PRODUCTION NOTE

University of Illinois at Urbana-Champaign Library
Linking Art Objects
and Art Information

Deirdre C. Stam and Angela Giral
Issue Editors
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Introduction

DEIRDRE C. STAM AND ANGELA GIRAL

Representing a departure from the usual pattern of Library Trends, this issue joins the concerns of traditional art librarianship both to topics found in information science—such as the nature and use of information—and to topics found in recent art historical writing, specifically the examination of the fundamental functions of the discipline and the construction of its information base.

Dynamic technological advances in the last decades have caused librarians to rethink the structure of documentation and to reorient the purposes and goals of the institutions known as libraries. They have transformed libraries into scholarly information centers by widely expanding the access to information stored there and in other locations.

While other fields can look to leading institutions to coordinate the linking of different kinds of information—and medicine stands out in this respect (Matheson and Cooper 1982; Goldstein Anderson 1986)—the art field has no National Library of Art to provide guidance in this endeavor. Advances take place in widely separated projects, and the significance of work undertaken in a single institution to solve a local problem is seldom appreciated by the field as a whole due to the lack of recognized channels of communication. While this issue of Library Trends cannot aspire to fill this need, it can and does attempt to offer reflections on the present situation by people who have contributed significantly to the conceptual foundations of systems to link art objects and art information.

Unlike most fields now developing integrated databases, the study of art concentrates upon a nonverbal entity—i.e., the work of art itself.
The vocabulary necessary to describe the work of art evolves as part of the research process; the object itself does not naturally suggest the words that should be used to characterize its aspects. Most information systems, including those used for art, are basically verbal in nature—at least their retrieval methods depend upon the word. This anomaly—the lack of natural connections between words and objects—forms the central difficulty of linking art objects and related information. The problem is a fundamentally conceptual one and one quite different from the merely technical problems of linking sets of databases serving other fields. In order to achieve meaningful links between objects and their information bases—links useful to scholars—one must consider the nature of scholarship in this unusual field of study.

Research in the visual arts typically begins with the art object. That is a truism of the discipline. Following the examination of the work of art itself is seeking information about the object in order to understand its context, and then to interpret the object for a contemporary audience. The articles in this collection focus on the linking of the art object with information considered pertinent to the object. Traditionally in the field of art history, that information has concentrated on persons and things immediately associated with the manufacture and history of the object—i.e., the artist, the patron, the imagery, and the placement of the piece. Recently, many scholars have looked at a wider context—the artist’s social setting, the economic conditions of that society, and even the ideology of that society. At the same time that some scholars have begun to take a long view, others have taken a very close view as they consider the physical structure and quantifiable characteristics of objects. The kind of information considered pertinent to objects then can alter and has done so over time, and from one art historical “school” to another. In all cases, a fundamental part of the research is the linking of the object to an information base. The process of making that link is the subject of this issue of Library Trends.

Underlying these articles is the assumption that art information in all of its manifestations—from bibliographic index to museum registration systems—is of interest to scholars of art and by extension to the librarians serving them. This collection of essays addresses the “informational” aspect of these systems rather than the technical level of data-processing considerations one would find in system manuals and documentation. Among the informational issues addressed are concern for the scholar’s mode of working, the purpose of systems, the relationship of institutional setting to the shape of the system, the logic implicit in choice and definition of data, and the harmonization of systems through the development of standards. All of these issues are important to art librarians who must find their way through available information systems and must judge the appropriateness and authoritativeness of their contents for the purpose of answering the query at hand.
The articles follow in a logical progression, moving from the user to the functioning system. The first two, written from the point of view of the user (for whom all information systems are created), consist of Brilliant's essay on the research patterns of scholars and students and of Scott's essay contrasting the needs of registrars and curators. In the historical section, three librarians give their perspectives on past efforts at linking object and bibliographic information, Samuels has the broader, historical perspective; Markey provides us with a comparative overview of three image-based information systems; and Allen details the efforts of the Museum Prototype Project in which eight museums attempted to create a shared database of European painting information under the auspices of the J. Paul Getty Trust. These are followed by two articles that are theoretical in approach, pointing toward new directions in the construction of art historical knowledge bases. Barnett discusses issues relating to the building of bibliographic and art object information systems, and Bearman outlines general considerations for the design of scholarly databases relating to art. The last four articles describe recent applications which link various kinds of information to descriptions of objects themselves. Sledge and Reed discuss the learning processes which took place during the course of developing the Smithsonian Institution's automated systems; Giral describes the sources of ideas used in the development of the automated catalog of architectural drawings from the Avery Library, Columbia University; van der Wateren recounts the experiences of linking architectural documentation, bibliographic information, and monuments at the British Architectural Library; and Bower discusses the utility of the Research Library Information Network (RLIN) system as a vehicle for carrying data relating to the Photo Collections of the Getty Center for the History of Art and the Humanities.

This collection of articles suggests areas for needed research and development in a field which is just beginning to explore the nature of its information structures, and to improve thereby the understanding of its paradigms as a discipline.

REFERENCES
How an Art Historian Connects Art Objects and Information

RICHARD BRILLIANT

The hypothetical, normative art historian, posited in the title of this essay, relies on memory, intuition or judgment, and luck to establish a context for any work or object of art. Only within some context, itself a mental construct of persuasive authority, can the work of art have significance and a place in history. Only then can it become worthy of those efforts of interpretation and analysis that constitute the discipline of art history and shape its scholarly goals.

Yet no object seen for the first time—directly or through some form of reproduction—can appear entirely innocent of categorization. Its inclusion in the class of “art object” immediately bestows upon the object all the implications of that special category of objects made by artists, considered by critics and aestheticians, and studied by art historians. The class may often be taken for granted as part of a received tradition that requires no reconsideration, but the rise of new standards or positions of aesthetic judgment involve the history of taste while impinging upon the nominal, descriptive conventions of art and its subject matter, such as landscape, portrait, or still-life. The mutability of these conventions and their displacement by broader, more analytical terms already inform the study of modern art, but their theoretical implications for the study of the history of art as a whole have had little effect.

Art historians are expected to study works of art in a historical context and with a manifest point of view. The question (usually unstated) of whether the object at hand is a work of art may be of great intrinsic interest, especially if the object—an African mask, a Mesopo-
tamian cylinder seal—might not have been so considered when it was made or the issue never arose. Scholarly attitudes toward such objects, however, are usually governed by institutional positions which depend on the conventional treatment of like objects in museums and in print, but these conventions, too, have their own history. Despite their acknowledged usefulness as conventions, they do not have the authority of eternal laws because they are, to such a large degree, time and culture bound. Whether or not Mesopotamian cylinder seals are art objects—and they are avidly collected and studied—they retain their great historical interest as artifacts, as tokens of economic activity long ago, and as rich repertories of a ritualized iconography more than 2,000 years in the making. Their similarity to coins or to postage stamps or to objects of craft, so admired in the 19th and 20th centuries, may indeed provide important analogies for the historian while challenging their status as works of art. Yet the inclusion of cylinder seals in standard histories of ancient Mesopotamian art not only gives them a privileged status as objects of art, but it also shapes the expectations scholars and collectors have for their treatment and the public's reception.

The aesthetic distance from collectible to art object may or may not be very great, but it is a perception worth exploring. At the very least, an art historian should be conscious of the critical import of the classification "art object" and its potential for illusory gratification. Perhaps art historians need not derive aesthetic pleasure from the objects they study and publish—more's the pity—but classification alone will not distinguish them from those historians and anthropologists who investigate the products, producers, and consumers of material culture, nor should it. The fact that the classification of an object may be in issue demonstrates the continuous gradient of an object from artifact to art, from the subject matter of history (or anthropology) to that of art history. Accordingly, the permeability of the boundaries of art history must be understood as a condition of research and so too the dependency of the art historian on the resources of the library in the humanities and social sciences.

Once the object has qualified as an artwork, the scholar's memory comes into play, and it has two different directions of activity. Primary is the internalized memory of like objects in the whole or in part which gives rise to mental images or the visualization on command from the observer's trained experience. Most art historians can do this fairly well; some great scholar-connoisseurs have extraordinary visual memories. It is said that John Beazley, the famous expert on Greek black- and red-figured vases, could recall the appearance of every pot or substantial fragment of painted Greek pottery he had ever seen. He brought his vivid recollection to bear on the vase before his eyes, sharpening his examination of the piece by an exquisite sense of the comparable. In
doing so, Beazley established both a general frame of reference and a more specific context for the persistent objectives of his researches—to locate the vase in time and space and to describe accurately its figured repertory.

Although few art historians have Beazley's visual memory, they all must begin their study of an object with some form of "It looks like..." and then seek to find the other objects and images which complement the proposed resemblance. If art historians cannot rely on their own mental repertories of artworks—even Beazley had his limitations—then they must look outwardly to those existing collections of comparable images and forms with which, as trained scholars, they should be familiar. These are (1) objects in museums, in galleries, and in private collections that are physically accessible; (2) archives of photographs or other forms of two-dimensional reproduction such as microfiche, videodiscs, and even photocopies; and (3) illustrated publications.

Unfortunately, direct access to comparable objects may be very difficult given the wide dispersion of artworks. In addition, the scholar might not even know of their existence because of the inadequacy or absence of publication. So-called comprehensive indexes, miscellaneous corpora, subject-specific lexicons, or general catalogs—the familiar staples of the reference collections of any decent research library—do offer the scholar considerable help in gaining preliminary access to pertinent objects and to relevant information. Yet their value is seriously compromised when such publications rely heavily on verbal descriptions of the artworks and contain few or no pictures. Expense or the alleged distortions of reproduction may once have been legitimate excuses for such omission, but they are no longer acceptable given the new modes of image making brought about by modern technology.

Consider then the inherent limitations of an authoritative index recently advertised in a 1987 Wasmuth (Berlin) book catalog:

Iconclass Indexes. A Series of iconographic reference works. Editors: Roelof van Straten and L.D. Couprie. Doornspijk 1987ff. (The Series, when complete, will index a full range of iconographic traditions in the West. Volumes planned include catalogues of: Dutch and German prints, Early Netherlandish Painting, and Dutch paintings and drawings of the Golden Age. The Iconclass Indexes will give access to these great and multifarious traditions by means of a standard, internationally recognized process of classification which should prove an immense boon to the study of the visual arts. Each volume will contain full references to reproductions of works discussed in standard art-historical publications of the subject. Upon publication, the Iconclass Indexes will become an invaluable staple in the field of iconographic research.)

And what if the library, contemplating the purchase of this expensive reference work, does not contain the "standard art-historical publications of the subject?" Even if the program of an image may be set out in words, an iconographer needs to examine the images themselves. How much more useful this publication would be if, in the manner developed recently by the University of Chicago Press, the volumes were to be
accompanied by microfiche of many, most, or all of the artworks discussed. The availability of the complementary images in microfiche at reasonable cost more than makes up for the modest quality of the reproductions. That too will certainly improve in the future as will the capacity of the microfiche readers.

In the field of classical art, the *Encyclopedia dell'Arte Artica*, published in Rome a generation ago, set a high standard of scholarly writing and generous illustration that was emulated by the McGraw-Hill *Encyclopedia of World Art* and other similar publications. These volumes have served as important reference works for students and scholars alike for years, primarily because they present good up-to-date articles and a useful collection of illustrations and at fair prices for each series of volumes.

Some newly published reference works, already deemed "indispensable," are very expensive, although they are valuable. Such is the *Lexicon Iconographiam Mythologiae Classicae* (Zurich); three of the fourteen planned volumes have appeared since 1984 but only the complete series can be purchased. The double volume one and two contains 190 line drawings and 688 plates, volume three has 741 plates, and together they contain thousands of illustrations. These magnificent volumes offer an up-to-date, authoritative treatment of classical iconography from the end of the Mycenaean Age to the beginning of the Early Christian period, and emphasize images and their development as exemplified by sculptures, paintings, mosaics, coins, gems, etc. with extensive reference to relevant ancient texts. Wherever the serious study of Greco-Roman and Renaissance art is to be undertaken, there must be the *Lexicon*.

