To: Joint Steering Committee for Revision of AACR

FROM: Jennifer Bowen, ALA representative

SUBJECT: Status report of the CC:DA Task Force on Rules for Technical Description of
            Digital Media

ALA was asked to review the rules for technical description of digital media in the draft of Part 1
of *AACR3* and to propose revisions; CC:DA charged a Task Force to do this. Unfortunately, the
draft of Part I is no longer on the table, and the Prospectus for *RDA* does not cover the technical
description in sufficient detail. In addition, the prospectus leaves open some fundamental
questions about the nature of the **data elements** that constitute the structure of the rules for
description in Part I of *RDA*.

Given this, the Task Force feels that it needs further guidance — and further development of the
draft of Part I of *RDA* — before it is able to recommend specific rules. This document is
therefore a status report on work to date. The Task Force's methodology has been to examine a
variety of metadata standards, looking for the data elements that are relevant to the technical
description. Based on a comparison of these standards, the Task Force intends to recommend
what data elements should be included in Chapter 13 of *RDA* and what particular guidelines
should be given for each. This work will be completed during the review of the draft of Part I of
RDA and will be submitted to the JSC either as a part of the ALA response to that draft, or as a
separate proposal to revise that draft.

In the meantime, the following status report includes (a) a list of major issues that have been
encountered and questions that ALA suggests the JSC address at their October meeting; (b) a
preliminary list of data elements recommended for inclusion in Chapter 13 of *RDA* for the JSC to
consider in deciding on the content of the Part I draft; and (c) an appendix tabulating the results
of the Task Force's investigations of the various metadata standards, as background for the
preliminary recommendations.

General Issues and Questions

The Task Force has encountered a number of general issues, some of them fundamental
questions dealing with the definition and scope of the data elements that constitute the structure
of the rules in Part I of *RDA* and their relation to the ISBD definitions and scope. We offer the
following discussion of these issues and ask some questions that we would like the JSC to
address at its meeting in October, to guide both the remaining work of this Task Force and the
development of the draft of Part I of *RDA*.

1. ***RDA* data elements vs. ISBD elements.** The JSC has stated that in *RDA* "instructions for
    recording data will be presented independently of guidelines for data presentation." The
    ISBD as a display standard is to be documented in an Appendix. It has not yet been
    decided exactly what status the ISBD will have in *RDA*, and the boundary between the

ISBD as a content standard and as a display standard is not yet clear. Specifically, there are some data elements that appear in different ways within the ISBD structure: the same data may be given as one of the main elements *or* within one of the main elements of the description *or* in a note. For example, the data element describing the *format of the digital file* may appear as a material-specific area (Digital Graphic Representation for cartographic resources) or as part of the Extent Statement, or as one of the Other Technical Details, or in a Note on the Technical Description. Yet it can be argued that all of these are in fact variations of the same data element. Whether the data is displayed following the Edition Statement (if any) or in one of the elements of the Physical Description Area or in a Note is a matter of data display and should be governed by **presentation** standards such as ISBD and not by the guidelines for **recording** the data set forth in *RDA*.

This approach has significant implications for *RDA* as a whole. An example from another part of the description is the parallel title, which is limited to titles in another language appearing on the same source of information as the title proper. We question whether some of these arbitrary distinctions between data elements in the ISBD — which seem to be driven by the ISBD display structure, not by the definition of the elements themselves — should be carried into *RDA*. On the other hand, if data elements recorded according to *RDA* are to be capable of presentation in an ISBD display, then these distinctions (e.g., between File Format as part of the Extent Statement and as a Note) need to be made at some level within *RDA*.

Questions:

    a. Should the Task Force confine its recommendations to the guidelines for the specific elements in its charge (Extent, Other Technical Details for Digital Media, Digital Graphic Representation)? Or should it use the information gathered from other metadata standards to recommend the logical data elements that should be included in the description of a digital resource?

    b. Should the scope of the data elements in *RDA* be strictly governed by the ISBD definitions?

    c. Exactly how should the distinction between a data elements as a note and the same data element as (or as part of) one of the other ISBD areas/elements be made?

2. **Granularity of data elements.** The outline of *RDA* has broken down the single ISBD element Notes into its components, but has not done the same for the other major compound element, the Other Technical Details. We note that the list of attributes of the manifestation in *FRBR*, section 4.4, does include the individual components. We feel that *RDA* would be more useful if it treated each of the components of Other Technical Details as separate data elements (or sub-elements). Again, the fact that these are presented together and in a specified order is a matter of ISBD display and not of what data is being recorded.

