Encoding Works and Images: The Story Behind VRA Core 4.0

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Visual resources professionals have long recognized the advantages of shared cataloging without truly enjoying its benefits. In the days when images existed solely as slides or photographs stored in cabinets in local sites, this was more of an inconvenience than a vital issue. Today, in the midst of a full-fledged digital transition, there is an urgent need for collaborative approaches in order to meet the demands of our users. The aggregate of visual resources databases probably represents the richest trove of information about art and architecture in the world. But communal access to this information remains sorely limited.

This has not been for the lack of trying over the course of many years. Metadata standards, particularly the VRA Core Categories, have been proposed, embellished, and widely accepted on an international scale.[1] Concomitant developments, such as the Getty Vocabularies, have provided powerful tools for controlling data values.[2] With the recent publication of *Cataloging Cultural Objects: A Guide to Describing Cultural Works and Their Images* (CCO), visual resources professionals now have a navigational chart for the formulation of content.[3] Cataloging methodologies have subsequently become more precise and better informed. And yet a truly viable mechanism for shared cataloging continues to elude the visual resources community. To some extent this is an ongoing symptom of persistent shortages in visual resources collections: shortages of time, funding, and technical support. However, the VRA Data Standards Committee is presenting yet one more instantiation of the Core Categories with the hope that VRA Core 4.0 will represent a significant turning point in the profession's quest for a standard data format. I would like to lend some perspective on how the visual resources profession has reached this juncture – a chain of circumstances that is nothing so grandiose as to be called a history, but might be considered as a back story for the advent of VRA Core 4.0.

It is important to remember that most visual resources collections came into being as independent entities separate from institutional library systems. Further, the development of automation in visual resources collections occurred almost a full generation after the beginnings of library automation, which was dependent on centralized systems that gave rise to national bibliographic utilities. The availability of the personal computer in the 1980s enabled slide curators to devise their own, home-grown databases. This freedom and flexibility, however, came at the expense of communal efficiency. Visual resources collections were (and, to a large measure, still are) cataloged redundantly, each reinventing the wheel hundreds of times over.

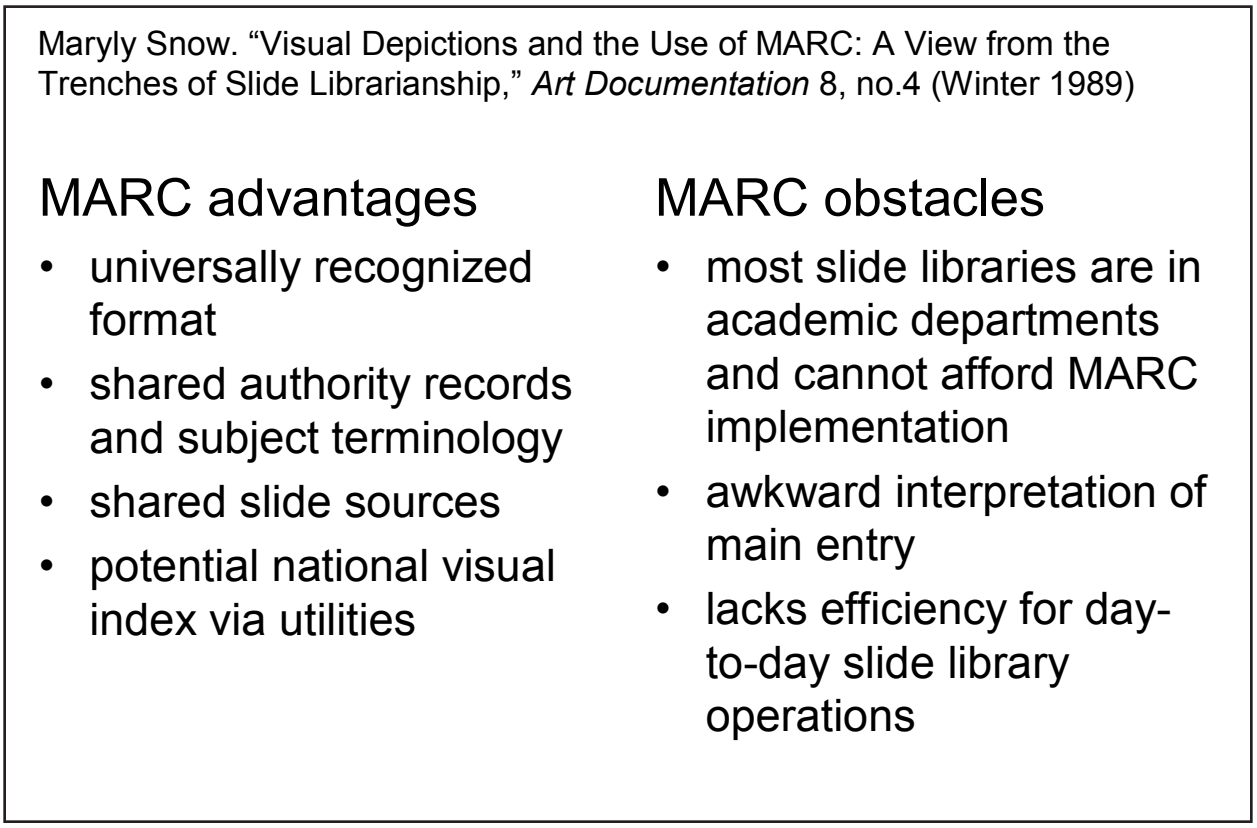
Librarians dealing with bibliographic materials have always looked somewhat askance at this predicament, since that community has long had a standard data format (MARC) and a standard set of rules for formulating content (i.e., the Anglo-American Cataloguing Rules). This is not to say that image collections, especially those that are incorporated into institutional library systems, have not been able to adapt the MARC format for their own needs, cataloging their holdings with records that could be contributed to an online public access catalog. But these have proven, over time, to be exceptions rather than the rule. Visual resources collections have, by and large, not adopted MARC cataloging, and I think it is worth our while to explore briefly this road not taken.

