retrieval, and for navigational purposes within each item. The data are held in structured files and are capable of fine granularity, such as a portion of a page or a hundredth of a second in time-based media. It is anticipated that XML RDF modifications to the structure will be imminently undertaken. This is seen as an important step towards enabling digital resources to be shared. The metadata structure includes a unique identifier which can be activated as rights management systems are developed.

The user interface has been designed to access the resource and at the same time present a cohesive 'feel'. The aim has been to help the user easily combine and switch between searching, viewing, and listening, and to adjust the screen layout to suit the task in hand. In addition the structure has to cope with changes in technology and with new media types as they are introduced. It is also recognized that once a resource has been established, and users became familiar with the potential ways of working, they will probably want to add new functions.

PATRON uses streams of multimedia data over a network, so the demands are high and are met currently by an ATM network to a local switch with Ethernet to the clients equipped with 10/100 Ethernet cards. The client computers are PCs running Microsoft Windows 95 and Internet Explorer 4 or later. The system and a sub-set of the resource can be run on a free-standing computer, and programs may be distributed on CD-ROMs

http://www.lib.surrey.ac.uk/Patron2/

4.1.18 JUKEBOX (Applying Telematic Technologies to Improve Public Access to Sound Archives)

The aim of Project JUKEBOX (EU, 1993-1995) was to set up a pilot system for a new library service, where users from remote distances can get online access to sound archives. It was planned to introduce a new library service which should have provided online access to the national sound archives in Europe. The information offered should have consisted of digitised sound recordings plus the associated catalogue data stored on specific databases in the archives. The information should have been accessible – nationally and across borders – via multimedia terminals located in e.g. public and university libraries, connected to archive databases.
The project was carried out by four European institutions: the national sound archives of Italy, UK, and Denmark, and a Norwegian research center. The pilot system contained selected recordings from the national libraries. The selection of audio material was based partly on an initial survey of user needs and partly on an investigation of copyright conditions attached to the recordings. Copyright was a major concern of the project; detailed negotiations with relevant copyright organisations were conducted. However, the idea that libraries and archives as public institutions should provide access to sound recordings with due regard to national copyright law turned out to be very difficult to achieve.

Libraries had been chosen as the focal point between users and sound archives. The library sector already has a well functioning and efficient system for interlending of printed materials. Moreover, in the 1990ies many libraries had introduced AV-services as a supplement to traditional services based on printed information. The introduction of special music lending departments in public libraries had attracted new users, and one assumption of the project was that a JUKEBOX service as proposed – providing online access to the comprehensive and unique collections of the sound archives – would strengthen the role of libraries as the central information suppliers of the future.

http://www.statsbiblioteket.dk/Old/jukintro.htm

Fønss-Jørgensen, Eva: " Project JUKEBOX – a presentation"
http://www.nordinfo.helsinki.fi/publications/nordnytt/nnytt4_94/jorgensen.htm

4.1.19 Servizio Bibliotecario Nazionale – Musica

Servizio Bibliotecario Nazionale – Musica (SBN, Italy): The national music libraries catalogue of Italy. The ICCU (Istituto Centrale per il Catalogo Unico delle Biblioteche Italiane e per le Informazioni Bibliografiche) has been committed to the protection of music holdings for several years, by means of the diffusion of standards for their treatment and the implementation of cooperative projects cataloguing and retrieval in the SBN network. These projects, funded by the Ministero per i beni e le attività culturali (Italy), led the creation of

- a specialised database resident on the SBN Index system, integrated with the SBN files that contain modern and older library material, and equipped with downloading and uploading functions in the UNIMARC format, available on the Internet at the following addresses: http://opac.sbn.it
- a software for the personal computer cataloguing of printed and handwritten music and librettos.

http://www.iccu.sbn.it/Emusic.html

4.1.20 The Internet Archive

The Internet Archive is a public nonprofit that was founded to build an 'Internet library,' with the purpose of offering permanent access for researchers, historians, and scholars to historical collections that exist in digital format. Founded in 1996 and located in the Presidio of San Francisco, the Archive has been receiving data donations from Alexa Internet and others. In late 1999, the organization started to grow to build more well-rounded collections; it contains audio and audiovisual items as well as other resources relevant to other libraries.