Not every art history library can afford it nor many other well-illustrated reference works. Yet for art-historical research which concentrates on the art object itself, ready access to large numbers of images is essential to the successful investigation of matters of style, composition, motif, iconography, connoisseurship, the constitution of an artist's oeuvre, the definition of figural repertories, etc. Thus without such images in abundance, the act of comparison—the methodological basis of the discipline of art history—cannot come into full play and the research facility fails to serve its users. Certainly the modest demands of the undergraduate may be met by modest resources, while advanced research requires much more, but interlibrary loan arrangements will not meet the absolute need for the images of works of art.

Ways to meet this need do exist: Catalogs of "blockbuster" exhibitions are readily available although their coverage is often capricious, their agenda far from being objective, and their scholarship uneven, but they are usually well-illustrated. In recent years many excellent *facsimiles* have been published, ranging from Medieval and Renaissance illuminated manuscripts and incunabula to the notebooks of artists
such as Leonardo, Turner, or Picasso. These facsimiles bring the semblance of the original works to the scholar's eye—often with considerable fidelity—and contribute effectively to the creation of "museums without walls." To further the attainment of this objective, photographic archives have begun to reproduce their holdings either as photographs or in microfiche—e.g., the Bartsch corpus of prints, the Marburg Medieval archive, the Courtauld series of drawings in private collections, the complete Anderson photo archive of monuments and artworks in Italy, views of Roman topography from the Fototeca Unione, and the photo collections of the German Archaeological Institute in Rome.

These collections, already on the market, are available for study but rarely for reproduction without permission. It should be noted that the Photo Archive of the Getty Center for the History of Art and the Humanities contains more than 1 million photographs and will acquire several million more in the next few years. However, because the Getty Center does not control the copyright to these photographs, it cannot lend them out for publication or reproduction. As a result, although the Getty Photo Archive is an important scholarly preserve for those scholars who can visit the Center in California, at present its holdings cannot be distributed to other less well-endowed institutions.

The Getty Center cannot bear the burden itself, but there is something anachronistic, even dysfunctional, about this limitation of its powers as a resource. This is especially the case when one considers that the transmission of photographic images over telephone lines is so well established. In addition, high quality digitalized image processing and storage have both developed rapidly in the past ten years and are becoming progressively more subtle and less costly. Some way should be found to distribute the visual information contained in these various photo archives to other centers of art historical research. Perhaps the solution lies in a fee system geared to the quality of reproduction desired and the frequency of its use which nevertheless respects the reproduction rights of the copyright holder; an accounting procedure for doing so certainly exists.

_Laser disk technology_ and the development of high-resolution video screens make it possible to bring a world of images to the attention of students and scholars. Long familiar from satellite photographs, the sophisticated _digitalized color processing_ of paintings for compositional and technical analysis and for reproduction (in whole or in part) is currently under development at Stanford University and elsewhere. This sensitive process transcends the color and tonal limitations of the conventional black-and-white photograph whose familiar distortions have been calmly accepted by generations of art historians. Similarly, _computer aided design functions_, ultimately derived from existing industrial practice, are being employed to capture the elusive three-dimensional appearance of works of sculpture and architecture through the manipulation of transient points of view. Accordingly, the different
sides of an object in space can be visualized through the rotational
display of an "object" or design on a viewing screen thereby breaking
the two-dimensional prison of the photograph if only in transit. How-
ever, even this last process can be preserved for study on videotape.

These and other developments will surely extend the visual
memory of all art historians (who have access to them) in unprecedented
ways, since the hunger for images is ultimately insatiable. For example,
one taking on the publication of an unknown "Roman portrait," to be
able to compare that marble head with thousands of works—previously
defined as Roman portraits—on a console and in three-dimensions, will
lead either to an extraordinarily thorough and definitive study or to
some self-indulgent contemplation of the apparently infinite variety
of the artistic repertory and of human physiognomy. The risk of the
latter's occurrence (not without its own rewards) remains acceptable
because the opportunity to create a visually discrete and comprehensive
scholarship of the art object is so irresistible. Indeed, as the class of
comparable objects grows, the need to develop more discriminating
methods of visual and formal analysis, so often neglected, becomes more
insistent, and this too will focus ever greater attention upon the object.
The price of the new technology will be high but the opportunity cost
cannot be ignored.

However, such a focus on the art object cannot be exclusive. Visual
memory alone is insufficient to place the object historically and to
interpret it properly despite the alleged correspondence of like-
appearing objects in a particular period and culture. Art historians may
act like art critics in grasping the visual properties of objects, but they
act like historians in surrounding the artifact with causes, effects, and
circumstances—the ingredients of significance. The historical dimen-
sion of art history then requires the kind of information found in books,
in periodicals, in old records, and in the varied forms of data collection
and control which depend on texts and on writing. Learning about an
art object diffuses the scholar's effort since context is a generalized
abstraction; only gradually, as the connections become clear, can the
historian close in on the subject of research.

If the art library incorporates the discipline's mine of historical
information, then the enterprising scholar must know where and how
to dig up the bibliographical lore, always hoping to find a few unex-
pected treasures. Experienced art historians possess a useful, active
memory of the relevant bibliography, buttressed by the inevitable 3 inch
by 5 inch index cards and by a special "feeling" of where to look next.
That feeling, a scholar's developed intuition, is engendered by the
conceptualization of the problem of research at hand and of the histori-
cal situation in which it falls. At the same time, the researcher's sense of
the history of scholarship itself channels the lines of investigation while
sharpening critical sensitivity to the attitudes of the authors of the
books, articles, and papers consulted. Indeed, when reading an article in
an older or unfamiliar journal, it has always been this author's custom to read all the articles in the particular issue and in the one before and after. By this means the editorial policy of the journal and the attitudes of its authors can be known thereby allowing the positioning of the article consulted in a wider intellectual or professional context. And sometimes serendipitous discoveries of other useful articles or reviews are made, adding to the stock of index cards and contributing to the next project.

Old dogs know the tricks. Some even prefer card catalogs to the new-fangled consoles, viewing screens, database searches, and all the devices of modern technology that have infiltrated the modern library. The machines are so often "down" and their product is often controlled by technicians—"computer-types" who may not be scholars themselves nor very good at reading foreign languages. Access to large databases like CLIO (Columbia Libraries Information Online) Art Bibliographies, supported through the RLIN (Research Libraries Information Network) by Stanford's RLG (Research Libraries Group), is enormously useful for the identification of current or recent publications even if there are intermediaries between the scholar and the information. But for art historians, older books and articles in scholarly journals are vital resources for effective, accurate, and valid research; there is little or no access to this massive, authoritative, and scholarly past in the contemporary bibliographies provided by the databases and the online services. This limitation seriously affects the progress of research, especially for students and younger colleagues who tend, naturally, to rely on these restricted, computerized databases rather than the card catalogs which are themselves out of date and usually discontinued.

Every scholar begins research with known bibliographical sources and moves from known sources to the unknown through the references, the footnotes, and the bibliography provided by the source. The referential network is expansive and may be very productive. But when the sources are inadequate or become a dead end or are not to be found in the library, graduate students and colleagues in art history at Columbia University use CLIO to develop and follow a line of research, thereby expecting to gain access to the recent relevant literature and through it to extend the referential network once again. They also use many of the standard general reference works and art bibliographies itemized in E. Arntzen and R. Rainwater, *Guide to the Literature of Art History* (London 1980).

In an informal survey conducted recently by my research assistant, Sheree Jaros, in the Avery Library, certain patterns of research procedure emerged and some bibliographical favorites stood out. After CLIO and the RLG search (if the terminals were working), most of the graduate students and colleagues started with *Art Index* and *RILA* (International Repertory of the Literature of Art), the latter an important newcomer. Of course, for those interested in the history of architecture,
the *Avery Index to Architectural Periodicals* enjoyed similar favor. In the next rank, and somewhat more field-specific, were the *Zeitschrift für Kunstgeschichte*, the *Répertoire d'art et d'archéologie*, the *Annuario Bibliografico di Storia dell'Arte*, the *Art Bibliographies Modern*, and *Fasti Archaeologici*. In the third rank were the specific bibliographies such as the *Index to 19th Century American Art Periodicals*, the *Byzantinische Zeitschrift*, the *Archäologisches Bibliographie* (of the German Archaeological Institute in Berlin), and many, many others not necessarily in the Avery Library but rather in the general university library. At the fourth level scholars had recourse to the published catalogs of art libraries, to a variety of topical serials containing annual bibliographical lists, and last—but by no means least—to the reviews and lists of books received for review printed in major journals such as the *Art Bulletin*, *Art History*, the *Bollettino d'arte*, and the *American Journal of Archaeology*.

In the physical sciences, the rapid turnover in knowledge places heavy emphasis on journal publication and requires immediate access to the articles and scientific reports provided by abstract services and computerized databases. Unless one is a historian of science or interested in the epistemological implications of scientific research, for the most part old (not very) science is not deemed worthy of the active research scientist's attention. As a result, scientific books and the tradition of scientific research are not valued highly and their preservation de-emphasized. Art history, although sometimes faddish in its interests, is not so topical, is not so pressured by the import of recent discoveries, and is not free from its own history as embodied in the literature. Even for those who devour journals on a regular basis, the current pace of journal publication in art history puts pressure on the scholar to keep up, to control the short view of particular topics of study within the context of *la longue durée*. Therefore, computerized databases of journal articles and major reviews, organized according to the priorities outlined above—or determined by a more "scientific" survey—are a necessity, and the task must be done by trained personnel.

*Quis custodiet ipsos custodes?* Who will watch over the cataloger-programmer who transforms the substance of these journal articles into accessible items of bibliographical information? No one would imagine that indexing by the title and/or author of a journal article by itself would suffice. Well-defined subject-matter guides alone will provide the requisite access to the periodical literature which, given the nature of such publications, tends to be specific and narrow. Precision in classification seems to vary almost inversely with flexibility, but sometimes small items are important. When our hypothetical art historian continues the research on an unknown Roman portrait and has advanced a tentative identification after viewing many images on a videodisc, it would be very useful to discover whether that portrait type has been published elsewhere; famous names might turn up on the
computer, but when the notice is embedded in an article dealing principally with other matters, access might be hard to come by. The association of art object and published reference, a commonplace of the catalog entry, could be gainfully explored with the new technology.

However, the refinements of classification may be so particularized as to render the item fairly inaccessible to the casual user who might otherwise profit. The scholar who finds precisely what he is looking for is also the scholar who may come upon something else close to it and also useful. Stretching the potential of a successful search not only depends on the knowledge, ingenuity, and luck of the researcher. It also depends on the permeability of the classes of information so that when separate rubrics in the database impinge on one another, the likelihood of productive access can be enhanced. Of course, any definition takes on additional complexity when foreign language publications are analyzed; lack of linguistic skill often leads to such schematic simplifications of content that the point of an article or study is obscured. As one of the respondents in the informal survey stated: "If only the Zeitschrift weren't in German. It would be so useful."

The present lexicon of art history is a product of practice and consensus. Its categories of reference are naturally those employed in a database although ideas and theoretical concepts are hard to codify. The ambitious Dictionary of Art, planned by MacMillan for publication in twenty-eight volumes with about 16,000 illustrations and hundreds of articles, may have a considerable impact on this lexicon especially in its redefinition of worthy subjects and in its pursuit of general and theoretical issues. Given the scope of this venture and the participation of so many leading art historians, it is possible that some categories of reference will be changed and new subjects of inquiry will be created. Any living discipline must undergo change, even one as slow-moving as art history, and the database must reflect such changes to remain responsive and responsible. However, because of the effort expended and the vastness of its coverage, a database may tend to preserve a frozen terminology to the disadvantage of its users. Therefore, all such systems which process art historical information for scholars must have sufficient built-in flexibility to respond to significant innovations in the discipline. The decoding and interpretation of art objects and their comprehension within a historical context of creation and reception are not governed by fixed laws.