Question: Should the components of Other Technical Details be treated as separate data elements?

3. **"Digital."** Our preliminary work suggests that there may be more than one sense of "digital" being used in the discussions surrounding *RDA*. In its comments on the draft of Part I, ALA recommended that the scope of the chapter on Digital Media be broadened to include all digital media. The instruction in the Draft (C7.0A) that digital media "does not cover digitally encoded sound produced for use with audio devices such as CD players, etc., … or digital recordings of moving or still images produced for use with electronic devices such as DVD players, etc.," proves unclear in practice as the range of digtal media grows along with the types of electronic devices to play them. A CD-ROM encoded with MP3 files could formerly be played only on a computer, while now MP3 files may be downloaded from the internet onto a MP3 player. One can play a standard music CD on a computer and display a CD-ROM of digital photographs on a DVD player. The distinction between what is clearly "digital media" and what is not is breaking down.

The term "digital" is somehow related to the *digital* / *analog* dichotomy, which applies to the encoding of data on the carrier. It is not clear that the category "electronic resources" in *AACR2* or "digital media" as it was used in the draft of Part I was limited to digital encoding. Certainly there are analog computer files, which probably fall within the scope of "electronic resources," but may or may not fall within the scope of "digital media." Similarly, it is not clear that all resources that are digitally encoded have anything in common other than the fact that they are not analog. There may be more than one distinction being made using the term "digital" and we suggest the need for further discussion on this issue.

Questions:

   a. How should the term "digital" be used in *RDA*?

   b. How broadly should the concept of non-digital — *analog* — be interpreted in the technical description?

4. **Direct vs. remote resources.** The Task Force reiterates the importance of the distinction between direct and remote digital resources. The rules for describing remote or networked resources are the most difficult to develop. However, as a general premise, we suggest that data relating to technical description of remote digital resources needs to be recorded *when such information is important to the user either in selecting a usable resource or in obtaining access to and use of the resource.* We note that this is not always the case. Often, all the necessary infrastructure for accessing and using the resource is handled by the server; in such cases, the cataloger has difficulty in ascertaining, and the user has no need to know, the technical requirements. We would like to see appropriate guidance included in the rules, preferably in terms more informative that "when considered important."

Question: Does the approach outlined above provide an adequate basis for deciding whether specific technical details need to be included in the description?

Preliminary Recommendations

The Task Force recommends that the following data elements relevant to digital media as such included in Chapter 2, Technical Description, of *RDA*. We do not include other data elements that are already covered by data elements relating to the type of data (e.g., sound or video) that is encoded on the digital media.

1. **Type and form of carrier**

    Preliminary recommendations: We await the findings of the group charged with looking at the SMDs, but state some of our concerns and preferences below:

    Issues relating to digital media:

    ✓ For direct-access resources, the Type and form of carrier should be based on that for the type of data encoded (when applicable); for data, programs, etc., something like the current set of SMDs in Chapter 9 should be included.

    ✓ For remote-access resources, it is not clear that Type and form of carrier (as opposed to Type and form of content) is appropriate; if so, the Type should be based on that for the type of data encoded (as above), but using the term "file" instead of the name of the carrier.

    ✓ In both cases, it is unclear whether this element should include the word "digital"; see discussion under General Issue #3 above.

    ✓ Should the Type and form of carrier for a digital resource clearly state or imply that a resource is digital, e.g. Web site, text file, digital map — or should the same term be used for both the digital resource and its analog counterpart?

2. **Extent**

    Preliminary recommendations: Again we await the findings of the group charged with looking at the SMDs, but state some of our concerns and preferences below:

    Issues relating to digital media:

    ✓ See points made under Type and form of carrier above.

    ✓ The ALA response to the draft of Part I included the following suggestion:

    > The rules for technical description need to be broken down into separate instructions to deal with (a) direct access media containing data and programs; (b) direct access

media containing content covered by other rules, e.g., for textual, audio, or video media; (c) remote access resources containing data and programs, (d) remote access resources containing content covered by other rules; and (e) multimedia.

✓ Extent for direct access resources containing data and programs: Rules for digital media should be applied.