http://www.archive.org

4.1.21 Bookshare

Bookshare.org is a web-based system supplying accessible books in digital formats designed for people with disabilities. These digital formats are the NISO/DAISY XML-based format for the next generation of talking books, and the BRF format for Braille devices and printers. Access to copyrighted books from Bookshare.org is limited to people in the United States with bona fide print disabilities and the non profit organizations serving them.

http://www.bookshare.org

4.1.22 MusicBrainz

The MusicBrainz Project is run by volunteers that are defining a metadata standard for music recordings. This metadata standard is an extension of the Dublin Core. The goal of the project is to define the metadata standard for music and to create a metadata catalog of all music recordings around the world. The current database with metadata still contains less than a million entries.

http://www.musicbrainz.org
http://dublincore.org/projects/

4.1.23 RIdIM (Répertoire international d'iconographie musical)

RIdIM (Répertoire international d'iconographie musical), cooperative bibliographic project of IAML, the International Musicological Society, and UNESCO's International Council for Philosophy and Humanistic Studies)

http://web.gc.cuny.edu/rcmi/ridim.htm

4.1.24 RILM (Répertoire international de littérature musicale)

RILM (Répertoire international de littérature musicale), cooperative bibliographic project of IAML, the International Musicological Society, and UNESCO's International Council for Philosophy and Humanistic Studies)

http://www.rilm.org

4.1.25 RIPM (Répertoire international de la presse musicale)

RIPM (Répertoire international de la presse musicale), cooperative bibliographic project of IAML, the International Musicological Society, UNESCO's International Council for Philosophy and Humanistic Studies, and others)

http://www.nisc.com/ripm

4.1.26 RISM (Répertoire international des sources musicales)

RISM (Répertoire international des sources musicales), cooperative bibliographic project of IAML, the International Musicological Society, nd UNESCO's International Council for Philosophy and Humanistic Studies, and others)

http://rism.stub.uni-frankfurt.de

4.2 Research Groups, Organizations, and Standardization Bodies

4.2.1 SMPTE (Society of Motion Picture and Television Engineers)

SMPTE (Society of Motion Picture and Television Engineers, founded in 1916) publishes ANSI-approved Standards, Recommended Practices, and Engineering Guidelines, along with the SMPTE Journal and its peer-reviewed technical papers. SMPTE holds conferences and local Section meetings to bring people and ideas together, allowing for useful interaction and information exchange in the areas of film, television, video and multimedia.

http://www.smpte.org

4.2.2 W3C (World Wide Web Consortium)

The W3C (World Wide Web Consortium) develops interoperable technologies (specifications, guidelines, software, and tools) to lead the Web to its full potential. W3C is a forum for information, commerce, communication, and collective understanding.

http://www.w3.org

4.2.3 ANSI (American National Standards Institute)

ANSI (American National Standards Institute, USA) is a private, non-profit organization founded in 1918 that administers and coordinates the U.S. voluntary standardization and conformity assessment system. It wants to enhance both the global competitiveness of U.S. business and the U.S. quality of life by promoting and facilitating voluntary consensus standards and conformity assessment systems, and safeguarding their integrity.

http://www.ansi.org

4.2.4 CIMCIM (International Committee of Musical Instrument Museums and Collections)

CIMCIM (International Committee of Musical Instrument Museums and Collections / Comité International des Museés et Collections d'Instruments de Musique, founded in 1960) is a committee of ICOM (International Council of Museums). It claims to promote high professional standards in the use and conservation of musical instruments in museums and collections.

http://www.music.ed.ac.uk/euchmi/cimcim

4.2.5 CISAC (International Confederation of Authors' and Composers' Societies)

The CISAC (International Confederation of Authors' and Composers' Societies) represents 209 copyright collection societies around the world. CISAC is promoting identifiers such as ISWC for better copyright management in a networked environment. As it's member institutions are relying on digital metadata for decades, CISAC launched in 2004 it's Common Information System (CIS) to enable authors' societies to search worldwide musical information, with each authors' society making its domestic repertoire available to its sister societies via the CIS network. CIS uses FastTrack software, systems, and data protocols.

http://www.cisac.org/

4.2.6 DCMI (Dublin Core Metadata Initiative)

The DCMI (Dublin Core Metadata Initiative) is an open forum engaged in the development of interoperable online metadata standards that support a broad range of purposes and business models.