The problem is not academic. Although it might be useful to computerize the Index of Christian Art as it is, because the Index then would be more available to scholars at large, one must question whether the Index should first be radically revised because its principles of organization go back more than sixty years. The Index surely preserves an important artifact of scholarship, but the historical "period" to which it refers and the very nature of "Christian Art" itself which the Index purports to illuminate are differently conceived by today's poten-
tial users. Sometimes tradition has to give way, especially when the objects of art become restless in their familiar places.

The reader might get the impression that some art historians connect art objects and information in capricious and unsystematic—although creative—ways. Objects by themselves do not connect with anything even if artworks can fix the attention of the observer, incite the delight of the connoisseur, and arouse the possessiveness of the collector. Art objects—once so defined—have only the connections given to them by a critic or art historian with a vision, whether that vision be historical, iconographic, stylistic, phenomenological, aesthetic, or some combination thereof. Art objects can exist without reference to any particular observer, but the historical fact and character of that existence needs to be demonstrated by someone capable of showing a persuasive connection between this object and that time and place. Historical research, if properly done, denies the isolation of the object and posits a nexus of objective, historical associations, acceptable to others with access to the same supporting information, properly presented to them by the scholar.

Justice Oliver Wendell Holmes used to write his opinions first and then find the cases and precedents to support his views. He did so confident in his vision of the law which incorporated facts, constructions of those facts, and prior decisions, and gave his opinions meaning; to satisfy his colleagues in the law, his argument was clearly expressed and he cited the necessary cases and evidence. Some of his opinions became law, some did not, and some are no longer law. Yet his point of view survives as a way of construing issues and all his opinions directly addressed the fact and the legal implications of the situation before him.

Art historians rarely have the lapidary style of a Justice Holmes, but they have, or should have, similar objectives in their work: to interpret the object, to make the historical argument clearly, to document that argument fully, and to give to the audience all that is necessary to make a fair judgment on the matter presented.
Museum Data Bank Research Report:
The Yogi and the Registrar

DAVID W. SCOTT

In the company of the research reports of this series, this article can claim only the status of an essay. It will attempt to survey, from the vantage point of the art museum administrator, the common ground between the registrar and the curator, and to determine whether the common ground, if any, justifies cultivation in the form of data processing. This investigation aims at no revolutionary conclusions, but it may help in clarifying the nature of some of the problems which characterize art museums and set them apart in the museum community.

Most of these problems are traceable to the nature of the work of art itself. (In this article, "work of art" will in general refer to a painting or work of sculpture; prints and the decorative arts will be considered incidentally and as secondary categories.) Insofar as its fundamental value and significance are commonly accepted as being intuitively apprehended, unquantifiable by any objective scale, and unique to the object, the work of art is the source of both pride and despair to the profession. The demonstration and assessment of value comes, ultimately, only from the response of the viewer, and all data that document this response are subjective in origin.

At the same time, a very rare and highly acclaimed work of art may be worth millions of dollars on the market, so the primary or aesthetic value may be overshadowed by the sensational commercial value. There are, of course, a number of possible kinds of secondary value which may in turn be more or less objectively quantifiable—i.e., not only market price, but documentary value (biographical, iconographic, historical,
social, scientific), value because of associations (religious, patriotic, sentimental), or functions (decorative, didactic), and so on.

Therefore, the director of an art museum finds himself a sort of foster father to a horde of objects whose value descriptors—individually and collectively—run the widest gamut, subjective to objective, and are often completely dissimilar in kind. At one pole, his job is to take an inventory and establish the identity, condition, ownership, and location of each object. At the other, he must assess the grounds by which each object is classified as art, good art, or great art. On the one hand, he appoints as an assistant a registrar with a passion for order. On the other, he appoints a curator, it is hoped knowledgeable, with a sixth sense for artistic quality.

The result, to paraphrase Arthur Koestler, is to bring together into the art museum the yogi and the registrar. The registrar, like Koestler’s commissar, believes that “all the pests of humanity...can and will be cured by Revolution, that is, by a radical reorganization of the system...; that this end justifies the use of all means...; that logical reasoning is an unfailing compass and the Universe a kind of very large clockwork [read computer]” (Koestler 1945, p. 3).

As for the curator, if we may suppose an extreme manifestation and again borrow from Koestler (1945):

On the other end of the spectrum, where the waves become so short and of such high frequency that the eye no longer sees them,...crouches the Yogi....He believes that logical reasoning gradually loses its compass value as the mind approaches the magnetic pole of Truth or the Absolute, which alone matters. He believes that nothing can be improved by exterior organisation and everything by individual effort from within....He believes that each individual is alone but attached to the all-one through an invisible umbilical cord. (pp. 3-4)

Koestler concluded that these polarities have never been combined in one individual. To be sure, the art museum director may have to attempt to reconcile these opposed temperaments, but that is not where the inevitable antagonism lies. In art museums we find, on occasion, intuitive registrars and orderly curators. But in carrying out their functions they discover that they have divergent needs because of differing and incompatible value systems which pertain to the objects of their concern.

To illustrate this and to bring the point home, let us take a specific example from the publications of the Museum Data Bank itself. In Museum Data Bank Research Report Number Three, Jack Heller has supplied a somewhat abbreviated sample of a card catalog entry, with a hierarchical structure, as a documentation of Picasso’s well-known painting, Three Musicians, in the collection of The Museum of Modern Art in New York (see Figure 1). His “record” contains “fields of information composed of tag, value and connectivity data” (Heller 1974, pp. 2, 14). Heller’s intention in producing this sample record was to demonstrate the application of connectivity data, but the record can also be
used in this present study as a starting point in examining the relative objectivity of the contents of the fields themselves.

In Heller’s record, the fields consist of the basic documentation characteristic of registrars’ records (these are essentially “objective”—i.e., the first group of fields) and then five or six subject matter descriptions of a kind that would normally be more of interest to a curator or art historian than to a registrar.

Even the first group of fields, the basic documentation, upon examination, proves to contain data subject to variation as they appear in other contexts—i.e., data which are established in “authoritative” form only by arbitrary decisions. Early catalogs of The Museum of Modern Art give the title as *Three Musicians (Three Masks)* and the measurements as 80% by 88%". Later catalogs give the title as simply *Three Musicians* and the measurements 6' 7" by 7' ¾" (Barr 1939, p. 108; Barr 1946, p. 122; Rubin 1972, p. 112). But it is at this level that data discrepancies are most easily resolved and agreement as to “facts” most easily reached.

Turning to the second group of data entries and comparing various published accounts of the painting, we find more disparity and less objectivity than in the case of the first group. What indeed is the subject matter of the picture? All shapes are highly distorted and abstracted, but there appear to be three seated figures wearing costumes and masks. Two hold musical instruments and the third, a musical score. There also appears to be a table in the foreground with objects on it and a dog in the background. Because of their musical accessories, the figures can be termed “musicians,” but they can as well be labeled “actors” or “masks,” or “a pierrot, a harlequin and a monk,” on the basis of their costumes. The musical instrument of the left-hand figure is perhaps more like a recorder than a clarinet. The musician to the right holds a musical score, not an accordion, and is perhaps shown as singing (in a second version of *Three Musicians*, owned by the Philadelphia Museum of Art, the monk holds an accordion [Rubin 1972, p. 112]).

In short, the instruments are not clearly established (clarinet or recorder?), the actions are not established (are the instruments being played or merely held?), and the figures cannot all be objectively labeled by costume “musicians” or “actors,” and the “monk” may be a “domino”). Even greater confusion would attend the objects on the table had not an art historian queried Picasso and learned that they represent a pipe, packet of tobacco, and pouch. (If one objects to the fact that the painting chosen here for discussion is untypically obscure as to subject, the fact remains that the accurate identification of subject matter is a problem endemic in art history [Rubin 1972, p. 112]).

The *Three Musicians* is a work of such importance in Picasso’s oeuvre that many studies of art history refer to it, discussing the version in The Museum of Modern Art interchangeably with its companion piece in the Philadelphia Museum of Art. A quick look at some of these
Figure 1. A Hierarchical Computerized Catalog Record (Adapted From: "On Logical Data Organization, Card Catalogs, and the GRIPHOS Management Information Systems" by Jack Heller, 1974, Museum Data Bank Research Report No. 3.

discussions reveals all the layers or levels of "fields" or value groupings that the critic-historian characteristically resorts to in describing and evaluating the work. In connection with such discussions, the writer often begins by reproducing the painting together with a title line listing a half dozen descriptors at what might be called the "registrars' level":

Next, the critic-historian characteristically mentions the subject matter briefly (musicians, instruments, costumes and types, setting), and then goes on to comment on style. Here we enter a third range of values, even more subjective and variable than "subject." We come across such characterizations as:

A calculated rearrangement...of fragmented and geometricized images derived from a motif.... (Read 1959, p. 156)

Picasso's *Three Musicians* shows this "cut-paper style" so consistently that we cannot tell from the reproduction whether it is painted or pasted.... The separate parts are fitted together as firmly as architectural blocks, yet the artist's primary concern is...with the image of the three musicians.... (Janson 1962, p. 523)

The composition is classically severe.... The forms are large, almost solemn. They are almost exclusively geometrical forms, and they are pieced together in the "synthetic" manner to suggest representational elements. (Haftmann 1960, p. 282)

These three characterizations overlap generously in content, but in saying much the same thing they employ almost totally different vocabularies. The only key words that are shared, even in root form, are "image, images" and "geometricized, geometrical." Although the critics might agree, more or less, on a few basic stylistic descriptors such as "cubism" and "synthetic cubism," they pursue their stylistic analyses using their own vocabularies and personal shades of meaning.

Finally, we come to the last layer of value groups: to the actual evaluation of the work. For each critic-historian and in each context this may differ, yet it is for this "value" that the work is acquired, cataloged, preserved, displayed, and studied by the art museum. The *Three Musicians* is cited as a masterpiece (Janson 1962, p. 523; Elger and Maillard 1956, p. 126; Rubin 1972, p. 112), as a synthesis, summary or climax of Picasso's Synthetic Cubist period (Brandi 1966, col. 326; Barr 1959, p. 108; Barr 1946, p. 122; Rubin 1972, p. 112), as impressively monumental (Janson 1962, p. 523; Elgar and Maillard 1956, p. 126; Rubin 1972, p. 112), as disturbingly expressive (Janson 1962, p. 523; Haftmann 1965, p. 232), and as sad, solemn, sinister, superbly decorative and mysteriously majestic (Barr 1939, p. 108; Barr 1946, p. 122; Rubin 1972, p. 112; Haftmann 1965, p. 232). In short, it is regarded as significant because of its formal quality, its place in Picasso's oeuvre and in the history of art, and because of its expressive impact. But these evaluations are all purely subjective, the result of a felt response or a comparative aesthetic judgment on the part of the critic-historian. Moreover, their import evades the computer.

It is not the point to labor the obvious fact that the descriptors used in regard to art works are uncommonly slippery. However, as a spokesman for art museums in the company of botanists, biologists, archaeologists, social historians, and computer scientists, it is necessary to illustrate most explicitly the distinctive nature of the concerns of the critic-historian as they are shaped by the unique nature of the object of
Presently we shall go on to consider the general implications of this in connection with data processing and networking, but first let us take another look at the observations made thus far. It should come as no surprise that the conclusions reached through our case study should correspond closely enough to those reached by theoretical critics. We may illustrate this by a comparison with a schema derived by Kenneth C. Lindsay from a study by James S. Ackerman (1963, pp. 144-63) and already related to the computerization of art objects on the occasion of The Metropolitan Museum's 1968 conference on Computers and their Potential Applications in Museums (see Figure 2) (Lindsay 1968, pp. 24-25, 31-33, 36).

The four value groups of our analysis of *Three Musicians* correspond roughly to the "Levels" of the Lindsay-Ackerman chart. The registrar's, or basic catalog, grouping parallels Level I, "Empirical, Work of Art as Object," although of course the basic records also include the documentation associated with the object. Subject matter falls under Level II, "Analytic, Formal and Symbolic Structure." (Ackerman's term "symbolic" is broader than "subject" and embraces abstract painting.) Stylistic analysis of a painting extends from II to IIa (Connoisseurship), and the fully subjective level is reached at III, "Intuitive or Valuative." In Lindsay's analysis, Level I yields data suitable for computer use, Level II does so partially, and Level III lacks such data.