At an ARLIS/NA conference in 1989, Maryly Snow, visual resources librarian at University of California—Berkeley, along with James Bower, from the former Getty Information Institute, articulated persuasively the need for a means to share visual resources cataloging—specifically an adaptation of the MARC format. Snow recapitulated her argument that same year in an article in which she promoted the advantages of such an adaptation (Figure 1).[4] MARC's great, singular virtue is that it works. It is a universally recognized medium of data communication with a stable infrastructure propelled by institutional, corporate, and governmental sanction. Snow discussed the common good that would be derived from shared authority records, subject terminology, and image sources – benefits that, in retrospect, are clearly self-evident. She envisioned a national visual index hosted by a bibliographic utility such as OCLC or RLIN, an idea that is now actually showing glimmerings of fruition in omnibus digitization efforts such as ARTstor or in data-harvesting schemes such as the Union Catalog of Art Images.[5]

Snow also forthrightly posited formidable obstacles to this vision. The largest problem, in and of itself probably a deal breaker, was administrative and logistical: not enough slide libraries were well-positioned to participate in a MARC-cataloging environment and the financial barriers to ameliorating this situation were prohibitive. Snow also touched upon the controversy of whether the main entry for a record should describe the item in hand, such as a slide, or the object depicted in the slide, a differentiation for which MARC was not particularly well-suited.

Strict interpretation of the cataloging rules, at least as they stood in 1989, mandated that an "author" main entry would not be the "creator" of the depicted object, but rather the person who photographed the slide itself. Visual resources catalogers working in MARC have devised various ways around this problem, but this conceptual stumbling block begged a fundamental philosophical question, familiar to us all, that has weighed upon all attempts to model metadata for visual materials ever since: just what is being cataloged, the depicted object or its surrogate?

Figure 1: Advantages and obstacles to using the MARC format.



Snow also pointed out the fact that for day-to-day slide library operations (label making, guidecards, or basic search and retrieval), MARC was unwieldy and not as efficient as then-available, off-the-shelf database management software. In the minds of most visual resources curators, immediate functionality won out over the potential sharing of data. Be that as it may, an ad hoc VRA MARC Advisory committee was formed in 1989 to investigate various MARC cataloging schemes that had been developed for image collections.[6] This led eventually to a thoroughgoing documentation of MARC practice in the world of art and architecture, published in 1998 and edited by Linda McRae and Lynda White, called the *ArtMARC Sourcebook*.[7]

This was a valuable compendium that, like Snow's work, presented a mixed bag of advantages and disadvantages. On one hand, the individual case studies demonstrated that, yes, it was possible to find within the vast mélange of MARC tags correspondences with the data elements required for visual resources cataloging. On the other hand, the collective result showed a marked lack of consensus on what these correspondences were; variant local practices ensured that extensive additional mapping would be required to share records in a multi-institutional system. The illustrated example (Figure 2) shows the many different MARC tags used by various institutions to express just one data element such as Work Type; the mapping is quite literally all over the map.

The VRA Data Standards Committee was begun in 1993, largely at the initiative of Linda McRae, who served as its first chair.[8] The committee has been so long associated with the VRA Core Categories that one might think that the formulation of the VRA Core was its original mission, but this would be an unwarranted teleology. The committee's original charge was rather broad: "to advocate and promote the use of standard descriptive practices in visual resources collections that will facilitate the management, organization, and exchange of information."

Following this broad profile, different types of data standards were grouped into clusters as areas of investigation (Figure 3). It became quickly evident that none of these types of standards was very meaningful without a well-defined set of data elements, and this became the focus of attention. In the process of investigating metadata sets used within the cultural heritage community, the committee examined cataloging practices in associated professions, but looked most closely at its own domain. There was a perceived need for an intrinsic, from-the-ground-up compilation of data elements based empirically on visual resources cataloging experience; such elements were collected from over sixty institutions across North America.

Figure 2: MARC Mapping for VRA Core 2.0 Work Type category.

Mapping of Core 2.0 Work Type category to MARC tags in various VR cataloging projects, McRae & White (eds.), *ArtMARC Sourcebook* (1998)

Category	MARC Tag	Number Used	MARC Tag	Number Used	MARC Tag	Number Used
Work Type	**655**	9	**630**	2	**690**	1
	245	6	**049**	1	**695**	1
	654	5	**100**	1	**740**	1
	650	4	**130**	1	**755**	1
	300	4	**340**	1		
	007	3	**653**	1		

Figure 3: VRA Data Standards Committee areas of investigation.