✓ Extent for other direct access resources: The extent statement should be formulated according to rules for the specific type of media, e.g., the rules for video media should be followed for digital video media.

✓ Extent for remote access resources: Rules should be included giving instructions for formulating extent statements when the option to do so has been exercised. The instruction should recommend use of the term *file(s)* and other terminology specified in the relevant chapters.

✓ Digital nature of media: When the extent statement is formulated according to rules for the specific type of media, the digital nature of the medium needs to be indicated. There seem to be two ways of doing this. One would be to add the term *digital* as an adjective modifying the SMD in the extent. The other would be to give "digital" in the other technical details. One of the reasons why we have not made a specific recommendation here is that this provision needs to cover both computer-readable media and traditional audio CDs and video DVDs. Current practice for these two categories follows the two different options stated above, and it is not yet clear to us which option is best suited for a generalized rule. See also the points made under General Issue #3 above.

3. **Digital/Analog**

Definitions:

Digital: A method of storing, processing and transmitting information through the use of distinct electronic or optical pulses that represent the binary digits 0 and 1, as opposed to analog representation of information in or eye-readable, photographic media, or variable but continuous wave forms recorded in response to the variations of a physical phenomena such as human speech or music or moving images.

Analog: Representation of information in eye-readable, photographic media, or variable but continuous wave forms recorded in response to the variations of a physical phenomena such as human speech or music or moving images, as opposed to the digital method of storing, processing and transmitting information through the use of distinct electronic or optical pulses that represent the binary digits 0 and 1.

Issues relating to digital media:

✓ Whether the resource is digital or analog needs to be recorded, either as part of the Type and form of carrier or the Extent or in a separate data element.

✓ *AACR2* rule 6.5C2, Type of recording, specifies the recording of either "digital" or "analog" as part of the Other technical details for sound recordings. This could become a general data element applicable to any medium. On the other hand, it is not clear whether this use of the term "digital" is the same as the use of the term in the phrase "digital media"; see General Issue #3 above. It is doubtful that it would be useful to identify most analog resources, e.g., "1 v. : analog".

4. **System requirements**

Definition: Specifications for hardware and/or software recommended or necessary to use the digital resource.

Preliminary Recommendations: State what equipment and/or software are needed for using the resource beyond what is normal and obvious for the medium. Make note of specific brands or versions of hardware of software when it is specified within the resource or readily ascertainable (e.g. , do not note that a computer is required but do note if a PC or Mac is required; do not note that a CD-ROM drive is required to used a CD-ROM, but do note if an 8X or higher CD-ROM drive is specified).

For media "enhanced" with characteristics of another media that has different system requirements, or accompanied by material with its own system requirements, note those requirements when readily ascertainable.

Issues:

✓ ALA's Consistency Task Force discussed what sort of information is appropriate in a System requirements note, and recommend that the note should identify equipment that is needed beyond what is normal and obvious for the medium. It is not necessary to say that a vinyl sound disc requires a turntable or speakers, or that a website requires a computer with a browser, or that a PDF file requires Acrobat reader. Except in those cases where a specific version is required, it may be that the indication of the digital format is sufficient to convey to the user what software or hardware is necessary. Over time, the specific software needed for access changes, so this note may quickly become out of date.

✓ However, for both audio and video media, there seem to be some standard pieces of information that should always be included in system requirements notes.

✓ For audio media, the need is primarily for digital resources (MP3, etc.) requiring special equipment; for "enhanced CDs" that have video and computer content in addition to sound content; and for emerging technologies (usually networked resources) requiring special equipment and/or software for use. At the least, the system requirements rule for audio media should therefore include mention of enhanced content ("System requirements for:" with reference to the rules for video and digital equipment).

✓ For video media, there is a system requirements aspect to many of the features detailed in the note on technical details for video media, although the content of the note and the order of the details would be different in a system requirements note. Some of these pertain to analog as well as digital media. The relevant elements are:

- o Videorecording system (DVD, VHS, Beta, etc.
- o Colour recording system (NTSC, PAL, SECAM, etc.
- o Regional encoding
- o Sound characteristics (Dolby encoding, stereo., mono., surround, etc.)
- o Projection characteristics/aspect ratio (widescreen, pan-and-scan, letterbox, etc.)
- o Layers (dual layer, single layer, etc.)
- o Software requirements (Windows Media Player, RealPlayer, QuickTime, etc.)
- o Content-specific requirements for games, text files (Acrobat Reader, etc.)