By now it should be sufficiently clear that the critic-historian inevitably finds data more and more subjective and data processing methods less and less helpful as he concentrates on meanings and significance. The greater part of his investigations may be conducted in the mid-level zones of style and iconography, but even here the nature of the data limits the usefulness of the computer.

At this point the question may be asked: "But who is this hyphenated critic-historian and what has he to do with day-to-day curating?" He may, of course, be an academic art historian exercising critical judgments and appearing as the author of standard texts and monographs, and at the same time he may very well show up on the staff of an art museum as a curator, writing such a book as *Picasso in the Collections of The Museum of Modern Art*. Indeed, the creative scholar-curador stands at the head of his profession.

It would be a gross oversimplification to assume that the creative scholar-curador spends the greater part of his time simply experiencing the unique qualities of art objects intuitively. Let us be quite specific in giving credit where it is due. The "empirical" tags are invaluable foundation stones for all art research, understanding, and criticism, and there have been occasions when the power of data processing has been extremely useful in solving problems of attribution. Ways have also been devised to utilize it as a tool at the iconographic and stylistic levels. (See the reports of J.B. Bird [1968], C.C. Daughterman [1968], and W.J.
<table>
<thead>
<tr>
<th>Levels</th>
<th>Objectification spectrum of our statement</th>
<th>Range of individualization</th>
<th>Information theory</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Empirical</td>
<td>I. by comparing against conventional standards of measurement</td>
<td>Operates with extrinsic characteristics of art</td>
<td>Least individualized</td>
</tr>
<tr>
<td>Work of art as object; record of physical properties (size, shape, materials, condition), technique</td>
<td></td>
<td></td>
<td>Less information because it has the most easily communicable message</td>
</tr>
<tr>
<td>II. Analytic</td>
<td>II. by comparing two or more works of art</td>
<td></td>
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<tr>
<td>Formal and symbolic structure (conventional character)</td>
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<td></td>
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<tr>
<td>IIa. (Connoisseurship)</td>
<td></td>
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<tr>
<td>Style of individual artists</td>
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<tr>
<td>III. Intuitive or valuative</td>
<td>III. by experiencing—not tabulating—the impact of the total art work</td>
<td>Process of articulating the uniqueness of individual works</td>
<td>Most individualized</td>
</tr>
<tr>
<td>Work of art as a unique object (total import)</td>
<td></td>
<td></td>
<td>More information because it has the more complex and individualized message</td>
</tr>
</tbody>
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Figure 2. Levels of Information Analysis (from "Computer Input Form for Art Works" by Kenneth C. Lindsay, 1968. In Computers and their Potential Applications in Museums. New York: Metropolitan Museum of Art, pp. 24-25.)
Paisley [1968] in *Computers and their Potential Applications in Museums*. Paisley suggests various uses for computers, but, in general, to research they have not yet proven effort- or cost-effective.) But after more than a decade of availability, the use of the computer for such art-related museum research remains fairly rare. The occasions when a mass of catalog data can be analyzed for results significant to research are infrequent (see later discussion for the special cataloging efforts of the National Collection of Fine Arts and the National Portrait Gallery), and so, it seems, are problems which are most effectively solved by special constructed databases. We come back to the fact that we are in a field where rarity and uniqueness are characteristic attributes, and where more or less subjective observations form a large part of the data on record.

To put this another way: in museum fields where the collections consist of many objects, each sharing certain extrinsic characteristics with numerous others, the mere cataloging of objects creates a potential tool for computer-assisted research. Three factors are important: the size of the collection, the degree of overlap of the descriptors, and the nature of the descriptors. In the art museum, the rarity of the objects limits the extent of the database; the individuality of the objects limits the overlap of the data; and the subjectivity of significant descriptors makes the accumulation of useful objective data difficult.

In the case of the National Gallery of Art, with about 2,680 paintings and 1,770 works of sculpture in its collections, the items within the purview of each curator can be reviewed or even inspected physically without difficulty. The registrar's office does not find card records unmanageable. In 1971, the gallery, with the assistance of David Vance and Jack Heller of the Museum Computer Network, computerized the sculpture records as a test project. The principal benefit was probably the bringing of greater conformity to the record entries; also, the various printouts by artist, medium, title, subject, donor, etc. were convenient and useful. However, there has been no expressed interest in a follow-up, and the gallery's sculpture curator remains convinced that the catalog database is of little help in research unless it is to be supplemented by an extensive descriptive record, using at least 300 tags, breaking down materials, techniques, iconography, and stylistic factors in detail. The formation of such a database for the 1,770 items of sculpture is a staggering proposition, yet, even if it were to be completed, its use would be limited unless it were networked to similar banks in other museums.

The curators of painting in the National Gallery also considered the sculpture computerization test project to be of only limited use. The Print Department, however, with some 30,000 to 40,000 items to keep track of and a rapidly expanding collection, recognized that the operation is at a point at which computerization could be of substantial help. Prints, of course, are objects less individualized, more repetitive, more
easily collected in quantity, more reflective of standardized and mechanical techniques, than paintings. Accordingly, computerized data are more useful in cataloging procedures and probably even elementary notations on technique and materials would make possible data sorts which would assist research.

Few museums have painting collections large enough to make computerized collection management obviously attractive from the cost-effective or effort-effective standpoint. On the other hand, other types of collections can easily grow to such a size, especially if the objects collected lend themselves to characterization by repetitive and objective data. The National Portrait Gallery in Washington has only 700 works of painting and sculpture, but its Catalogue of American Portraits contains 30,000 entries. The gallery resorted to data processing at an early stage. It is by policy not concerned with aesthetic quality but with likeness, and it disclaims being an art museum. The National Collection of Fine Arts has sponsored an Inventory of American Painting. To date it has amassed about 130,000 entries. Computerized data processing obviously provides the proper tools for this undertaking which is, in fact, not concerned with cataloging so much as creating an extensive and necessarily uncritical inventory.

The National Gallery of Art is faced with the problem of processing an even larger mass of art-related data but in the form of collection control and cataloging. The Photo Archive at the gallery has been building up the photographic collection actively for about five years and now has some 600,000 photographs with a goal of 2.5 million. Obviously, if only three sets of index cards were to be kept (artist, title, and subject), the result would be 7.5 million cards, for practical purposes an unmanageable and unsortable number. The gallery has had computerization of its photographic collection data under study for several years, and it appears finally to be near the start of active processing.

The problem of identifying the essential descriptors for such a catalog is difficult. The size of the collection is such that it is tempting to list all questions which might reasonably be asked so that the computer might be called on to help whenever one of them should arise. On the other hand, given a cataloging task of this magnitude, every entry on the record card that can possibly be dispensed with must go. If each record card took an average of five minutes to fill out, a staff of five catalogers working full time would require six years to process the photos already on hand, and at the end of that time the staff would be at least another six years behind in processing the acquisitions that had come in while they were working. (The design of an appropriate catalog entry form for a large photographic archive has been under study for some time at the National Gallery. Sample forms designed for both SELGEM and GRIPHOS use have been designed, but no actual entries begun. Meanwhile, the Mellon Center for British Art and Studies at Yale has been awarded a
The dimensions of the problem are such that it is easy to understand why the most nearly comparable photographic collection, at the Witte Library in London, keeps no cataloging record at all of its holdings. It has about a million photographs and a very limited staff. Photographs are filed alphabetically by artist in boxes and on the shelves where they are stored. If a print is misfiled, there is not only no way of finding it, but also no direct way of determining whether it ever existed or how it could be replaced. The Witte Library is an invaluable resource but, for economic reasons, it has entered the realm of the yogi without benefit of registrar.

While we are considering examples of cataloging, we should also turn to the other extreme: The Museum of Modern Art in New York, where a zealous and inventive registrar played a major role in developing a data processing system suitable for the records of art collections (but adaptable to other types of museum collections), and then supervised the entry of the museum's catalog data into the computer. The example of The Museum of Modern Art demonstrates that an art museum with a collection of moderate size can process its catalog records without great difficulty or expense if the registrar takes the initiative, with the support of the administration, and that the resultant printouts are useful. (David Vance has documented his work at The Museum of Modern Art and for the Museum Computer Network in a series of articles and publications; much of it is summed up in his Manual for Museum Computer Network Data Preparation [State University of New York at Stony Brook 1975].)

If other art museums appear currently to be slow to follow this lead, the reason traces back to the problem that lies behind the conflict, if any, between the curator and registrar—i.e., the problem that lies in the nature of the art objects themselves. To be sure, the registrar may be more interested in a computerized catalog than the curator, but, more importantly, the art museum staff as a whole is less likely to be interested in such a catalog than the staff of a history or science museum.

In summary, in the case of art galleries with a relatively select and limited collection of paintings and sculpture (if we may generalize from the experience of the National Gallery of Art and random observations):

- the registrar may be attracted to data processing but is not driven to it by collections management problems;
- the Painting and Sculpture Curators do not regard the catalog database as a research or management tool requiring computerization;
- as a result, the staff and administration tend to avoid the disruptive cost and effort necessary to convert the basic records;
- however, curators on specific occasions may resort to computer-assisted data analysis as a research tool, using specially constructed data banks;
—meanwhile, as certain collections grow, such as print collections, the value of computer-assisted cataloging becomes apparent to the curators concerned as well as the registrar; and especially in the case of research inventories and very large research collections like the Photographic Archive of the National Gallery, the museum staff will be forced to use the computer; this may well be the point at which the average curator first becomes familiar with the tool.

There is no doubt but that the computer will be used increasingly in art museums, but since most of the registrars will not soon be in a position to convert their core data into computer form, art museum networking, however desirable in theory, will be slow in coming about.

Editor's Note: This paper represents a revision of a 1976 essay by the author which was number 7 in a series of Research Reports of the Museum Data Bank Committee. The author was then planning officer for the National Gallery of Art. He is currently planning consultant at the National Museum of American History where the registrar's office is engaged in a multiyear project of inventoring the collections. The article, revised for this issue of Library Trends, retains its pertinence in describing the problems of classification and computerization peculiar to art collections.

The author notes that, since this article first appeared, the National Gallery has developed massive computer capacity under the leadership of the treasurer. In the course of establishing control of general inventories, the trustees requested that the art collections be computerized.

REFERENCES


Documenting Our Heritage

Evelyn K. Samuel

INTRODUCTION: THE PROBLEM

In the museum world, the primary manifestation of the information age has been a trend toward increased emphasis on records maintenance. Since the 1970s, documentation of museum objects has emerged as a major concern for museum professionals. In its 1984 report, Museums for a New Century, the American Association of Museums (1984) notes that: "The lack of information about the number, location, and condition of objects, artifacts and specimens in the nation's museums is a handicap to adequate care and maintenance of these collections and to scholarly progress in general" (p. 53).

In theory, a museum "should be able to produce any object from its collection when any document from its registration system is picked at random" (Reibel 1978, p. 24). Conversely, the documentation for any object should be readily available to shed further light on any object as required.

Instead, records of the hundreds of thousands of objects in museum collections worldwide are less than adequate, and it is generally recognized that "museums throughout the world have an overwhelming documentation problem" (Andrew 1980, p. 42). Although this deficiency appears to be universal, it is of special significance in the context of the art museum owing to the unique characteristics of art objects each of which is "an irreplaceable, unduplicated, and priceless piece of humanity's cultural history" (Halliday 1987, p. 9). Furthermore, art objects, frequently loaned to other museums for temporary exhibitions and, even within the owner institution, exhibited in a variety of con-
texts, are subject to frequent shifts in location. Were the exact whereabouts of a single object to be in doubt for even a few hours, its custodians could be in a most precarious, uncomfortable position. Thefts from museums and the practice of “deaccessioning” tend to make headlines in the press and provoke unfavorable public comment.