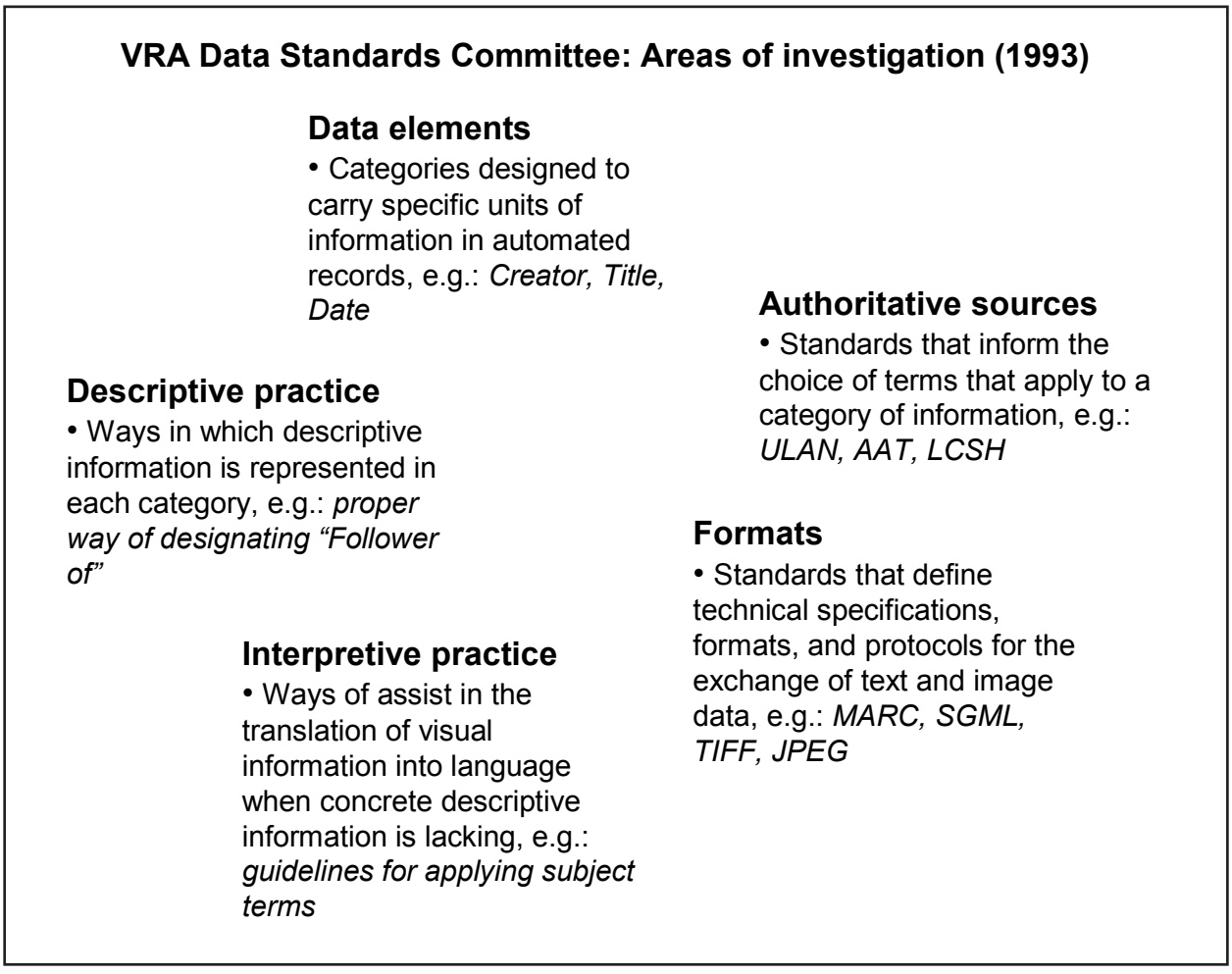


Figure 4: CDWA and VRA Core categories 1996.

CDWA Core Categories (1996)	VRA Core 1.0 (1996)
Catalog Level	OBJECT CATEGORIES
Object/Work Type	Object Type
Classification Term	Titles
Title or Name	Dimensions
Measurements Description	Materials
Materials and Techniques Description	Techniques
Creator Description	Dates
Creator Identity (link authority)	Subjects
Creator Role	Repository Name
Creation Date	Repository Place
Subject Matter Indexing Terms	Repository Number
Current Location Repository Name	Site
Current Geographic Location	Larger Entity Names
Current Repository Numbers	Notes
	CREATOR CATEGORIES
	Creator
	Nationality
	Culture
	SURROGATE CATEGORIES
	View Description
	Image Type
	Image Owner
	Image Owner Number
	Source

This effort was helped along considerably by the publication of the *Categories for the Description of Works of Art* (CDWA), a Getty-sponsored project that exhaustively gathered data elements pertinent to the world of art.[9] The CDWA in its full form was far more dense and granular than was practicable for visual resources application. It was around this time, however, that the bibliographic community began to promote the idea of a core-level record—that is, a record with a completeness level that was between minimal and full, and which contained data elements judged to be essential for both identification and access—a concept that was expressed in its most simple and generic form in the Dublin Core.[10]

Thus an extracted subset of Core Categories was indicated for the CDWA, but while this provided a more than adequate framework for the description of art objects in museums, it did not particularly accommodate built works, nor did it adequately provide for the description of surrogates, and this was the point of departure for what became known as the VRA Core Categories, version 1.0 (Figure 4).[11]

If one looks backward through the various versions of the VRA Core to this initial list, it might appear that nothing much has really changed; many of the elements are quite familiar. However, the progressive development of the VRA Core was not so much about the names of the elements as the way these elements were shaped and put together. VRA Core 1.0, while mapped to other standards such as MARC and CDWA, was not much more than a rough draft, without any real sense of how the elements might interact in a real-life application and it was soon superseded by a more sophisticated scheme (Figure 5).[12]

Some of the changes in VRA Core 2.0 were merely semantic (for example, Object Type was renamed Work Type). Other changes were structural. The separate Creator categories in VRA Core 1.0 reflected the fact that in a relational environment such

Figure 5: VRA Core 1.0 and 2.0.

Core 1.0 (1996)	Core 2.0 (1997)
OBJECT CATEGORIES	WORK CATEGORIES
Object Type	Work Type
Titles	Title
Dimensions	Measurements
Materials	Material
Techniques	Technique
Dates	Date
Subjects	Repository Name
Repository Name Repository Place	Repository Place
Repository Number	Repository Number
Site	Current Site
Larger Entity Names	Original Site
Notes	Style/Period/Group/Movement
	Creator
CREATOR CATEGORIES	Role
Creator	Nationality/Culture
Nationality	Subject
Culture	Related Work
	Relationship Type
SURROGATE CATEGORIES	Notes
View Description	
Image Type	VISUAL DOCUMENT CATEGORIES
Image Owner	Visual Document Type
Image Owner Number Source	Visual Document Format
	Visual Document Measurements
	Visual Document Date
	Visual Document Owner
	Visual Document Owner Number
	Visual Document View Description
	Visual Document Subject
	Visual Document Source

data would reside in a separate authority. But in an abstract metadata set pertaining to the work itself, this was an unnecessary distinction, so these were folded into the Work categories and the fact that the Creator could have a specific Role in the making of the work was recognized. Site was re-imagined to incorporate temporal dimensions and thus was expanded into Original Site and Current Site. The potential for the relationship among works, implied in the Larger Entity Names element in VRA Core 1.0, was more specifically asserted with the concept of a Related Work and the realization that there are different types of relationships that could be codified. Finally, the Surrogate categories were renamed Visual Document categories and fleshed out to nine elements.[13]

The VRA Core underwent its first significant assessment in 1997 with the VISION Project, a collaborative testbed conducted by the Research Libraries Group and the Visual Resources Association.[14] Visual resources collections from thirty-three institutions contributed over one thousand records into a database modeled on VRA Core 2.0, using a Web-based inputting template developed by RLG. These records described works of art and architecture ranging among different media, cultures, and time periods. As part of the experiment, some objects were assigned to be cataloged by all 33 participants, while each participant also individually chose records to be added to the database.

The data set yielded by the VISION project was, all things being equal, pretty much a mess, but a very instructive mess. There was confusion in the interpretation of the intent of the elements and there was glaring inconsistency in the accumulated data values. The first problem seemed to indicate weaknesses in the design of VRA Core 2.0; the second problem, considering the number of participants and the fact that there were little or no prescribed rules for data content, was inevitable. Clearly, there was still much work to be done.