5. Mode of Access

Definition: The means by which an electronic resource mounted on a remote server is accessed.

Preliminary recommendation: The Task Force finds the text of the current rule for this data element (AACR2 9.7Bc) to be sufficient.

6. Digital format

Definition: The identification of a file, bit stream, etc., by the organization of its digital information according to preset specifications.

Preliminary Recommendations: The rule should call for recording information relating the format of a digital object if it is readily available and necessary for use of the resource. Use of MIME types should be recommended when appropriate.   For complex items consisting of multiple formats, the principle format should be given, if that is meaningful; additional information may be given in a note.

Issues:

✓ This is a general data element applicable to all digital media. The file format may be important (if the user needs to provide software for access or use) or it may be irrelevant (if the server provides its own viewer, for instance).

✓ There are special rules for cartographic resources, *AACR2* rule 3.3E, based on the existence of a particular set of standards applicable to geospatial data.

✓ Reference to file format could be made in the Extent element or in the Other Technical Details, but this may be simply a matter of ISBD display (see General Issue #1 above); here we are simply treating it as a separate data element.

✓ The file format may be quite complex. A digital resource may in fact contain files in a variety of formats; a web page with inline graphics or other embedded objects. *AACR2* often makes a distinction between a simple, concise statement that can be given in Area 5 and a more complex statement that should be given in a note; again, this may be simply a matter of ISBD presentation and not about guidelines for how to record the data.

✓ Format is obviously an attribute of files, but it can also apply to bit streams. For example, an image bit stream within a TIFF file may have a format that is defined within the TIFF file format specification. An AVI file may be delivered as a BitTorrent stream.

✓ There are multiple uses of the term "file format":

    o the format the data set is stored in, i.e., native data set environment, for some remote access resources
    o the transfer format or the format of the files on a CD-ROM which generally indicates what software can use the files
    o the compression file format used for many online images
    o video format
    o audio format

✓ The file format may imply software requirements. Is it necessary to both give a digital format and also name the software in the system requirements? For example, when it is stated elsewhere that the file is in PDF format is it necessary to note that an Adobe Acrobat reader, unless a specific version is indicated? Or would such information be considered "normal and obvious for the medium"?

7. File size

Definition: The size of a digital object, given in bytes, megabytes, etc.

Preliminary recommendations: The current rule needs to be simplified.

Issues:

✓ This is a general data element applicable to all digital media. In the case of direct-access resources, the size of the file(s) may be logically an extension of the Extent statement. For remote-access resources, the size of a given file may be important for a user with limited download capacity — or it may be irrelevant if all the details are hidden behind the server's firewall.

✓ Again, this may be complex. Guidelines should include something about recording information that is readily available, and recording aggregate information about an aggregation of files.

8. **Assorted other data elements**

Preliminary recommendations: Give whatever information is important for that particular resource

Issues: The following have been noted either in AACR2 or in other metadata standards as important to some communities. This is not an exhaustive list and can easily change as technology changes. Provisions should be made for adding these data elements when readily available and considered important. The Task Force will continue to look at these elements and will make recommendations in its final report.

- o Cartographic data type (raster, vector, point)
- o Cartographic object type (point, line, polygon, pixel)
- o Number of objects used to represent spatial information
- o Digital transfer information
- o Vertical coordinate system
- o Rules
- o Program statements
- o Bit rate
- o Compression
- o Resolution
- o Image size
- o Data quality
- o Record density
- o Sectoring
- o File structure
- o Number of variables
- o Number of routines
- o Character sets

APPENDIX

Data Elements relating to Technical Description in other Metadata Standards

Metadata Standards examined:

- Cataloging Cultural Objects [CCO]
- Dublin Core [DC]
- VRA Core Version 3.0 [VRA]
- Public Broadcasting Metadata Dictionary Project [PBCore]
- Structural Metadata Dictionary for LC Digital Objects [LCDigObj]
- MPEG-7 [MPEG-7]
- Content Standard for Digital Geospatial Metadata [CSDGM]
- ONIX [ONIX]
- NISO Z39.87-200X Data Dictionary—Technical Metadata for Still Images (Draft) [NISO TMFSI]

Digital attributes (across media types)