Since the 1960s, the public’s involvement with the museum has intensified and has engendered a need for accurate information about museum holdings. Because museums derive their tax-exempt status from their educational functions, museum workers must be prepared to open their storerooms and files to scholars. Furthermore, accurate records of objects are essential not only for scholarly research and for the museum’s educational programs but also for the mundane requirements of insurers and auditors in the event of loss or damage. Many museums have initiated documentation projects only after the loss of an important object with concomitant embarrassing publicity.

Museums do, in fact, document their major holdings most carefully, but the objects actually on exhibit in their galleries at any given time comprise but a small percentage of the total collection. A museology text published in 1975 asserts that: “The Field Museum of Natural History exhibits less than one percent of its total collection at any one time” (Burcaw 1975, p. 93). In many museums, information about the bulk of the collection—in storerooms and warehouses—remains largely inaccessible to scholars (Sarasan 1975, pp. 3-4).

The great museums were conceived as educating the public at large, promoting scientific research, and disseminating information about the objects in their care. Eventually the concept of “care” came to include documentation. And, as the most recent development, the obligation of record-keeping has been incorporated in the codes of ethics that museum workers have devised for their own guidance. The most recently published code of ethics for curators places the obligation to maintain records in its very first paragraph: “Curators are authorities concerning the collection under their care. As such, they should develop and preserve thorough, up-to-date, easily comprehensible information about these collections” (Lester 1983, p. 36).

Such records as may have been compiled in the past, often consist of illegible cards with incomplete or obsolete information. Because details relating to museum objects do not remain constant, the records need to be frequently updated to reflect current location, valuation, attribution, condition, exhibition record, and bibliography. To maintain such a multifaceted variety of information manually would require enormous amounts of staff time and expense to which few nonprofit institutions can commit themselves. When Peter Homulos, director of the Canadian National Inventory Programme, surveyed the state of documentation in
Canadian collections in 1972, he discovered huge backlogs of handwritten, illegible cards with obsolete information. He identified a significant problem area in the responses he received to the question: "How frequently does the information on the catalog cards change?" Because he was told that once an object was cataloged the information "hardly ever" changes, he concluded that updated information failed to reach the registrars and thus they assumed that no changes needed to be entered into the records (Homulos 1982, p. 11).

As museum workers began to recognize the need for accurate documentation, they also discovered that the computer offered a solution to the problems they faced. The museum environment, however, has refused to recognize that the technical aspects of gaining control of their collections have already largely been solved by the library community. In fact, within museum circles, there has been a notable failure to share information or to benefit from the experience of others (Stam 1981, p. 15). Each project is perceived as unique, with its own problems, requirements, and solutions. To remedy this situation, a librarian at the Metropolitan Museum has begun to compile a data bank of museum computer literature (Barnett 1987, pp. 1-2). The Getty Trust expects to disseminate information on ongoing museum computer projects, continuing the format of its Census published in conjunction with the Second International Conference on Automatic Processing of Art History Data and Documents held in Pisa in 1984.

Current literature on museum records falls into two categories. The majority of published sources consists of descriptions of individual museum projects detailing the hardware and software used to inventory and catalog collections. Conference reports, articles in museum journals, and the sparse information published between hard covers is mostly devoted to descriptions of one museum's, or one department's, efforts at bringing its collection management procedures up-to-date by using computers (Light et al. 1986). An alternate approach, taken by the computer experts, addresses the practical issues of uniform data standards, syntax, and nomenclature for museum databases. Conspicuous by their absence are discussions of the theoretical basis of classification and indexing. Rare is the author in museum publications who touches upon either of the fundamental issues in museum computerization—change management and training in documentation for museum personnel.

**Dimensions of Museum Information Systems**

In order to create the desirable optimum variety of access points to each object, a great number of files would need to be created, each arranging the same redundant data in a different sequence. For example, to provide adequate finding aids for Jacob Hurd's Silver Loving Cup, the cataloger at the Metropolitan Museum produced at least eight 7.5 x 12.5 cm cards (Dudley et al. 1979, pp. 219-27). A typical entry shows...
a "maker entry," three subject entries, a descriptive heading entry (CUP, LOVING), and a photograph filed under the cup's accession number. An additional card would be filed under the classification: WA (for western art)—Metal work—Silver—XVIIIth c.—American—Mass.—Boston—Cup—Loving. The concept of the unit card has not been incorporated so that each card has its own format. These cards, then, are filed in disparate sequences to reflect the name of the artisan who created it, the type of object involved, and, in this case, the heraldic symbols it displays which are labeled subjects. In addition, of course, the loving cup's provenance would need to be registered in a donor file, and its storage place recorded in a location file to show its current whereabouts. It would also need to be included in an inventory list detailing the contents of the storage room or gallery that houses the silver cup. A parallel cataloging sample for a painting by Gauguin consists of ten cards (artist, title, subject cross reference, donor, previous provenance, artist/title, photograph, notes, exhibition record, and bibliography). However, for the Metropolitan Museum's Department of European Paintings, the average number of cards per record is fifteen to twenty; in some cases there may be as many as 100 cards for a single picture (Baetjer 1984, p. 123). Even so, the shortcomings of the card system become evident when additional access points are needed which were not provided for in the original plan.

What if an object of gold is depicted in a painting on a wooden panel? In most formats we might easily miss it when asking for objects made of gold: the material in this case would be entered as "wood" and so the golden object would be found only if we took the trouble of asking for every word "gold" or "golden" wherever occurring.... (Paijmans and Verrijn-Stuart 1982, p. 153)

While the quotation makes the case for a full-text search capability in a computerized system, it also points out a serious flaw of manual documentation. The Metropolitan Museum's silver cup would not be retrieved for an exhibit of silver objects. The entries for the Gauguin illustrate the same problem: the cataloger at the Metropolitan Museum carefully noted that "the fruit at the feet of the Virgin is placed on a 'fata,' an altar of the type once used to make offerings to the Tahitian gods" (Dudley et al., pp. 222-25). Since this item of scholarly research is recorded in a note within the catalog entry, the word "fata" is not an access point (i.e., no card is filed under the subject heading "fata"). A researcher looking for images of Tahitian cult objects would not find this altar through the catalog.

It has been estimated that even small museums may maintain more than twenty-five different files and ledger books (Sarasan and Neuner 1983, p. 17). Few museums can afford the time and personnel required to create such redundant labor-intensive records.

If the file is to reflect the research relating to the object, the amount of data to be entered may become quite overwhelming. Catalog records for art objects have been compared to medical records in respect to the
variety of data formats they contain—i.e., factual, numerical, and
descriptive—and above all, to their being open ended and not completed
throughout the subject's lifetime (Vance 1984, p. 1). The extent of
documentation for museum objects is limited only by the amount of
research devoted to the specimen.

MUSEUM RECORDS

Recording of rarities in collections, both of books and of objects, is
as old as the art of writing itself. Thousands of clay tablets inscribed
with cuneiform characters were found during the excavation of the
palace of Assurbani-pal in Nineveh. Archaeologists at the site conjectured
that these were "methodically arranged and cataloged" (Encyclopaedia
Britannica, s.v. "Libraries").

Since the pre-Christian era, the museum and the library have
developed along parallel lines, frequently devoted to both books and
artifacts. The most famous example would be the Alexandrian Library
which was devoted to scholarship and research and which, in addition
to manuscripts, gave room to works of art, animals, and curiosities.
Under the administration of Callimachus, a catalog of all the principal
books in the Alexandrian library was prepared and arranged in 120
classes (Jones 1971). After the Fall of Rome, the repositories of learning
were the monasteries and their treasuries. Monastic libraries preserved
classical literature and thus provided the impetus for humanistic scholar-
ship and the growth of universities. The Wunderkammern, amassed
by the princely families of the Renaissance, formed the nuclei of the
great national collections of Europe. Both monasteries and private
collectors employed librarians to produce inventories of their holdings.
In the United States, the forerunners of the modern museum—
atheneums and cabinets of curiosities—tended to be connected with
libraries and the boundaries between the two institutions were often
nebulous until well into the twentieth century (Rawlins 1981, p. 2). An
example of this intimate relationship would be the Newark Public
Library where, during his tenure, John Cotton Dana succeeded in
founding the Newark Museum and operated both library and museum
according to his concept of the most up-to-date educational principles.

With the development of modern museums—the great national
storehouses of historic, ethnologic, scientific, and art collections—mere
handlists of accessions were insufficient. More detailed information is
required for managing collections and for assembling objects for special
exhibitions.

It was not by accident that major campaigns to gain control of
museum records were started in the latter half of the 1970s. In the United
States, the great museums had been founded just 100 years earlier, and,
preparing for their centennial celebrations, curators found that they
could not readily reconstruct even their own history let alone the past of
most of their possessions ("Museum Archives" 1980, p. 10). To com-
pound the problem, museum workers who had begun their careers in the depression years were retiring and taking with them a wealth of information that had never been committed to paper (Sarasan 1981, p. 40). Institutions that exercised care to document and catalog their objects found that the records generated to manage their collections had resulted in so much paperwork as to represent an almost impenetrable maze.

Museum documentation is derived from library record-keeping systems. The very terminology of museum systems corresponds to that of the library world. Both types of institutions enter a newly received acquisition into an “accession record” and then proceed to catalog it. When a book leaves the library, a “circulation” record is created corresponding to the museum’s loan files. The library’s old-fashioned three-card circulation system (now an anachronism) is exactly the kind of information system museums are still constructing today (Dudley et al. 1979, p. 236).

New York’s Metropolitan Museum of Art (MMA) serves as a model for museum practice in the United States. Object cataloging at the museum owes its beginnings to Henry Watson Kent, a friend of John Cotton Dana. Dana and Kent frequently collaborated on publications and shared a common philosophy concerning library and museum management. Dana’s founding of the Newark Museum while holding the office of librarian of the Newark Public Library is a telling example of the extension of the educational function of the library to the exhibition and study of realia. Dana, whose background was primarily in the area of librarianship, is numbered among the great “museum masters” of America, while Kent, who similarly combined library and museological functions, is not as prominent in the annals of museology.

Kent had attended the first course in Library Economy taught at Columbia College by Melvil Dewey in 1884 (Kent 1949, p. 11). When appointed assistant secretary to the board of trustees of the Metropolitan Museum he introduced the “library economy” methods he had studied to gain control of the MMA’s objects (Howe 1948, p. 49). He began by creating an accession record and then started a card catalog. The first manual for museum catalogers, published in 1956 by Metropolitan Museum personnel who were trained by Kent, recommends the A.L.A. Cataloging Rules for Author and Title Entries as a guide for establishing name authorities (Dudley et al. 1979, p. 227).

Although heavily dependent on library methodology, museum workers object to comparisons between library cataloging and object cataloging. They point out that the difference between cataloging a booked and cataloging a museum object is that the object does not have a title page which tells the cataloger what it is (David Vance to Samuel, personal communication, 24 May 1983). Nevertheless, the procedures are closely related: besides establishing authorship and title, cataloging
a book involves classification, assignment of subject heading, and physical description. That is, in essence, the information required for cataloging a museum object as well. Like libraries, museums use classification to bring similar objects together and subject indexing to provide alternative access points or finding aids. Understanding the principles of classification and subject indexing is essential for creating coherent documentation. Museum documentalists argue that library theory is not applicable to their problems because the library cataloger deals with a limited number of attributes in comparison to the vast amount of information entailed in cataloging museum objects.