DCMI's activities include consensus-driven working groups, global workshops, conferences, standards liaison, and educational efforts to promote widespread acceptance of metadata standards and practices.

http://dublincore.org

DCMI Working group libraries:
http://dublincore.org/groups/libraries/

4.2.7 DLF (Digital Library Federation)

DLF (Digital Library Federation, USA) is a consortium of libraries and related agencies that are pioneering in the use of electronic-information technologies to extend their collections and services.

http://www.diglib.org

4.2.8 EBLIDA (European Bureau of Library, Information and Documentation Associations)

EBLIDA (European Bureau of Library, Information and Documentation Associations) is the European Bureau of Library, Information and Documentation Associations. We are an independent umbrella association of national library, information, documentation and archive associations and institutions in Europe. Subjects on which EBLIDA concentrates are European information society issues, including copyright & licensing, culture & education and EU enlargement. We promote unhindered access to information in the digital age and the role of archives and libraries in achieving this goal.

http://www.eblida.org

4.2.9 EBU (European Broadcasting Union)

EBU (European Broadcasting Union, founded in 1950) is the largest professional association of national broadcasters in the world with 71 active members in 52 countries of Europe, North Africa and the Middle East and 45 associate members in 28 countries further afield. Activities include operation of the Eurovision and Euroradio networks, coordination of news and sports programming, promotion of technical standardisation, legal advice, and the defence of public service broadcasting.

http://www.ebu.ch

4.2.10 IASA (International Association of Sound and Audiovisual Archives)

IASA (International Association of Sound and Audiovisual Archives) has more than 400 members from more than 60 countries which represent a broad palette of audiovisual archives, distinguished by their focus on particular subjects and areas: e.g. archives for all sorts of musical recordings, historic, literary, folkloric and ethnological sound documents, theatre productions and oral history interviews, bio-acoustic, environmental and medical sounds, linguistic and dialect recordings as well as those for forensic purposes. Various committees, sections and task forces are responsible for developing the work of IASA, serve as fora for information and discussion, and deal with specific areas of interest (e.g., the Radio Sound Archives Section, the Cataloguing and Documentation Committee, the Discography Committee).

http://www.iasa-web.org

4.2.11 IAMIC (International Association of Music Information Centres)

IAMIC (International Association of Music Information Centres, dating back to 1958, 1962-1991 a branch of IAML, since then independent) is a network of organizations promoting new music. It has 43 members in 38 countries (2002). Each Music Information Centre is responsible for documenting and

promoting the music of its own country or region, or certain musical field, as well as co-operating internationally with other centres and international organizations on issues of common concern. Music Information Centres are open to the public and have extensive resources. In addition to large libraries of sheet music and sound archives, some centres maintain up-to-date collections of biographical and research material, many issue publications and recordings, and all serve as a focus of musical activity in their country or region.

http://www.iamic.net

4.2.12 IAML (International Association of Music Libraries, Archives and Documentation Centres)

IAML (International Association of Music Libraries, Archives and Documentation Centres, founded in 1951) has about 2,000 individual and institutional members in some 45 countries throughout the world, mainly in Europe and North America. Founded in 1951 to promote international cooperation and to support the interests of the profession, IAML is a respected member of the international library and music communities. It has national branches in 22 countries, five professional branches, four subject commissions and various working groups, and is responsible for several large-scale documentation projects, mainly RISM, RILM, RIdIM, and RIPM.

http://www.iaml.info

4.2.13 ICOM/CIDOC (International Council of Museums/International Committee for Documentation of the International Council of Museums)

ICOM/CIDOC (International Council of Museums/International Committee for Documentation of the International Council of Museums) is the international focus for the documentation interests of museums and related organizations. It has over 750 members in 60 countries.

http://www.cidoc.icom.museum
http://www.willpowerinfo.myby

CIDOC Museum Information Standards:
http://www.willpowerinfo.myby.co.uk/cidoc/stand0.htm