- **File type**
  DC: *Format*: "The physical or digital manifestation of the resource." Typically, Format may include the media-type of the resource. Format may be used to identify the software, hardware, or other equipment needed to display or operate the resource. Recommended best practice is to select a value from a controlled vocabulary (for example, the list of Internet Media Types [MIME] defining computer media formats).
  CCO: *Measurements*. *Format of the work*: example: jpeg
  VRA: *Measurements.Format*: Example jpeg
  PBCore: *FormatDigital*: list of MIME types (Mandatory if applicable, repeatable)
  PBCore: *FormatEncoding***:** more specific—examples: Sorenson 3, MPEG-2 4:2:2, M-JPEG A, Real Media 9, Windows Media 9, MP3, AAC, MXF (Recommended, repeatable)
  LCDigObj: *Data Type***:** list of MIME types
  MPEG-7: **MediaInformation.MediaProfile.MediaFormat.System**: SystemCS (PAL, SECAM, Real, Windows Media, etc.—this is broader than FileFormat)
  MPEG-7: **MediaInformation.MediaProfile.MediaFormat.FileFormat**:
  MPEG7:**FileFormatCS** (MIME scheme recommended)
  CSDGM: *Format Name***:** The name of the data transfer format.
  CSDGM: *Native Data Set Environment***:** A description of the data set in the producer's processing environment, including items such as the name of the software (including version), the computer operating system, file name (including host-, path-, and filenames), and the data set size.

▪ **File type** (continued)
   ONIX: **Image/audio/video file format code** (GIF, JPG, TIF, RealAudio, MP3 etc.)
       Product form detail (Real Video format, Quickstime, AVI , Windows media, etc.,
           WAV, RealAudio, MS-DOS, Window, Macintosh, etc.]
       E-publication type code = *001* (HTML, PDF, Adobe E-book reader, NetLibrary, etc.)
       E-publication format code = *01* (HTML, PDF, Microsoft Reader, RocketBook, RTF,
           OEBPS, XML, SGML, EXE, ASCII, etc.
   NISO TMFSI: **FormatDesignation** (drawn from the PREMIS data element set, example:
       TIFF, GeoTIFF—use the most specific)
       FormatName (name or description of file format, examples: image/jp2,
           image/TIFF/GeoTIFF, Adobe PDF, use a controlled vocabulary)
       FormatVersion (version of the format if applicable)

▪ **File size**
   DC: *Format*: "The physical or digital manifestation of the resource." Typically, Format may
       include the dimensions of the resource. Examples of dimensions include size and
       duration.
       In addition to the specific physical or electronic media format, information concerning
       the size of a resource may be included in the content of the Format element if available.
       In resource discovery size, extent or medium of the resource might be used as a criterion
       to select resources of interest, since a user may need to evaluate whether they can make
       use of the resource within the infrastructure available to them.
   CCO: *Measurements. Size***:** kb, Mb, Gb
   PBCore: *FormatFileSize***:** in Bytes only (Recommended, repeatable)
   LCDigObj: *Data Size***:** KB, MB, GB, TB, PB
   MPEG-7: **MediaInformation.MediaProfile.MediaFormat.FileSize**: In bytes; need to
       convert for display to KBps or MPps
   CSDGM: *Spatial Data Organization***:** Includes both indirect and direct spatial reference
       methods (Point/vector object and Raster object information)
   ONIX: **Extent type code = *22*** (Filesize)
           Extent unit code (Kbytes, Mbytes)
   NISO TMFSI: **fileSize** (use bytes only)

▪ **Bit rate**
   PBCore: *FormatDataRate***:** number followed by rate: kilobits/second, bytes/second,
       kilobytes/second, megabits/second (Recommended, repeatable)
   MPEG-7: **MediaInformation.MediaProfile.MediaFormat.VisualCoding.BitRate**

▪ **Video format standard** (same here as file type?)
   PBCore: *FormatStandard***:** MPEG video, QuickTime, RealSystems, Windows Media
       (Recommended, repeatable)
   MPEG-7: **MediaInformation.MediaProfile.MediaFormat.VisualCoding.Format**:
       MPEG7VisualCodingFormatCS [I don't know what this is other than color is an attribute
       of it)

- **Audio format standard** (same here as file type?)
  PBCore: *FormatStandard* (Pull down list: Linear PCM audio, DolbyDigital AC3 Audio, MPEG audio, DTA audio, SDDS audio—I don't know if these are digital or not) (Recommended, repeatable)
  MPEG-7: **MediaInformation.MediaProfile.MediaFormat.AudioCoding.Format**: MPEG7AudioCodingFormatCS

- **Dimensions**
  CCO: *Measurements. Size*: measured in pixels, as in 2100 x 1557 Pixels
  VRA: *Measurements.Dimensions*: Example shows 72 dpi
  LCDigObj: *Extent type: Dimensions*: Pixels, Width:Height (I moved this from Resolution below, I think I put it in the wrong place)
  CSDGM: *Spatial Data Organization***:** Includes both indirect and direct spatial reference methods (Point/vector object and Raster object information).