The Islamic manuscript might be cited as the perfect confluence of the art of the book and the book as art. The extent of information required in rare book cataloging far exceeds that needed for the contemporary trade book but the underlying theory is the same. Similar though they may be to library cataloging, the formal and intellectual requirement for the cataloging of museum objects are immensely more complex. However, an understanding of the theoretical aspects of classification and subject indexing is essential in organizing information about museum objects for retrieval. When Chenhall and Homulos (1978) suggest that the dimensions of a painting represent an aspect of classification they are in error (p. 43). Unless a collection classifies by size, dimensions are part of the object’s description or the book’s collation and not part of its classification. Even when correctly relating museum cataloging to library classification, the acknowledged experts demonstrate a lack of comprehension. In a recent article (Elkins 1985, pp. 6-12), Holman J. Swinney, director of the Margaret Woodbury Strong Museum, is quoted as comparing the Library of Congress classification system to Chenhall’s Nomenclature (Chenhall 1978): “The library uses names, the titles of books, as the basis for its system and Nomenclature either names the object for you, or because it is open-ended, like the Library of Congress’ system, you can add other names” (Elkins 1985, p. 9). But names and titles are not the basis of classification. The LC schedules present a logical, hierarchical arrangement of concepts in order that books about the same subject will be grouped together. Names and titles provide additional access points making it possible to locate a book by a variety of approaches. The resulting creation of multiple ways of retrieving information is an instance of the redundancy librarians build into their indexes and catalogs to optimize the rate of success in retrieval for the seeker of information.

**History of Automated Cataloging in Museums**

In the latter half of the 1960s, the museum world recognized the potential usefulness of the computer for enhancing object documentation. Magnetic tapes, with the limitation of sequential reading of information, had been supplanted by direct access devices which made it possible to index and invert files and select data at will from any part of
an archive (Vance 1986, p. 38). At the National Museum of Natural History, Smithsonian Institution, for example, computers have been used for collection management since the early 1960s (Gautier 1986, p. 48). Other museums also began to enter data using software packages specially designed for museum cataloging applications. Outstanding among these are SELGEM (SELF-GEnerating Master), used on IBM equipment by the Smithsonian Institution and others, while the Museum Computer Network favored GRIPHOS (General Retrieval and Information Processor for Humanities Oriented Studies).

These early museum computer projects were intended to create databases encompassing "all information on all objects to answer all questions" about the objects in collections (Sarasan and Neuner 1983, p. 7). To accommodate in-depth scholarship, the GRIPHOS system has 420 possible data fields (Vance 1975, p. 2).

If information about objects were to be expeditiously captured in computerized records, and if these records were to be made accessible to other institutions within a network, then locating objects for exhibition or for research would be vastly simplified. Researchers would be spared long hours of drudgery merely ferreting out the whereabouts of objects, time which they could use for more creative scholarship. The computer seemed to hold the promise that this could indeed be achieved.

Among early projects was one conducted at the University of Oklahoma's ethnological collection. It was hoped that this project would grow into a network inventorying the objects in ethnological collections nationwide, estimated to number about 1 million (Sarasan and Neuner 1988, p. 5).

Equally ambitious were the computer applications envisioned by the art museum registrars. The Museum Computer Network (MCN), founded in 1965 (Vance 1986, p. 38) hoped to create a nationwide data-bank of art museum objects. The Oklahoma project did expand to museums in Missouri but never attained the expected national coverage, and one participant in the Museum Computer Network—the Museum of Modern Art—achieved a complete catalog of its holdings, but the other fourteen members shelved their computer projects within a few years (Vance 1986, p. 41). Still active as an advisory body, the MCN holds annual conferences where museum personnel exchange information but it has, for the present, abandoned the goal of the national art information network.

Although the nonprofit sector has been a low priority for the computer industry, IBM funded a conference on computer applications to art history scholarship sponsored by the Metropolitan Museum of Art as early as 1965. The published proceedings detail a wide variety of projects involving computer applications such as stylistic analysis of archaeological textiles, guidance devices, and cataloging, not omitting the then inevitable plans for the universal data-bank of art objects (Metropolitan Museum of Art 1968).
If one examines the reasons why many projects were abandoned within a few years of their start, and why museum computer projects have taken an entirely different direction during the course of the intervening twenty years, one finds a variety of factors responsible.

Museum employees have little preparation for documentation. Until the present decade, training for museum work concentrated on connoisseurship for art museum curators and on science for those entering museums of natural history or ethnology. Knowledge of constructing and maintaining information systems is a low priority for museum curators and even registrars, yet they are entrusted with the recording of their collections (Hoachlander 1979, p. 5). Serving as automation project managers in addition to handling curatorial functions often so taxed their already overextended schedules that they lost interest in pursuing computerization of records (Sarasan 1981, p. 45).

Museum computer projects, initially at a disadvantage owing to the poor quality of existing manual records, experienced further setbacks due to the excessively ambitious goals envisioned when computers first began to be used in the museum environment. Unforeseen developments in computer technology have also contributed to deflecting the course of museum catalog automation. Given the huge mainframe computers that were the state of the art in the late 1960s, the goals then adopted for documentation do not seem unreasonable. Information had to be keypunched and fed to the system in batch mode, creating new opportunities for error. Printouts, when obtained, turned out to be costly. However, the present-day microcomputer can be made to store as much information as could the awkward giants of those days (Paijmans and Verrijn-Stuart 1982, pp. 145-47).

The problems which in the past impeded the spread of computerization are gradually being dispelled. Advances in computer technology are responsible for the elimination of many of the stumbling blocks that earlier prevented computers from being widely adopted by museums. A startling comparison suggests that: “If the aircraft industry had evolved as spectacularly as the computer industry over the past 25 years, a Boeing 767 would cost $500 today and it would circle the globe in 20 minutes on five gallons of fuel” (Gupta and Toong 1985).

As personal computers have penetrated into the home and have become increasingly user-friendly, resistance to them is decreasing. Thus the issue of change management may disappear spontaneously as the transition occurs outside the workplace. In fact, the microcomputer has brought automation within reach of most museums. Relatively inexpensive and transportable, the microcomputer takes up little space and can serve several users simultaneously. Since it can be owned for less than $5,000, it does not require extensive consultation with either boards of directors or computer experts; its purchase is no longer a major decision.
On the basis of a survey conducted for the Association of Systematics Collections, Lenore Sarasan concluded that 95 percent of the projects begun twenty years earlier were failures "when judged by data communication standards" (Sarasan 1983, p. 4). Many projects were abandoned in the data entry stage when it was discovered that the software did not provide the means of sorting and retrieving information as expected (Sarasan and Neuner 1983, p. 7).

For many years Canada's National Inventory Programme was cited as the most successful national project constructing a nationwide database of museum records which would support research and exhibition throughout the country. Originally using Unesco's International Species Inventory System software, the project was reconsidered in 1980 (Homulos 1986, pp. 7-8). Eventually, PARIS (Control Data's Pictorial Artifact Retrieval Information System) was adopted as its software, and the nationwide project was reconstituted as the Canadian Heritage Information Network (CHIN). In September 1986 CHIN was officially "dismantled." The task force that recommended the dismantling of the National Museums Corporation, and with it the Canadian Heritage Information Network, found that: "The four museums acting independently would be more cost-effective and efficient than present operations under one central corporation" ("News Release/Communique" 1986). Apparently the museums had used the system which was intended as a mutual information network to manage their collections but had not interacted well as an information network (Report and Recommendations 1986, p. 33).

Computerization of museum data has moved into a prominent position on an international scale with the support of the J. Paul Getty Foundation especially in relation to art museums and art-related scholarship. Here again, after an ambitious beginning, retrenchment necessarily followed. The Museum Prototype Project, a pilot project for cooperative art museum cataloging, foundered upon the usual rocky grounds. As Katharine Baetjer (1984) pointed out at the 2nd Conference in Pisa:

The group [The Membership of the Museum Prototype Project] will inevitably encounter further difficulties in attempting to establish rules for controlled vocabulary and syntax. I believe that post-coordinated control is the only option, and must once again point out that local precedent will mitigate against substantial change. (p. 129)

Although the excessively ambitious projects of the late sixties and early seventies were abandoned, automation in object cataloging remained a lively issue. As central museum administrations began to utilize computers for the most essential administrative functions—mailing lists, accounting, and climate control—new approaches were devised in the curatorial departments. Often motivated by a move to a new facility, registrars carried out straightforward inventories of their
collections, capturing the data in electronic devices. A limited number of data fields were defined, creating manageable files of finite units within a collection. The Margaret Woodbury Strong Museum began as a collection of objects in a private home in Rochester, New York. While a new museum building was under construction, the objects were given accession numbers and entered into an automated system. Also, the staff of the Dallas Museum of Fine Arts conducted a computerized inventory prior to its move to a new building. In the course of such an inventory, problems were encountered and resolved—i.e., objects without numbers were assigned permanent accession numbers, and numbers (cards) without matching objects were placed into categories for later consideration. Because simple file management software made it possible to print out the information thus gathered in accession number order, or in the form of a location file, after the move to the new facility, it served as the nucleus for further elaboration of computerized catalogs. Forced by the computer to adhere to uniform syntax in entering data, museum workers also began to appreciate the need for thesauri of terms if the information they were accumulating was to be correctly structured for retrieval. They began to think in terms of modules which could be added to enhance the existing databases. An ancillary benefit of beginning with narrowly defined goals which can subsequently be expanded is that not only are results more immediately demonstrable, but also, in the event of a cessation of funding, the original project retains its usefulness. A modest project, such as an inventory of part of a collection, can be brought to completion in a reasonable span of time. It will then serve as a pilot or demonstration project and may attract further funding for automation.

Summing up its deliberations concerning museum records, the Commission on Museums for a New Century concludes that "the complex job of recording information about objects and making it accessible should, in most museums, eventually cease to be a wholly manual operation" (American Association of Museums 1984, p. 48).

REFERENCES


Access to Iconographical Research Collections

Karen Markey

INTRODUCTION
Iconographical research collections are tools that support the iconographical approach to the history of art and offer access to secondary subject matter and photographic reproductions of artworks. In this article, the four major approaches to art historical scholarship are defined. One of those four approaches—iconography—is targeted in this discussion because it supports iconographical research collections.

A matrix of subject access to visual resources collections displays the many possibilities for providing subject access to these collections. Generally, iconographical research collections describe secondary subject matter through subject headings or a classification scheme; these collections employ phrase indexing of subject headings or classification codes. Access to three different iconographical research collections through secondary subject matter is described and their respective positions in the matrix are pinpointed. Typical users of iconographical research collections are scholars in art history, theology, and medieval studies who are trained in the iconographical approach to the history of art. Thus access to iconographical research collections through secondary subject matter is in accordance with the training and knowledge of users of these collections.

Access to two different visual resources collections through primary subject matter is described. Users of these collections do not need special training in iconography because primary subject matter can be described by anyone with practical experience with everyday life. Subject access to these collections is contrasted with that offered by icono-
graphical research collections. The reasons for the limitation of the latter collections to secondary subject matter are presented along with future directions in subject access to iconographical research collections.

**Approaches to Art Historical Scholarship**

In general, art historical scholarship employs one of four approaches:

1. **Form and style** requires an analysis of formal conventions. It results in "the identification and definition of artistic styles such as Byzantine, Gothic, and Baroque, through artworks' morphological terms, as representing tendencies toward certain modes of composition, of color organization, proportion, treatment of space, etc." (Ackerman & Carpenter 1963, p. 9).

2. **Connoisseurship** is the "study of the artistic personality of an individual artist or of a group or school of artists as revealed in their works" (Ackerman & Carpenter 1963, p. 203).

3. **Iconography** is "the study of subject matter or meaning in art" (Panofsky 1962, p. 3).

4. The **social history of art** "interprets a work of art in terms of the conditions that brought it into being" and "calls upon sources that art has in common with the other activities of society" (Ackerman & Carpenter 1963, p. 220).

Scholars may span one or more approaches in their published work. In *Painting in Florence and Siena after the Black Death*, Millard Meiss brought "his background as a connoisseur and iconographer into partnership with a study of religious and literary history to explain a dramatic shift in style following the plagues of the mid-fourteenth century in central Italy" (Ackerman & Carpenter 1963, p. 224).

Underlying the great variety of approaches among art historians, there is a common need for certain basic identifying information that affects every historical operation. Regardless of the approach of art historians, nearly all ask of the work they study: (1) When was it executed (date)? (2) Where has it been since its execution (provenance)? (3) Who created it (responsibility)? (4) How was it created (materials, tools, techniques)? (5) Why was it created (function)?