4.2.14 IEC (International Electrotechnical Commission)

IEC (International Electrotechnical Commission) prepares and publishes international standards for all electrical, electronic and related technologies. These serve as a basis for national standardization and as references when drafting international tenders and contracts.

http://www.iec.ch

4.2.15 IETF (Internet Engineering Task Force)

The Internet Engineering Task Force (IETF) is a large open international community of network designers, operators, vendors, and researchers concerned with the evolution of the Internet architecture and the smooth operation of the Internet.

http://www.ietf.org

4.2.16 IFLA (International Federation of Library Associations and Institutions)

IFLA (International Federation of Library Associations and Institutions; founded in 1927; headquarters at the Royal Library, The Hague, Netherlands) is the leading international body representing the interests of library and information services and their users.

http://www.ifla.org

4.2.17 ISO (International Organization for Standardization)

ISO (International Organization for Standardization) is a worldwide federation of national standards bodies from more than 140 countries, one from each country. ISO is a non-governmental organization established in 1947. The mission of ISO is to promote the development of standardization and related activities in the world with a view to facilitating the international exchange of goods and services, and to developing cooperation in the spheres of intellectual, scientific, technological and economic activity. ISO's work results in international agreements which are published as International Standards.

http://www.iso.org

4.2.18 ISO/TC46/SC4

ISO/TC46/SC4 (ISO Technical Committee 46 – Information and Documentation; Subcommittee 4 – Technical Interoperability) develops standards for computer applications in ISO Technical Committee 46, Information and Documentation.

http://www.niso.org/international/SC4

4.2.19 ISO/TC46/SC9

ISO/TC46/SC9 (ISO Technical Committee 46 – Information and Documentation; Subcommittee 9 – Identification and Description) develops and maintains ISO standards on the identification and description of information resources.

http://www.nlc-bnc.ca/iso/tc46sc9

4.2.20 ITU (International Telecommunication Union)

ITU (International Telecommunication Union) is an international organization within the United Nations System where governments and the private sector coordinate global telecom networks and services. It publishes telecommunication technology, regulatory and standards information.

http://www.itu.int

4.2.21 MCN (Museum Computer Network)

The Museum Computer Network is a nonprofit organization of professionals dedicated to fostering the cultural aims of museums through the use of computer technologies.

http://www.mcn.edu

4.2.22 MLA (Music Library Association)

The Music Library Association is the professional organization in the USA devoted to music librarianship and to all aspects of music materials in libraries. Founded in 1931, MLA provides a forum for study and action on issues that affect music libraries and their users.

http://www.musiclibraryassoc.org

4.2.23 MPEG (Moving Picture Experts Group)

MPEG (Moving Picture Experts Group, ISO/IEC JTC 1/SC 29/WG 11) is a working group of ISO/IEC in charge of the development of standards for coded representation of digital audio and video. Besides standards strictly related to bit-efficient representation of audio-visual content, MPEG has produced and is currently producing other standards that relate to the practical use of those standards.

http://mpeg.telecomitalialab.com

4.2.24 NISO (National Information Standards Organization

NISO (National Information Standards Organization, USA) is an ANSI-accredited organization that develops standards specifically for the library, information services, and publishing sectors. NISA makes its standards freely available on its website.

http://www.niso.org/

4.2.25 Open Archives Initiative

The Open Archives Initiative develops and promotes interoperability standards that aim to facilitate the efficient dissemination of content. The Open Archives Initiative has its roots in an effort to enhance access to e-print archives as a means of increasing the availability of scholarly communication.

http://www.openarchives.org

4.2.26 SMPTE (Society of Motion Piture and Television Engineers)

SMPTE was founded in 1916 to advance theory and development in the motion imaging field. With over 250 corporate members in 85 countries today, SMPTE publishes ANSI-approved Standards, Recommended Practices, and Engineering Guidelines, along with the SMPTE Journal and peer-reviewed technical papers. SMPTE holds conferences and local Section meetings to bring people and ideas together, allowing for useful interaction and information exchange.

http://www.smpte.org/

5 Problems, Needs and Requirements

The library community has a long tradition of defining exact and elaborated requirements. In the information society, and with decreasing budgets in the non-profit sector, the number of those libraries, organisations, companies and individuals that are able and willing to implement those requirements that are most precise and recommendable from an expert's point of view, is growing quite small. This does not only apply for **bibliographical** requirements such as FRBR (Functional Requirements for Bibliographic Records) but also for many of the more demanding **technical** requirements issued e.g. by the World Wide Web Consortium (W3C).