Among other effects, the dissonant results of the VISION Project reinforced the notion that even the most perfect metadata scheme in the world would not guarantee efficient inputting and retrieval without some mutually shared sense of direction for the selection, formatting, and organization of data values. This understanding of a need for data content guidelines gave impetus to the effort that eventually produced *Cataloging Cultural Objects: A Guide to Describing Cultural Works and Their Images* (CCO), an offshoot from the development of the Core Categories that became a most considerable project in its own right.[15]

Meanwhile, certain structural issues needed to be addressed in VRA Core 2.0. Creating records for surrogates entailed the redundant inputting of information pertinent to the work for each instance of the surrogate, an awkward interface necessitating some sort of software intervention to normalize this one-to-many relationship (Figure 6). Furthermore, the distinction between Works and Visual Documents was not always clear. In the example shown here (Figure 7), the Villa Rotunda, the drawing of the villa in Palladio's *Quattro Libri*, a slide of the drawing, and a digital scan of the slide form a cascading chain of being more complex than what could easily fit into the two-tiered structure of VRA Core 2.0. The Data Standards Committee deliberated the inexorably complicating step of adding a third, or even fourth level of entity to the metadata model, when the suggestion was made (and I believe Elisa Lanzi, committee chair at the time, should be credited): why not simply build one set of elements that could accommodate all entity levels?

Figure 6: VRA Core 2.0 Work and Visual Document categories.

WORK CATEGORIES
Work Type = cathedral
Title = Chartres Cathedral
Date = Begun 1194
Current Site = Chartres, France
Style/Period/Group/Movement = Gothic
Nationality/Culture = French
Subject = Gothic architecture; cathedrals

WORK CATEGORIES
Work Type = cathedral
Title = Chartres Cathedral
Date = Begun 1194
Current Site = Chartres, France
Style/Period/Group/Movement = Gothic
Nationality/Culture = French
Subject = Gothic architecture; cathedrals

VISUAL DOCUMENT CATEGORIES
Vis. Doc. Type = slide
Vis. Doc. Format = 35 mm
Vis. Doc. Measurements = 2 x 2 ″
Vis. Doc. Date = 1995
Vis. Doc. Owner = Princeton University
Vis. Doc. Owner Number = 12345
Vis. Doc. View Description = view from south
Vis. Doc. Subject = rose window; buttresses
Vis. Doc. Source = faculty photo

WORK CATEGORIES
Work Type = cathedral
Title = Chartres Cathedral
Date = Begun 1194
Current Site = Chartres, France
Style/Period/Group/Movement = Gothic
Nationality/Culture = French
Subject = Gothic architecture; cathedrals

VISUAL DOCUMENT CATEGORIES
Vis. Doc. Type = digital image
Vis. Doc. Format = JPEG
Vis. Doc. Measurements = 768 x 1024
Vis. Doc. Date = 1997
Vis. Doc. Owner = Princeton University
Vis. Doc. Owner Number = 12345
Vis. Doc. View Description = view from south
Vis. Doc. Subject = rose window; buttresses
Vis. Doc. So[redacted]

Figure 7: Villa Rotunda.

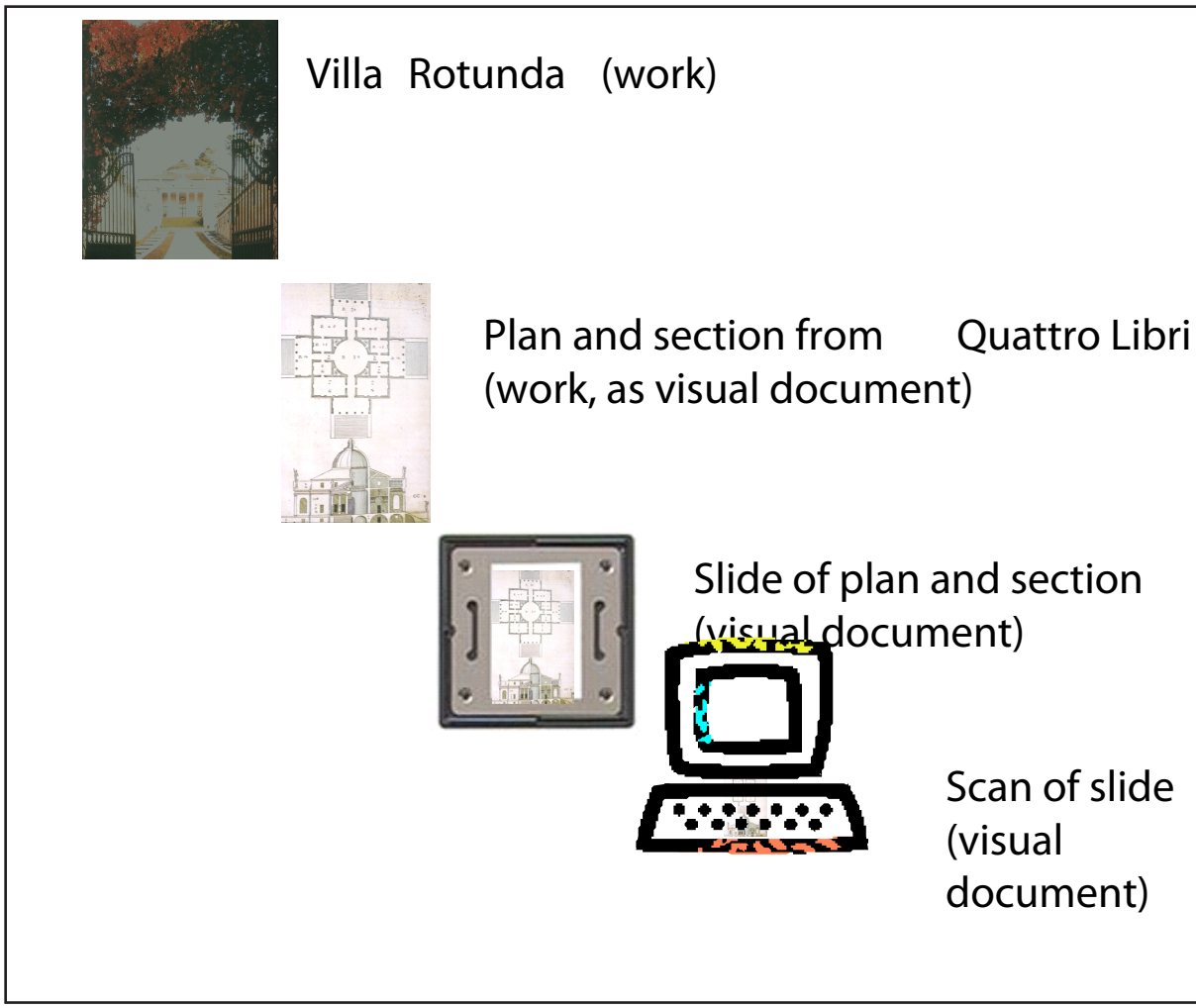


Figure 8: VRA Core 2.0 and 3.0.