Bibliographic tools and collections of visual resources have been established to support one or more of the four approaches to art historical scholarship. An art slide collection is a tool familiar to librarians and curators from academic institutions, museums, and art galleries. The art slide collection may be an administrative unit of the university library, museum, art gallery, art history department, or architecture department. However, the identifying information assigned to each slide in the collection answers the questions all scholars ask of a work of art, namely when the work was done, where, by whom, how, and why.
Iconography

The prominent art historian Erwin Panofsky (1962) defined iconography as "that branch of the history of art which concerns itself with the subject matter or meaning of works of art" (p. 3). In the analysis of an artwork, the iconographer distinguishes three levels of subject matter: (1) primary subject matter, (2) secondary subject matter, and (3) iconological interpretation.

**Primary Subject Matter.** Primary subject matter is "the identification of forms such as configurations of line and color, or peculiarly shaped lumps of bronze or stone as representations of natural objects such as human beings, animals, plants, houses, tools and so forth" (Panofsky 1962, p. 5). Panofsky employs Leonardo Da Vinci's *Last Supper* to explain how to identify primary subject matter. The *Last Supper* shows thirteen men sitting around a table eating dinner and engaged in conversation. This enumeration of objects, events, and expressional qualities is a *pre-iconographical description* of this artwork. The only knowledge needed to formulate a pre-iconographical description is practical experience with everyday life.

**Secondary Subject Matter.** Secondary subject matter is "the identification of themes or concepts manifested in images, stories, and allegories" (Panofsky 1962, p. 6). When viewers realize that the gathering of these thirteen men depicts Christ's last supper with his disciples, they have reached the second level of meaning called secondary subject matter. The identification of secondary subject matter is called an *iconographical analysis*. The iconographer relies upon his knowledge of literary sources, customs, and cultural traditions peculiar to a certain civilization.

**Iconological Interpretation.** Iconological interpretation is "the identification of underlying principles which reveal the basic attitude of a nation, period, religion, class, or philosophical persuasion" (Panofsky 1962, p. 7). For Panofsky, the culmination of iconographical analysis is iconological interpretation. "But when we try to understand it [Leonardo's *Last Supper*] as a document of Leonardo's personality, or of the civilization of the Italian High Renaissance, or of a peculiar religious attitude, we deal with the work of art as a symptom of something else which expresses itself in a countless variety of other symptoms" (Panofsky 1962, p. 8).

The study of iconography (or subject matter in art) requires scholars engaged in iconographical analysis to pass through the first level of interpretation—i.e., pre-iconographical description. Thus, such scholars actually perform two interpretations of an artwork—i.e., pre-iconographical description and iconographical analysis.

**Iconographical Research Collections**

Iconographical research collections are tools that support the iconographical approach to the history of art and feature access to subject matter and photographic reproductions of artworks.
In the late 1960s, discussions by scholars on the automation of visual arts information revealed the availability of data for conversion to machine-readable form per level of subject matter. Art historian Kenneth C. Lindsay (1968) listed these three levels and added another level for empirical information—i.e., identifying information that tells when the work was done, where, by whom, how, and why (see Figure 1) (p. 25). This figure shows that identifying information and secondary subject matter of artworks are presently described in iconographical research collections and thus are available for conversion to machine-readable form. Primary subject matter, however, is not described in iconographical research collections; consequently, primary subject matter is not available for conversion to machine-readable form. Lindsay considered the third level of interpretation—iconological interpretation—beyond the purview of automation.

Since scholars must pass through the first level of interpretation to perform an iconographical analysis of a work of art, why has subject access to iconographical research collections been limited to secondary subject matter? Two explanations for this focus on the physical format and users of these collections:

1. The physical format of iconographical research collections is a card or microform format. These formats preclude the assignment of more than a few subject headings, descriptors, or classification codes per image. Secondary subject matter describes themes, stories, or allegories of an image and thus requires one or two entries per image. In contrast, primary subject matter requires the identification of many entities represented in an image—i.e., objects, events, and expressional qualities. Preparation and filing of multiple entries for primary subject matter for providing access points to a card- or microform-based collection would be prohibitively expensive in terms of the professional and clerical labor required.

2. Iconographical research collections have been established to support scholarly research; thus, secondary subject matter is in accordance with the training and knowledge of users of such collections and supports their scholarly pursuits.

Matrix of Subject Access

A three-dimensional matrix displays the many possibilities for providing subject access to visual resources collections (see Figure 2). At the top of the matrix are the two types of subject matter—primary and secondary—suitable for conversion to machine-readable form. On the left side of the matrix are the three principal methods of subject access. At the bottom of the matrix, four indexing techniques for visual resources collections are given.

The organization of this two-by-three-by-four-celled matrix seems to indicate that any of the four indexing techniques can be applied to any of the three methods of subject access and so on. In practice, this is
Is data available for computer input?

<table>
<thead>
<tr>
<th>Act of Interpretation</th>
<th>Is data available for computer input?</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Empirical (e.g., title, date, size, artist)</td>
<td>Yes</td>
</tr>
<tr>
<td>I. Pre-iconographical description</td>
<td>No</td>
</tr>
<tr>
<td>II. Iconographical analysis</td>
<td>Yes</td>
</tr>
<tr>
<td>III. Iconological interpretation</td>
<td>No (but probably not necessary)</td>
</tr>
</tbody>
</table>


Figure 2. Matrix of subject access to visual resources collections

not true. This section features descriptions of three iconographical research collections and pinpoints each collection's position in the matrix. The three collections covered in this paper are characteristic of iconographical research collections, especially with regard to their respective position in the matrix.
Index of Christian Art (Princeton Index). The Index of Christian Art (Princeton Index) was begun in 1917 by Charles Rufus Morey, an art historian at Princeton University in the Department of Art and Archaeology. The Princeton Index "grew out of iconographical research that was actively pursued in the Department of Art and Archaeology" (Woodruff 1942, p. vii).

Today, the Index of Christian Art is still an administrative unit within that department. Its director, Nigel Morgan, is an art historian known for research in Gothic manuscripts. The mission of the Index since 1917 has been to catalogue by subject and "picture-type" all of the known (published) monuments of Christian art dated before the year 1400, to record briefly the history of the objects, to assemble the important bibliography relating to each monument, and finally, when the literature of art history now available has been searched and exhausted, to maintain the catalogue by adding to it yearly all of the newly published material and all of the pertinent bibliographical references." (Woodruff 1942, p. 2)

In Figure 3, a portion of the matrix of subject access (Figure 2) is shown pinpointing the Index of Christian Art. In general, the Index is composed of two card files: (1) an alphabetical subject index, and (2) a monument file of an estimated 260,000 black-and-white photographic reproductions of artworks. A user of the Index of Christian Art who is interested in images of Lucifer first consults the alphabetical subject index under a subject heading. Figure 4 shows the alphabetical arrangement of subject headings under the main heading "Angel." Under the subdivided heading "Angel: Lucifer," the user first encounters a scope note or information card for this heading which bears other headings that the user can consult for this topic (see Figure 5). Following this information card are main entry cards (see Figure 6) and reference cards (see Figure 7) that describe the secondary subject matter of the artworks and direct the user to the monument file for a photographic reproduction of the artwork described.

In the monument file, photographic reproductions are filed by medium—e.g., metalwork, illuminated and illustrated manuscripts, sculpture, painting, mosaic—then alphabetically by city, then by institutional type, and institution. The user finds a photograph of the illuminated manuscript showing Lucifer by first consulting the monument file for illuminated and illustrated manuscripts, then under the city name Strasbourg, then under libraries in this city, and so on.

Users of the Index of Christian Art are principally art historians and scholars in related disciplines. The photographic collection of the Frick Art Reference Library and Index of Jewish Art resemble the Princeton Index in their construction and access to secondary subject matter (Knox 1979; Narkiss & Sed-Rajni 1976).

Iconclass. Iconclass is not an iconographical research collection; rather, it is a hierarchical classification scheme used as a subject access tool in a
II. Secondary subject matter

B. Phrase indexing

2b. Alphabetico-classed list of subject headings

Figure 3. Pinpointing the Princeton index's position in the matrix

Figure 4. Princeton index guidecards following "Angel"
number of iconographical research collections. The scheme was initiated by the art historian Henri Van de Waal and completed by Leendert Couprie at the Department of Art History at the University of Leiden with financial assistance from the Netherlands Organization for the Advancement of Pure Research and the Royal Netherlands Academy of Arts and Sciences (Van de Waal 1974-85; Couprie 1983). Iconclass distributes iconography into nine broad categories: (1) religion and magic; (2) nature; (3) human being, man in general; (4) society, civilization, culture; (5) abstract ideas and concepts; (6) history; (7) Bible; (8) literature; and (9) classical mythology, ancient history.

Iconclass can be used by the keepers of iconographical research collections to effect a systematic arrangement of artworks by secondary subject matter. In Figure 8, a portion of the alphabetical Iconclass index under the index entry "courting" is shown. A user interested in "one-sided courting" would access the photographic collection under the Iconclass number "33 C 31" to see depictions of one-sided courting or the systematic arrangement of Iconclass under this number to find other relevant Iconclass numbers and topics of interest.

In Figure 9, a portion of the systematic arrangement of Iconclass is shown beginning with the number "33 C 31 one-sided courting." The Iconclass user might find additional numbers by browsing this systematic portion such as "33 C 31 11 woman in flight—leaving something behind (clothing, shoe, etc.)." The user can then access the photographic collection at hand under relevant numbers or the systematic Iconclass bibliography to find published literature on this topic. Iconclass has been applied to organize iconographical research collections such as the Decimal Index to Art in the Low Countries (DIAL) and the Marburger Index. Iconclass can also be applied to provide a systematic arrangement of print materials. For example, three of the seventeen published volumes of Iconclass are a systematically arranged bibliography.

**DIAL. (Decimal Index to Art in the Low Countries).** DIAL is published by the Department of Art History at the University of Leiden and the Netherlands Institute for the History of Art at The Hague (Rijksbureau voor Kunsthistorische Documentatie 1958). DIAL is a subscription service to over 15,000 postcard-sized photographs of Dutch and Flemish art from the fifteenth to the seventeenth centuries. DIAL subscribers are academic and museum libraries and archives around the world.

In Figure 10, a portion of the matrix of subject access (see Figure 2) shows that DIAL describes secondary subject matter using a classification scheme. DIAL photocards bear one or more Iconclass numbers. Photocards also include identifying information such as artist, medium, size, title of artwork, owning museum, etc., but the detail of this identifying information varies from photocard to photocard.

Subscribers usually file DIAL photocards by Iconclass number. DIAL users first consult the Iconclass alphabetical index for subjects of
Angel: Lucifer

See also

Satan
Angel: Fall
Isaiah: Prophesy, Fall of Lucifer

Figure 5. Scope note and reference card for a subject heading

Figure 6. Main entry and bibliography cards under a main entry
interest (see Figure 8), find one or more relevant Iconclass numbers, then browse systematically-arranged DIAL photocards for artworks depicting secondary subject matter of interest. A DIAL user who has already identified Iconclass number "33 C 22 6 interrupted [lovers'] meeting—taken by surprise" would find the photocard whose identifying information is shown in Figure 11 by browsing the photocard file under this iconclass number.

**Marburger Index.** The Marburger Index also applies Iconclass numbers to photographic reproductions of artworks. Figure 12 pinpoints the location of this index in the matrix of subject access (see Figure 2). The Marburger Index describes secondary subject matter through a classification scheme.