With **accessibility, interoperability,** and the **limitation of resources** in mind, a practical balance between optimal technical innovation and a realistic update of library tools and services has to be found

5.1 Identified Problems

From a typical music library perspective, the most urgent problems do not appear to be originally technological but rather economical, legal or societal problems. As far as the general notion towards innovative technological applications within libraries is concerned, it will be more than expected if technology can help solving those problems instead of rising new ones. Due to the long and very successful tradition of music libraries as well as to the high level of training of library staff, a certain reluctance to adopt new means, rules and technologies can be found among music libraries more often than a longing for new multimedia functionalities. In times of decreasing economical resources especially for public and non-profit institutions, keeping up services will be prior to searching for new ones in many cases. At the same time, „simply" keeping up classical library services will hardly be enough: Corresponding to changes in the society, in the economy and in technology, „[public] libraries are changing fast: but they need to change even faster." (PULMAN Guidelines, 1st ed., June 2002, p.5)

Thus, to bring music libraries in the multimedia interactive age is an arguably more complex task as it will be e.g. with music notation: In order to help music libraries, librarians and library users to make the best possible use of interactive and multimedia technologies, the complex issues of one of Europe's most traditional forms of institution will have to be considered, including a wealth of societal, legal and economical aspects in addition to „pure" technological possibilities of innovative applications.

In order to meet these special requirements for the problem assessment as far as libraries are concerned, the Working Group Music Libraries is preparing a survey in close co-operation with several branches of IAML (the International Association of Music Libraries, Archives and Documentation Centers). The survey aims at locating the most relevant areas of library activities as far as the need for actual technological improvements are concerned.

5.1.1 General problems

The goal of MUSICNETWORK is to bring European music industries and content providers into the interactive multimedia area. But why are we not there yet?
Contradictions on every level of the content value chain have prevented so far that a market could take shape.

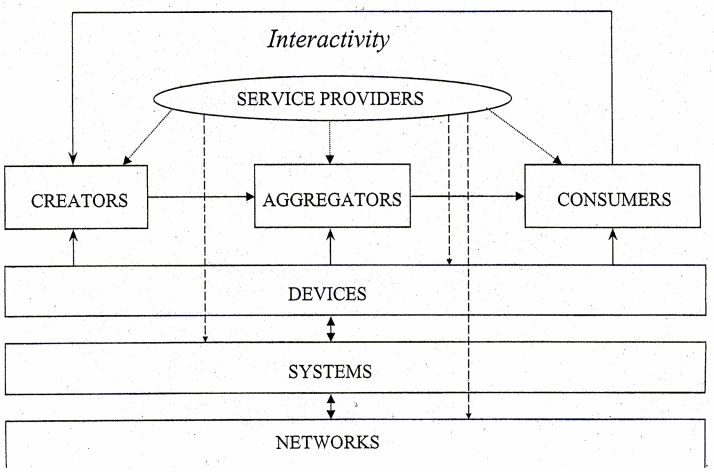

Figure 2: *„The content value chain". Source:* RITMO – Research for Integrated Trading Models for Online Music. – Online at Interactive MusicNetwork Multimedia: http://www.interactivemusicnetwork.org/wg_libraries/technologies.html

- For the different categories of actors the balance of immediate need to interact with bodies outside their category vs. risk currently is negative. The barrier of high transaction cost results in the segmentation of communication and slows down the process of convergence and unifying the market.
- There's a lack of communication and exchange between technology, business, NPO and culture-related players as far as the development of standards and digital/interactive technologies is concerned.
- There's a lack of incentives for libraries and other NPOs to react to the societal and technological challenges by improving networking and cooperation.