Core 2.0 (1997)	Core 3.0 (2000)
WORK CATEGORIES	CATEGORIES
Work Type Title Measurements Material Technique Creator Role Date Repository Name Repository Place Repository Number Current Site Original Site Style/Period/Group/Movement Nationality/Culture Subject Related Work Relationship Type Notes	Record Type Type Title Title.Variant Title.Translation Title.Series Title.Larger Entity Measurements Measurements.Dimensions Measurements.Format Measurements.Resolution Material Material.Medium Material.Support Technique Creator Creator.Role Creator.Attribution Creator.Personal name Creator.Corporate name Date Date.Creation Date.Design Date.Beginning Date.Completion Date.Alteration Date.Restoration Location Location.Current Site Location.Former Site Location.Creation Site Location.Discovery Site Location.Current Repository Location.Former Repository ID Number ID.Current Repository ID.Former Repository ID.Current Accession ID.Former Accession Style/Period Style/ Period.Style Style/ Period.Period Style/ Period.Group Style/ Period.School Style/ Period.Dynasty Style/ Period.Movement Culture Subject Relation Relation.Identity Relation.Type Description Source Rights
VISUAL DOCUMENT CATEGORIES	
Vis. Doc. Type Vis. Doc. Format Vis. Doc. Measurements Vis. Doc. Date Vis. Doc. Owner Vis. Doc. Owner Number Vis. Doc. View Description Vis. Doc. Subject Vis. Doc. Source	

Ergo, version 3.0, a single set of elements that brought the VRA Core more closely into line with other metadata standards, such as the Dublin Core.[16] Based substantially on the Work Categories as defined in VRA Core 2.0, VRA Core 3.0 added a Rights element in order to account for copyright information and, most crucially, a Record Type element to indicate whether the categories were describing a work or describing a surrogate, now known as an image (Figure 8).

An important new feature of VRA Core 3.0 was the refinement of categories into subsidiary elements known as qualifiers. Qualifiers enabled the parsing of categories into narrower or more specific meanings. For example, the concept of date for a given work can have multiple connotations, such as creation, completion, or alteration. Qualifiers also allowed for the regrouping of associated elements into logical clusters. For example, Role, which existed as a separate element in VRA Core 2.0, was more appropriately incorporated as a qualifier of Creator. By establishing a single element set that could be inflected by qualifiers, much in the manner of the Dublin Core, the VRA Core became simpler and, at the same time, more robust and accommodating.

This, then, is the VRA Core such as it has recently been known, a commonly-understood mode of organization that has informed cataloging databases throughout our sphere of activity. But the challenge has remained to make the Core more dynamic, so that our data are not only shaped by similar precepts, but are actually interoperable. Throughout the development cycle of the VRA Core, there has been an ongoing dialectic between theory and practice. In its successive versions, the VRA Core has been presented as a conceptual guideline rather than an explicit data structure. For a long time, implementation has been

the dreaded "I" word, and for good reason: the VRA Data Standards Committee has wanted to avoid wedding the VRA Core to the technology of any given moment. But if the VRA Core was to maintain its relevance in the world of metadata, especially with the ascendancy of the Web, it needed to take on a more robust functionality.

As the new decade began, it was apparent that Extensible Markup Language (XML), a stable, non-proprietary, platform-independent data format, was fast becoming the lingua franca of data exchange, and it behooved the committee to express the VRA Core in a valid data format.[17] More specifically, an XML schema, a set of rules for document encoding, needed to be developed for the Core. At first, it was hoped that it would be possible to translate VRA Core 3.0's elements and qualifiers into XML's nested structure of elements, sub-elements, and attributes (Figure 9). But, as a matter of course, writing an XML schema exerts a test of logic upon the underlying metadata, and this exposed some telling defects in VRA Core 3.0.

While the qualifiers as defined in VRA Core 3.0 were a step in the right direction in terms of capturing nuance, they were problematic in their application. For example, although the LargerEntity qualifier of the Title element was a convenient way to define whole/part relationships, it created ambiguity because it conflicted in function with the Relation element. Another typical example was in the Date element, where the qualifiers Beginning and Completion are distinct smaller divisions of what comprises a date, whereas the other qualifiers describe different kinds of dates. One could think of other possible kinds such as discovery or destruction and the list potentially could proliferate on and on. The problem here was an apples and oranges mixture that translated poorly into XML.

Figure 9: VRA Core 3.0 and XML mock-up.

Core 3.0 (partial list)

```
Record    Type   = work
Type    = painting
Title    = Eve, Cain slaying Abel
   Title.Variant = Eva
   Title.Larger Entity = Ghent Altarpiece
Measurements
   Measurements.Dimensions
= 204 x 32 cm
Material
   Material.Medium = oil paint
   Material.Support = panel
Creator     = Eyck, Jan van
   Creator.Role = painter
Creator     = Eyck, Hubert van
   Creator.Role = painter
Date
   Date.Completion = 1432
```

XML mock -up

```
<recordType   > work</  recordType   >
<type> painting</type>
<title>Eve, Cain slaying Abel
   <variant>Eva</variant>
   <largerEntity   >Ghent Altarpiece
   </largerEntity   >
</title>
<measurements>
   <dimensions>204 x 32 cm
   </dimensions>
</measurements>
<material>
   <medium>oil paint</medium>
   <support>panel</support>
</material>
<creator>Eyck, Jan van
   <role>painter</role>
</creator>
<creator>Eyck, Hubert van
   <role>painter</role>
</creator>
<date>
   <completion>1432</completion>
<date>
```

Figure 10: VRA Core 3.0 and 4.0.