- **Resolution, etc.**
  VRA: *Measurements.Resolution*: no example
  PBCore: *FormatFrameSize*: the horizontal and vertical resolution of a format type. It may be expressed in pixels, pixels per inch, or in the case of ATSC digital TV, a combination of pixels measured horizontally vs. the number of lines of image/resolution data stacked vertically (interlaced and progressive scan). Examples: 352x240 (MPEG-1 NTSC), 720 lines x 1280 pixels, 1280x720 (Recommended, repeatable)
  PBCore: *FormatBitDepth* (probably too detailed for us)
  PBCore: *FormatSamplingRate* (Probably too detailed for us)
  LCDigObj: *Resolution*: Indicates the quality or sharpness of a scanned or printed image. Expressed as the number of dots-per-inch (dpi).
  LCDigObj: *Bit Depth*: Indicates the number of different colors or shades of gray that can be stored in each pixel of a scanned (i.e., raster) image. Sometimes referred to as "Color Depth." Usually expressed as number of bits per pixel. (probably too detailed for us)
  MPEG-7: **MediaInformation.MediaProfile.MediaFormat.VisualCoding.Resolution**: Image (resolution in dpi)
  MPEG-7: **MediaInformation.MediaProfile.MediaFormat.VisualCoding.Pixel**
  MPEG-7: **MediaInformation.MediaProfile.MediaFormat.AudioCoding.Sample.Rate**
  CSDGM: *Entity and Attribute Information***:** details about the information content of the data set, including the entity types, their attributes, and the domains from which attribute values may be assigned.
  NISO TMFSI: **CompressionScheme, SpatialMetrics**

- **Data Quality**
  CSDGM: *Data Quality Information*: A general assessment of the quality of the data set.

Static image attributes

- **Type of Material**
    DC: *Type*: "The nature or genre of the content of the resource." Type includes terms describing general categories, functions, genres, or aggregation levels for content. Recommended best practice is to select a value from a controlled vocabulary (for example, the DCMI Type Vocabulary). To describe the physical or digital manifestation of the resource, use the FORMAT element.
    CCO**:** *Materials and Techniques*. Electronic/digital media. Example Digital image—says this is the same as *Work Type* which has no digital examples
    VRA: *FormatMediaType*: Static image (Recommended, repeatable)
    MPEG-7: **MediaInformation.MediaProfile.MediaFormat.Content**: Controlled list: image
    ONIX: **Product content type = *07*** (Still images/graphics)
    Image/audio/video file type code = *01* (Whole product)

- **Color**
    CCO**:** *Materials and Techniques. Color***:** note if important, but can be very detailed
    PBCore: *FormatColors*: Color, B&W, Grayscale; or combine (B&W with grayscale sequences)
    LCDigObj: *Color Mode*: Bitonal, Color, Grayscale (associated with a raster image)
    MPEG-7:
    MediaInformation.MediaProfile.MediaFormat.VisualCoding.Format.ColorDomain
    NISO TMFSI: **ColorSpace, ColorProfile**

- **Size**
    MPEG-7: **MediaInformation.MediaProfile.MediaFormat.VisualCoding.Frame.Height**
    MPEG-7: **MediaInformation.MediaProfile.MediaFormat.VisualCoding.Frame.Width**
    NISO TMFSI: **CompressionRatio, ImageWidth, Image Height,**

Video attributes

- **Type of material**
    DC: *Type*: "The nature or genre of the content of the resource." Type includes terms describing general categories, functions, genres, or aggregation levels for content. Recommended best practice is to select a value from a controlled vocabulary (for example, the DCMI Type Vocabulary). To describe the physical or digital manifestation of the resource, use the FORMAT element.
    VRA: *FormatMediaType***:** Moving image (Recommended, repeatable)
    MPEG-7: **MediaInformation.MediaProfile.MediaFormat.Content**: Controlled list: video, audiovisual [video with audio]
    ONIX: **Product content type = *06*** (Moving images: film, video, etc.)
    Image/audio/video file type code = *01* (Whole product)