5.1.2 General/Economical Problems

- „Trade-off" complexity vs. workflow, staff skills and cost
- Adoption of complex solutions for the future burdens today's budgets

5.1.3 Market/Structural Problems

- Market shaken up by disruptive technology (Clayton Christensen), „From product to service"
- Early risk takers have been pushed out of the market by established stakeholders: reluctant decision makers are encouraged
- Opposition of priorities of content holders and access providers is not overcome yet (telcos, hardware manufacturers, software manufacturers)
- Overheated competition of established stakeholders defending their position
- Competition of standard providers: standard bodies, industry networks, proprietary „de facto"-standards of individual stakeholders: everybody claims to have the solution and thus blocks the others
- Lack of new business models
- Missing consensus
- Conflict of non-profit status vs. exploitation-schemes, especially for libraries

5.1.4 Copyright/IPR Issues

- The legal situation regarding copyright is a complex task; it's hard to collect neutral/correct information not biased by interest groups (e.g., copyright-protected publications will generally state that copying is forbidden instead of stating at which time the respective publication will become part of the public domain)
- Licensing issues: Agreements with rights holders are difficult and time-consuming, at least if they cover more than what is provided by means of collective licensing (e.g. as is the copying of books in some countries)
- Slowly adapting legal framework, still based on paradigms of the old market: copyright issues, no European market (business models based on territorial licensing), international contracts, etc.
- No copyright harmonization yet, copyright law not „convergent" even within the EU member states (e.g., lending and copying especially of music recordings and music scores are very restricted in several countries)
- Border of copyright and constitutional rights not without conflicts (access/participation, privacy, fair use, etc.)
- The legal situation regarding copyright is partly an obstacle for the development of NPO and other structures enabling public access to cultural heritage and repertoire.

5.1.5 Technology-Related Problems

- Gap between R&D and practice – in other words: knowledge is outdated before it reaches the market
- Technologies not ready: standards, DRM, OMR, information retrieval, etc.
- Uncertainty concerning formats for digitization of sheet music
- Lack of commonly accessible and accepted technological solutions and standards
- Technology is a moving target (decision makers in the consultant trap)
- The developments in the IST and library/metadata area are exploding
- It's hard to decide for the right standard, technology or application.
- It's increasingly hard to keep track of technological and standard changes and developments.
- Most current technologies for the generation of metadata, for indexing and information retrieval, for asset management and lending demand additional training of the library staff and are very time-consuming.

5.2 Possible Solutions and related issues

- Obviously, music librarians tend to be very skeptical about the technological potential as far as (automated) cataloguing/indexing is concerned. A careful comparison of „classical" cataloguing approaches versus emerging metadata/knowledge retrieval approaches (ontology-based search engines, semantic web etc.) has to be made.
- With regard to the arguably symbiotical co-existence of a) classical standard software solutions for (music) libraries and b) innovative applications for content-based classification and retrieval, plus new services such as streaming and download, it has to be carefully examined whether and to which extent integrated solutions (in comparison to modular/interoperable standards and solutions) might be practicable, including market acceptance, usability and training.
- New technology-enabled music library services can be observed in an increasing number of music libraries – from the Danish www.musikbibliotek.dk to the Norwegian www.phonofile.no and many others. Typically, these applications and services will extend classical functionalities of libraries into the digital and interactive domain, thus sometimes seemingly interfering with other actors. As libraries can hardly be expected to remain „offline" as the only player within the music area, new roles and synergies should be explored, while the original functions of libraries – to accumulate and to preserve knowledge, to provide access to the society's cultural artifacts, and to foster communication, education and scholarship – should be kept up even in the digital domain.

- In many cases music libraries – as other institutions – currently are suffering from decreasing economical resources. Best-practice examples of the use of technology within music libraries to cut costs, extend services and overcome limitations of resources should be carefully examined.

5.2.1 Trends and possibilities for standardization of music-related metadata in digital environments

- Complex, but ...
- Adaptive multitude of services
- Standards-compliant and interoperable: again after a period of „new isolation“?
- Targeted, but the target is changing
- Demand lower level of librarians‘ education??
- Political aspects at least as important as technical

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