Core 3.0 (2000)

Categories

Record Type
Type
Title
- Title.Variant
- Title.Translation
- Title.Series
- Title.Larger Entity

Measurements
- Measurements.Dimensions
- Measurements.Format
- Measurements.Resolution

Material
- Material.Medium
- Material.Support

Technique
Creator
- Creator.Role
- Creator.Attribution
- Creator.Personal name
- Creator.Corporate name

Date
- Date.Creation
- Date.Design
- Date.Beginning
- Date.Completion
- Date.Alteration
- Date.Restoration

Location
- Location.Current Site
- Location.Former Site
- Location.Creation Site
- Location.Discovery Site
- Location.Current Repository
- Location.Former Repository

ID Number
- ID.Current Repository
- ID.Former Repository
- ID.Current Accession
- ID.Former Accession

Style/Period
- Style/ Period.Style
- Style/ Period.Period
- Style/ Period.Group
- Style/ Period.School
- Style/ Period.Dynasty
- Style/ Period.Movement

Culture
Subject
Relation
- Relation.Identity
- Relation.Type

Description
Source
Rights

Core 4.0 (2005)

Elements (bold); sub -elements (small type); attributes (italic)

work, collection, or image
(id)
- agent
  - attribution
  - culture
  - dates (type)
    - earliestDate
    - latestDate
  - name (type)
  - role
- date (type)
  - earliestDate
  - latestDate
- description
- inscription
  - author
  - position
  - text (type)
- location (type)
  - name (type)
  - refid (type)
- material (type)
- measurements (type)
- relation (href, type, relids)
- rights
- source
  - name (type)
  - refid (type)
- stateEdition (count, num, type)
  - description
  - name
- stylePeriod
- subject
  - term (type)
- technique
- textref
  - name (type)
  - refid
- title (pref, type)
- worktype

The upshot of this was that in order to make the VRA Core XML-compliant, version 3.0 could not simply be tweaked, but needed a serious overhaul, hence the evolution of VRA Core 4.0 (Figure 10). Core 4.0 comprises elements, sub-elements, and attributes, reflecting the component parts of XML. The undifferentiated qualifiers of VRA Core 3.0 have now been assigned separate functions in VRA Core 4.0 (Figure 11). EarliestDate and latestDate, which are discrete smaller parts of Date, have been treated as sub-elements, whereas different kinds of date, such as creation or alteration, are values that can be assigned to the *type* attribute. Put into practice as an XML expression, using as an example New York's former Pennsylvania Station, the creation and destruction dates of the building can be expressed as repeating packets of elements, sub-elements, and attributes.

VRA Core 4.0's XML structure differentiates zones for data that are to be displayed to the user and for data that serves as indexing values, controlled as much as possible by various authorities. This model follows very closely the format outlined in CCO and one can observe that the Core and CCO have effected a symbiotic relationship insofar as VRA Core 3.0 provided the elemental groundwork upon which the CCO editors developed data content guidelines and CCO, in turn, influenced the methodology of VRA Core 4.0.

Figure 11: Comparison of Date element in Core 3.0 and 4.0.

Core 3.0	Core 4.0	Core 4.0 expressed as XML
Date Date.Creation Date.Design Date.Beginning Date.Completion Date.Alteration Date.Restoration	• date (type) earliestDate latestDate	<dateSet> <display> 1902 -1911 (demolished 1965) </display> <date type ="creation ">… <earliestDate> 1902 </earliestDate> <latestDate> 1911 </latestDate> </date> <date type =“destruction ">… <earliestDate> 1965 </earliestDate> <latestDate> 1965 </latestDate> </date> </dateSet> 

It is important to remember that XML is meant to augment relational databases as an agent of exchange, and is not meant, at least at the present level of software development, to replace relational databases. But, just as a case in point, MDID2, which many visual resources collections are currently using as a presentation tool, has required imported cataloging data to be formatted in XML.[18] It is also important to remember that XML encoding is intended to be transparent to user and cataloger alike, much in the way that HTML encoding is transparent to viewers of the Web. Data may be rendered both as tombstone text and expressed, under the covers, as it were, as an XML record (Figure 12).

VRA Core 4.0 is laden with many bells and whistles. However, they are there only if needed; a more economical, stripped-down version should be viable. Also, it should be kept in mind that Core 4.0 will undoubtedly require some fine tuning, especially as cataloging experience accrues.

A visual paradigm for earlier versions of the VRA Core might look something like an antique secretary (Figure 13), with its sequence of cubbyholes built to hold objects of varying sizes, but fundamentally inert in structure. By contrast, VRA Core 4.0 might be envisioned as something like a fancy picnic hamper (Figure 14), with its highly specified functionality – an efficient carrying case for the complex sets of data visual resources professionals deal with every day. The learning curve for this new format can be steep and the transition from VRA Core 3.0 to VRA Core 4.0, in terms of systems implementation, may not be a simple process. But metadata crosswalks are indeed feasible. VRA Core 4.0, if nothing else, is an investment for the future. As digital asset management becomes more and more an institution-wide enterprise, an XML interface may well become an obligatory passport to the long-desired and increasingly necessary realm of data exchange.[19]

Figure 12: Record for Pennsylvania Station expressed in XML.

Data as "tombstone" text	Data expressed as XML
 Pennsylvania Station. New York, New York. Designed by McKim , Mead & White (American, 1879 -1919). Built 1902 -1911 (demolished 1965).	<agentSet > <display> Designed by McKim , Mead & White </display> <agent> <name type=" corporate ">McKim , Mead & White </name> <dates type=" activity ">< earliestDate >1879 </ earliestDate > < latestDate >1919 </ latestDate > </dates> <culture vocab =" AAT ">American </culture> <role vocab =" AAT ">architects </role> </agent> </agentSet > <dateSet> <display> Built 1902 -1911 (demolished 1965) </display> <date type=" creation "> <earliestDate> 1902 </earliestDate> <latestDate> 1911 </latestDate> </date> <date type= "destruction "> <earliestDate> 1965 </earliestDate> <latestDate> 1965 </latestDate> </date> </dateSet > < locationSet > <display> New York, New York </display> <location type=" site "> <name type=" geographic " vocab =" TGN "> New York (city) </name> <name type=" geographic " vocab =" TGN "> New York (state) </name> </location> </locationSet > < stylePeriodSet > <display></display> < stylePeriod vocab =" AAT "> Classical Revival </ stylePeriod > </ stylePeriodSet > < titleSet > <display> Pennsylvania Station </display> <title type=" traditional " pref =" true "> Pennsylvania Station </title> </ titleSet > < worktypeSet > <display></display> < worktype vocab =" AAT "> railroad station </ worktype > </ worktypeSet >

Notes

1. Documentation of the VRA Core Categories can be found on the VRA Web site at http://www.vraweb.org/.

2. Databases produced and maintained by the Getty Vocabulary Program include the Art and Architecture Thesaurus (AAT) http://www.getty.edu/research/conducting_research/vocabularies/aat/, the Union List of Artist Names (ULAN) http://www.getty.edu/research/conducting_research/vocabularies/ulan/, and the Getty Thesaurus of Geographical Names (TGN) http://www.getty.edu/research/conducting_research/vocabularies/tgn/.