- **Color**
  CCO: *Materials and Techniques. Color*: note if important, but can be very detailed
  PBCore: *FormatColors*: Color, B&W, Grayscale; or combine (B&W with grayscale
      sequences)
  LCDigObj: *Color Mode*: Bitonal, Color, Grayscale (associated with a raster image)
  MPEG-7:
      MediaInformation.MediaProfile.MediaFormat.VisualCoding.Format.ColorDomain

- **Video format standard**
  CCO: *Measurements*. *Format of the work*: example: VHS, DVD
  PBCore: *FormatStandard*: NTSC video (interlaced or progressive), ATSC video interlaced
      or progressive), PAL video, SECAM video (Recommended, repeatable)
  MPEG-7: **MediaInformation.MediaProfile.MediaFormat.Medium**: MPEG7MediumCS
      (Do not use for file accessible via web, includes vinyl record, CD, VHS, DVD, film—
      doesn't say if it includes video files on CD-ROM or something)
  MPEG-7: **MediaInformation.MediaProfile.MediaFormat.System**: SystemCS (PAL,
  SECAM)
  ONIX: **Product form code** (Videodisk, DVD video, other)
          Product form detail (PAL, NTSC, SECAM)
          Image/audio/video file type code = *01* (Whole product)
          Product form feature type = *05* (DVD region (values come from controlled list (list
          #103)))

- **Audio format standard** (eg Dolby)
  PBCore: *FormatStandard* (Pull down list: Linear PCM audio, DolbyDigital AC3 Audio,
      MPEG audio, DTA audio, SDDS audio—I don't know if these are digital or not)
      (Recommended, repeatable)

- **Duration**
  CCO: *Measurements*. *Time*: minutes, or hours and minutes. Examples: 2 hours 2 minutes 39
      secords; approximately 122 min.
  PBCore: *FormatDuration***:** HH:MM:SS or similar flavor (if you want to go down to
      milliseconds—recommends suiting institutional need) (Mandatory if applicable, use
      once)
  LCDigObj: *Extent type: Duration* HHHH**:**MM**:**SS.SSS
  MPEG-7: **MediaTime.MediaDuration**
  ONIX: **Extent type code = *09*** (Duration: use for running time)
          Extent unit code (Hours, minutes, seconds)

- **Aspect ratio**
  PBCore: *FormatAspectRatio***:** examples: 4:3, 4:3 (16:9 letterbox), 4:3 (16:9 anamorphic),
      16:9, 5.5:3, 7:3 (Panavision or CinemaScope), 2.35:1, 1.85:1 (Recommended,
      repeatable)
  MPEG-7: **MediaInformation.MediaProfile.MediaFormat.VisualCoding.Frame.Height**
  MPEG-7: **MediaInformation.MediaProfile.MediaFormat.VisualCoding.Frame.Width**

▪ **Track information** (e.g. stereo, multiple video tracks)
PBCore: *FormatTracks***:** intended to indicate the number and type of tracks that are found in a media item, whether it is analog or digital. For example, 1 video track, 2 audio tracks, 1 text track, 1 sprite track, etc. Additional configuration information of these tracks should be described using *FormatChannelConfiguration*. (Optional, repeatable)
MPEG-7: **MediaInformation.MediaProfile.MediaFormat.AudioCoding.AudioChannels**
MPEG-7: **MediaInformation.MediaProfile.MediaFormat.AudioCoding.Presentation**: includes mono & stereo

▪ **Frame rate**
PBCore: *FormatFrameRate* (we seldom know this)
MPEG-7: **MediaInformation.MediaProfile.MediaFormat.VisualCoding.Frame.Rate**

Audio attributes

▪ **Type of material**
DC: *Type*: "The nature or genre of the content of the resource." Type includes terms describing general categories, functions, genres, or aggregation levels for content. Recommended best practice is to select a value from a controlled vocabulary (for example, the DCMI Type Vocabulary). To describe the physical or digital manifestation of the resource, use the FORMAT element.
VRA: *FormatMediaType***:** Sound (Recommended, repeatable)
MPEG-7: **MediaInformation.MediaProfile.MediaFormat**.Content: Controlled list: audio
ONIX: **Product form code** (CD-Audio, CD-ROM, CD-I interactive, DART, Audio disc, MiniDisc, CD-Extra, DVD Audio, downloadable audio file, other audio format)
> **Image/audio/video file type code = *01*** (Whole product)
> **Product content type** (Performance, music, other audio, audiobook)—spoken word: audio recording of a drama   or other spoken word performance)