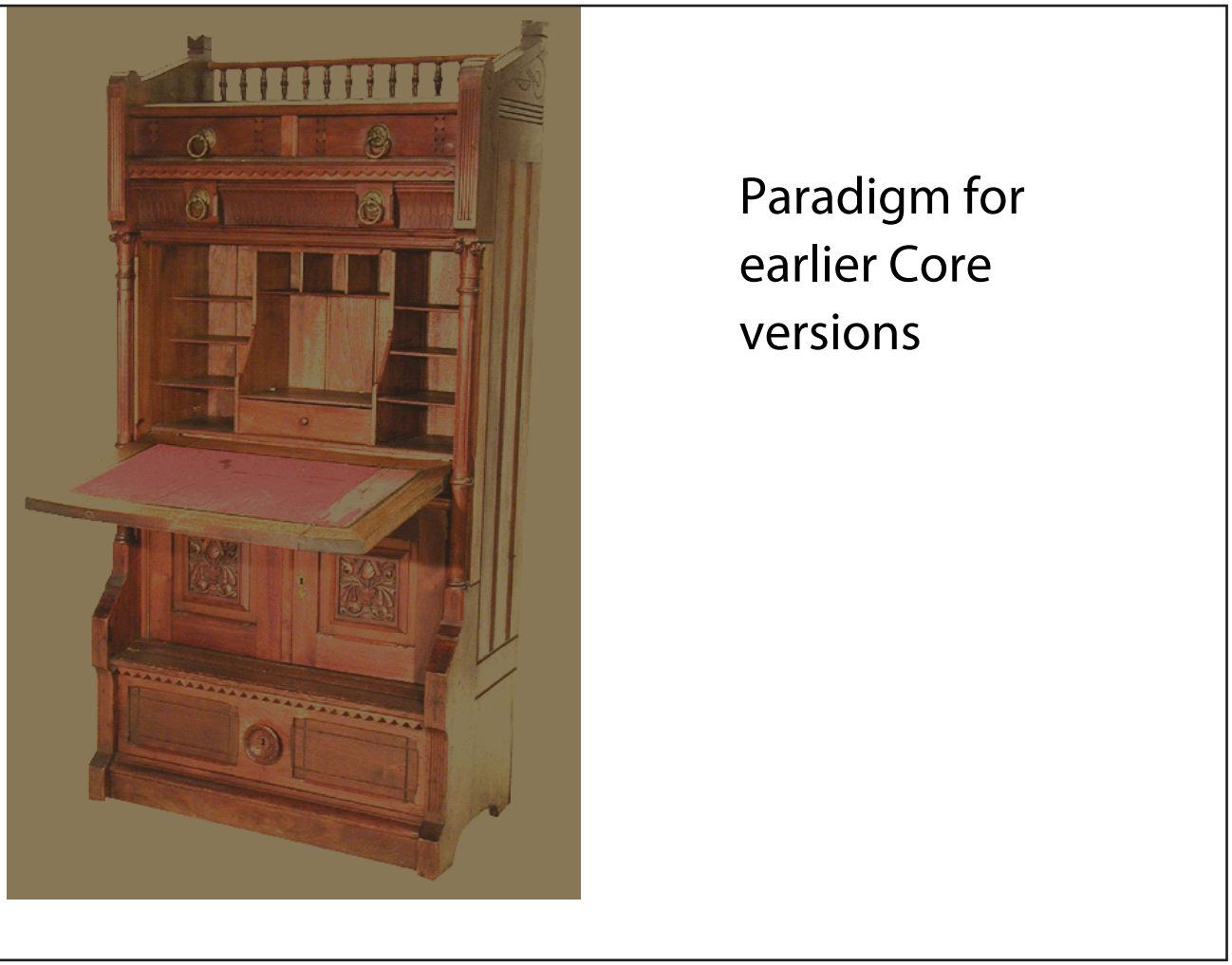
3. Cataloging Cultural Objects Web site is found at http://www.vraweb.org/ccoWeb/cco/index.html

4. Maryly Snow. "Visual Depictions and the Use of MARC: A View from the Trenches of Slide Librarianship," *Art Documentation* 8, no. 4 (Winter 1989).

5. ARTstor is a non-profit initiative, founded by The Andrew W. Mellon Foundation, with a mission to use digital technology to enhance scholarship, teaching and learning in the arts and associated fields (see http://www.artstor.org/info/). The Union Catalog for Art Images (UCAI) Project, also funded by the Mellon Foundation, will create a prototype database using bibliographic metadata and thumbnail images submitted by three partner institutions: the University of California, San Diego, the Fine Arts Library at Harvard University, and the Ingalls Library of the Cleveland Museum of Art (see http://gort.ucsd.edu/ucai/).

6. Dustin Wees, "The Work of the VRA Standards Committee: Past, Present, and Future," *VRA Bulletin* 23, no. 2 (Summer, 1996), p.61-63.

Figure 13: Visual paradigm for earlier Core versions—antique secretary.



7. *ArtMARC Sourcebook: Cataloging art, architecture and their visual images* (Linda McRae and Lynda S. White, editors), Chicago: American Library Association, 1998.

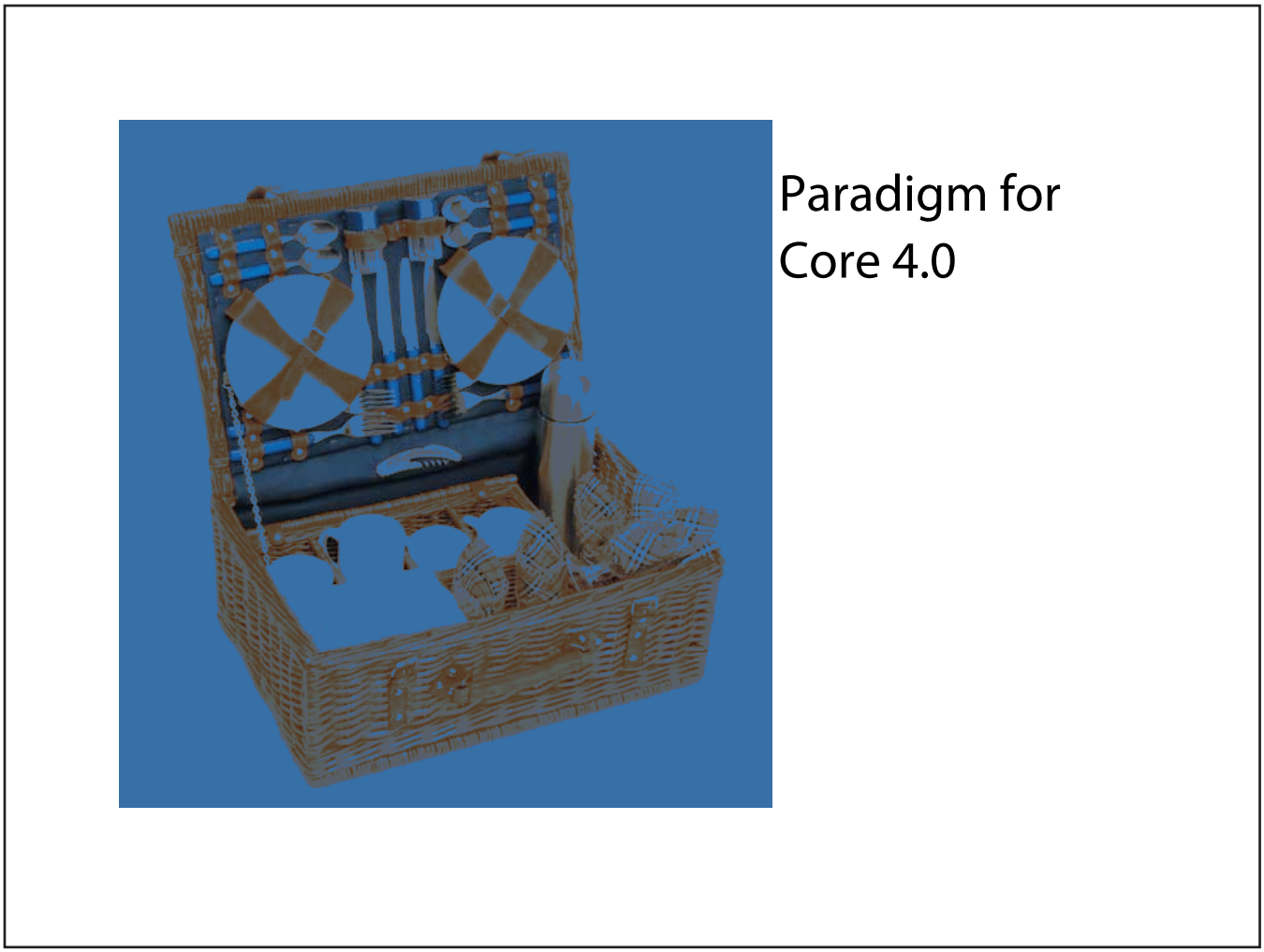
8. *VRA Bulletin* 20, no. 1 (Spring 1993), p.3.

9. The Categories for the Description of Works of Art (CDWA) was a project of the Art Information Task Force, a group that was jointly sponsored by the Getty Art History Information Program (AHIP) and the College Art Association. See *Visual Resources: An International Journal of Documentation* 11, nos. 3-4 (1996) for a special issue dedicated to the description and analysis of the CDWA, edited by Murtha Baca and Patricia Harpring. The CDWA in its current form can be accessed at http://www.getty.edu/research/conducting_research/standards/cdwa/.

10. The Dublin Core is a metadata set that provides simple standards to facilitate the finding, sharing and management of information. It originated in a workshop convened by the Online Computer Library Center (OCLC) and the National Center for Supercomputing Applications (NCSA) on March 1-3, 1995, in Dublin, Ohio. The Dublin Core has evolved into an ongoing organization, the Dublin Core Metadata Initiative http://dublincore.org/index.shtml.

11. Dustin Wees, "Core Categories for Visual Resources: A Draft Proposed by the VRA Data Standards Committee," *VRA Bulletin* 23, no. 3 (Fall 1996), p.57-59. Willy Cromwell-Kessler, of Research Libraries Group, noted in 1998 about core data: "In general, within the cultural heritage community, there have been two lines of standards development emphasizing respectively: 1) The delineation of the entire universe of relevant information about the objects to be described; 2) The subset of information elements that are needed to meet a specific need. The VRA Core belongs to the latter line of development." See Willy Cromwell-Kessler, "The VRA Core Categories in the Wider Data Context", *VRA Bulletin* 25, no. 4 (Winter 1998), p.41-44.

Figure 14: Visual paradigm for VRA Core 4.0 – picnic hamper.



12. Core 2.0 was introduced in a special issue of the *VRA Bulletin* (v. 25, no. 4, Winter 1998) edited by Elisa Lanzi and Linda McRae.

13. For further discussion on the development of version 2.0, see Lynda S. White, "Creating the VRA Core: The Critical Issues," *VRA Bulletin* 25, no. 4 (Winter 1998), p.34-40.

14. The VISION project was documented in a series of articles in *VRA Bulletin* 25, no. 4 (Winter 1998) written by Sheila Hannah, Katherine Martinez and Jim Coleman, Sherman Clarke, Colum Hourihane, Margaret Webster, Kathleen Cohen, and Elisa Lanzi.

15. See note 3 above.

16. VRA Data Standards Committee, "VRA Core Categories, Version 3.0 Released: From Core 2.0 to Core 3.0," *VRA Bulletin* 27, no. 2 (Summer 2000), p.43-56.

17. The most comprehensive explication of XML is found at http://www.w3schools.com/xml/default.asp.

18. As of this writing, the most recent version of MDID also allows the import of comma-separated value (CSV) files and tab-delimited (TSV) files, as well as XML. See http://mdid.org/mdidwiki/index.php?title=Import_image_records_from_a_data_file.

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