▪ **Audio format standard** (e.g. stereo)
PBCore: *FormatStandard* (Pull down list: Linear PCM audio, DolbyDigital AC3 Audio, MPEG audio, DTA audio, SDDS audio—I don't know if these are digital or not) (Recommended, repeatable)
MPEG-7: **MediaInformation.MediaProfile.MediaFormat.Medium**: MPEG7MediumCS (Do not use for file accessible via web, includes vinyl record, CD, VHS, DVD, film— doesn't say if it includes audio files on CD-ROM or something)
ONIX: Product form detail (CD standard audio format, SACD super audio format)

▪ **Duration**
CCO: *Measurements*. *Time*: minutes, or hours and minutes. Examples: 2 hours 2 minutes 39 secords; approximately 122 min.
PBCore: *FormatDuration***:** HH:MM:SS or similar flavor (if you want to go down to milliseconds—recommends suiting institutional need) (Mandatory if applicable, use once)
LCDigObj: *Extent type: Duration*: HHHH**:**MM**:**SS**.**SSS

- **Duration** (continued)
  MPEG-7: **MediaTime.MediaDuration**
  ONIX: **Extent type code** (Duration: use for running time)
  Extent unit code (Hours, minutes, seconds)

- **Track information** (e.g. stereo, multiple video tracks)
  PBCore: *FormatTracks***:** intended to indicate the number and type of tracks that are found in a media item, whether it is analog or digital. For example, 1 video track, 2 audio tracks, 1 text track, 1 sprite track, etc. Additional configuration information of these tracks should be described using *formatChannelConfiguration*. (Optional, repeatable)
  MPEG-7: **MediaInformation.MediaProfile.MediaFormat.AudioCoding.AudioChannels**
  MPEG-7: **MediaInformation.MediaProfile.MediaFormat.AudioCoding.Presentation**: includes mono & stereo

Cartographic attributes

- **Resource Type**
  DC: *Type*: "The nature or genre of the content of the resource." Type includes terms describing general categories, functions, genres, or aggregation levels for content. Recommended best practice is to select a value from a controlled vocabulary (for example, the DCMI Type Vocabulary). To describe the physical or digital manifestation of the resource, use the FORMAT element.
  CSDGM: *Entity and Attribute Information***:** Details about the information content of the data set, including the entity types, their attributes, and the domains from which attribute values may be assigned.
  ONIX: **Product form code** = *CZ* (Other cartographic)

- **Spatial reference information**
  CSDGM: *Spatial Reference Information***:** The description of the reference frame for, and the means to encode, coordinates in the data set.

Text attibutes

- **Resource Type**
  DC: *Type*: "The nature or genre of the content of the resource." Type includes terms describing general categories, functions, genres, or aggregation levels for content. Recommended best practice is to select a value from a controlled vocabulary (for example, the DCMI Type Vocabulary). To describe the physical or digital manifestation of the resource, use the FORMAT element
  ONIX: **Product form code** = *DG* (Electronic book text)
  Text item type code (Textual work, front matter, review, letter, etc.)

- **Extent**
  ONIX: **Extent type code** = *02* (Number of words)

Other attributes for strictly digital media (e.g. multimedia, software, direct access electronic resource)

- **Resource Type**

  DC: *Type*: "The nature or genre of the content of the resource." Type includes terms describing general categories, functions, genres, or aggregation levels for content. Recommended best practice is to select a value from a controlled vocabulary (for example, the DCMI Type Vocabulary). To describe the physical or digital manifestation of the resource, use the FORMAT element.
  VRA: *FormatMediaType*: Dataset, Interactive resource (Recommended, repeatable)
  CSDGM: *Entity and Attribute Information*: Details about the information content of the data set, including the entity types, their attributes, and the domains from which attribute values may be assigned.
  ONIX: **Product form code** (Digital (digital or multimedia; detail unspecified), game cartridge, diskette, online resource, DVD-ROM, other digital)
    Product content type (Game, software, data)