The Marburger Index was begun in the 1920s by Richard Hamann in a small university department called the Bildarchiv Foto Marburg (BFM) (1985) in the Art History Institute of Philipps University Marburg. With recent funding from the Volkswagen Foundation, BFM produced on microfiche an initial 500,000 photographs of German art from the Bildarchiv and over twenty other archives of German institutions. By 1987, the Marburger Index had approximately 800,000 photographic reproductions on microfiche.
courtesy
  see also conduct
  courtesy, manners; etiquette 44 B 15 31
  Humanity, Politeness; 'Cortesia', 'Humanita' (Ripa) 57 A 9
courtier(s)
  royal household; courtiers, retinue, train see 44 B 15 2
  King Ahasuerus is furious with his wife Vashti and asks his courtiers' advice: Memucan (Muchaeus) suggest to depose the queen 71 Q 21 3
courting
  see also love unrequited
  see also proposal
  see also seducing
  see also suitor(s)
  animals courting and mating KEY (+ 43) to 25 F
  relations with friendly, non-aggressive character (expressive connotations)
    see KEY (+ 91) to 31 A etc.
  lovers; courting, flirting see 33 C 2
  one-sided courting 33 C 31
  rest during harvest (eating, dancing, making love, etc.) 47 114 9

Figure 8. Alphabetical iconclass index

The Marburger Index consists of a monument file of photographic reproductions and multiple indexes to the identifying information and Iconclass numbers assigned to artworks. BFM provides online searching of computerized indexes to approximately 30,000 of the total 800,000 images through the STAIRS retrieval system. This online system allows keyword access to Iconclass numbers and captions from the systematic arrangement of Iconclass. Manual searches of the Marburger Index can be performed by consulting the computer-produced microfiche indexes accompanying the monument file. BFM is constantly working to increase the number of images accessible through its online and microfiche indexes.

The microfiche indexes provide access to much more information than could be provided through card or book indexes. Figure 13 shows a portion of the primary iconography microfiche index under Iconclass number "33 C 21 courting." Marburger Index users must first identify this Iconclass number by consulting the alphabetical index and/or systematic arrangement of Iconclass. In this primary iconography index, brief empirical information is provided for photographic reproductions. Once users find relevant empirical information, they can consult the monument file to see images of interest. In the monument file, images are organized on microfiche alphabetically by city, city view, and building type, and each image is accompanied by brief identifying information (see Figure 14). Besides the primary iconography index, the Marburger Index provides subject indexes on microfiche for: (1) secondary iconography (by Iconclass number), (2) alphabetical por-
<table>
<thead>
<tr>
<th>Iconclass Number</th>
<th>Description</th>
</tr>
</thead>
</table>
| 33 C 31          | one-sided courting  
|                  | seduction 33 C 21 9 |
| 31 1             | woman in flight  
|                  | lover chased away 33 C 22 9 |
| 31 11            | leaving something behind (clothing, shoe, etc.) |
| 31 2             | lover deserting woman |
| 31 21            | deserted woman |
| 31 3             | man accused by woman he has cast off |
| 31 4             | man in flight |
| 33 C 32          | pursuit of a woman, prowling -CC- pursuit of a man |
| 32 1             | rivalry of men for the love of women; trying to get the skirt; ‘Rivalita’ (Ripa) |
| 32 11            | rivalry of women for the love of men; fight for the hose; ‘andouille’ |
| 32 2             | shaking lovers out of a tree, with cudgel |
| 32 21            | shaking lovers out of a tree, by throwing things |
| 32 3             | Love’s labours lost (a third person interfering successfully) |
| 32 31            | the succeeding third |
| 33 C 33          | the (difficult) choice |
| 33 1             | shifting out the candidates by men -CC- by women |
| 33 2             | blindfolded choice |
| 33 3             | choice between wealth and youth |
| 33 C 34          | marriage lottery |
| 34 1             | computerized dating |


trait catalog, (3) special catalog for the iconography of art and science, and (4) special catalog for Biblical iconography.

**Common Characteristics of Iconographical Research Collections.** In Figure 15, relevant portions of the matrix of subject access are highlighted for iconographical research collections. These collections share the following characteristics:

1. They were begun by and are currently administered by art history departments and art historians, respectively.
2. They serve art historians and scholars from related academic disciplines.
3. They describe secondary subject matter through subject headings or classification schemes.
4. Automation has been applied to few iconographical research collections.
II. Secondary subject matter

B. Phrase indexing

1. Classification scheme

Figure 20. Pinpointing DIAL's position in the matrix

92 B 3 (+13 Venus): 92 B 4 : 33 C 22.6

(Photograph)

H. Goltzius engraving
Hollstein VIII,137

Leyden, Printroom
photo Netherl.Art
Inst.L nr.23917

Mars and Venus surprised

Figure 11. Descriptive information on DIAL photocards

5. Automation of iconographical research collections has introduced keyword indexing of secondary subject matter.
6. Primary subject matter has not yet been described.
Primary Subject Matter

Users of two visual resources collections, the Repository of Stolen Art (RoSA) and The Historic New Orleans Collections (THNOC), can access artworks for their primary subject matter. These collections contain images that would be found in iconographical research collections. However, subject access approaches in THNOC and RoSA have been developed with the knowledge that users will not necessarily have special training in Christian iconography, theology, or art history.

Repository of Stolen Art (RoSA). The Repository of Stolen Art is currently under development by the Royal Canadian Mounted Police (RCMP), Interpol Branch, Ottawa, Ontario. The objective of RoSA is to promote electronic exchange of information on stolen cultural property in support of RCMP's commitment to suppress theft, receiving, and trafficking in this property. This property includes objects from soils or waters, ethnographic art, military objects, decorative art, fine art, scientific and technical objects, books, records, photographs, and sound recordings (Vance 1984, pp. 377-78).

Figure 16 highlights relevant portions of the matrix of subject access for RoSA. Generally, phrase and keyword indexing is applied to keywords and phrases which represent the primary subject matter of artworks. RCMP collects and enters data into the Canadian Heritage Information Network (CHIN), the government-supported and centralized online cataloging service of the National Museums of Canada. RoSA is searched by detectives, police, and other local, provincial, national, and international law enforcement agencies for identification and recovery of works. RoSA is also searched for graphing networks and patterns of receiving and disposing of works. Online interactive searching is provided by the keyword, Boolean-based PARIS (Pictorial Artifact Retrieval Information System).

Individual RoSA records are built by answers to a yes-no questionnaire about: (1) empirical information—e.g., size and shape of lost object, function, materials, inscriptions, patterns; and (2) primary subject matter. An example of questions from the RoSA questionnaire is given in Figure 17.

The Historic New Orleans Collection (THNOC). The Historic New Orleans Collection documents the history of New Orleans through approximately 150,000 photographs, prints, and paintings. The goal of a project to automate access to THNOC is “to provide subject access to a broad spectrum of users with diverse interests including specialists, library scientists, and iconographers as well as students, the general public, and scholars in other fields” (Sarasan 1984a, pp. 817-18). To accomplish this goal, subject access to primary and secondary subject matter will be provided through pre-iconographical descriptions and
iconographical analyses, respectively. A thesaurus to pre-iconographical descriptions will be developed, and Iconclass will serve as the controlled vocabulary for iconographical analyses. Other subject access approaches to THNOC will mix primary and secondary subject matter in data fields for proper names, places, and events depicted in images, and in controlled vocabulary terms added to the database by THNOC users.

Figure 18 shows relevant portions of the matrix of subject access for THNOC. MINISIS is a relational database management system that will be installed on a Hewlett-Packard minicomputer to offer THNOC users state-of-the-art retrieval capabilities such as free-text Boolean-based searching, range searching, truncation, and access to a multilingual online thesaurus (Sarasan 1984b, pp. 387-406).

**Barriers to Access of Iconographical Research Collections**

Iconographical research collections pose certain barriers to users who need to access the artworks in these collections. Since secondary subject matter is described in iconographical research collections, users must be sufficiently experienced with iconographical analysis to perform a successful search of the collection at hand. “Providing access to collections by primary subject matter can ease the task of users since it requires only one level of interpretation, practical experience, and knowledge of the history of style” (Markey 1986, p. 7). The recent design and development of RoSA and THNOC may be indicative of a shift from secondary to primary subject matter to serve users who are not experienced with iconographical analysis and to take advantage of the increased number of subject access points that can be easily accommodated by computer technology.

Subject access to iconographical research collections varies from one collection to the next. Differences between systems with regard to
subject access mean that users must familiarize themselves with the subject headings, keywords, classification scheme, etc., employed by the collection at hand. Compounding this variation in subject access approaches are:

1. Subject authority files of the principal iconographical research collections have not been published and made readily available in printed or machine-readable form.
Figure 14. Descriptive information on microfiche images in the Marburger index

Figure 15. Pinpointing iconographical research collections in the matrix

2. The secondary subject matter of existing iconographical research collections is somewhat limited to the style(s), historical period(s),
and/or geographical area(s) of the original collection. For example, Iconclass is closely associated with Dutch art and the Index of Christian Art is associated with Western Christian art from 400 to 1400 A.D.

3. Subject heading lists have proliferated since the mid-1970s. Examples of lists published in this time period are the subject headings list used at the Centre National de la Recherche Scientifique, the classified subject headings used at the Yale Center for British Art, the classified subject heading list of the National Museum of American Art, and the subject headings for Canadian iconography used at the Public Archives of Canada (Garnier 1984; Yale Center for British Art 1979; National Museum of American Art 1983; Castonguay 1981, pp. 269-80).

Identifying information about artworks varies from one iconographical research collection to the next. Every collection provides identifying information but there the similarity ends. Differences between systems with regard to such information will require users to search for a known artwork under variant forms of artists' names, institution names, dates, etc. The publication of cataloging rules for describing graphic materials, *Graphic Materials: Rules for Describing Original Items and Historical Collections* (Betz 1982), and the availability of a machine-readable cataloging (MARC) format for representing the identifying information of graphic materials may foster consistency among collections (Online Computer Library Center 1986). The Art & Architecture Thesaurus (AAT) will eventually make a controlled vocabulary available for expressing style, geography, materials, and techniques connected with artworks (Barnett 1986, p. 135).

Efforts to establish a centralized cataloging system for the visual arts have failed or been disbanded—e.g., Museum Computer Network, Museum Prototype Project. Two results of failed efforts are the creation of separate databases within a single centralized system and the proliferation of separate local databases. Also, these databases vary from other databases with regard to the identifying information and subject cataloging assigned to each entry.

**Future Directions**

Separate collections and specialized databases will proliferate as long as there is no single organization responsible for establishing and maintaining rules, guidelines, and formats for identifying information and subject cataloging. As long as financial support and governance comes from art history departments, programs, and institutions, access to collections will be provided for scholars through *secondary subject matter*.

If a centralized system is successfully established, the system will have to take advantage of data and functions that can be shared among institutions supporting iconographical research collections and other artwork collections. Identifying information for artworks and authority
Check all descriptions that seem true, even if they are not consistent.

A. Shape
B. Surface
C. Human faces and figures
   C1 Entire human figure
   C2 Portrait head or bust, partial figure
   C3 Torso shown without head
   C4 Other incomplete figure (e.g., sketch of eye, hand)
   ⋮
D. Individual and types
   D1 Christ as child
   D2 Christ as adult
   D3 Christ with cross, crucifixion
   ⋮
   D19 Military person, warrior, soldier, etc.
   D20 Musician, singer, dancer, actor
   D21 Wearing plume or feathers
   ⋮
E. Activities
   E1 Procession, parade, caravan
   E2 Eating, drinking
   E3 Smoking
   ⋮
F. Animals
G. Setting
H. Detail

Figure 16. Pinpointing RoSA in the matrix

Figure 17. RoSA Questionnaire

data for iconography, artist and school names, styles and periods, geography, building names, and institution names are data that can be shared among iconographical research collections, museums, art slide and picture collections, and academic institutions. The model of sharing data among institutions will be the reverse of the library automation model—i.e., institutions will add entries first to their own local systems and then add these entries to the centralized system.

As long as there is variation among collections with regard to identifying information and subject cataloging, the burden of access is
placed on users of iconographical research collections. At present, users must become proficient in the use of iconographical research collections that employ different subject vocabularies. It can be expected that when iconographical research collections are transformed from manual, card-based files to online databases, users will have to become familiar with many different online retrieval system interfaces and access techniques, especially in view of the proliferation of separate, specialized databases.

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The Museum Prototype Project:  
A View from the Library

NANCY S. ALLEN

INTRODUCTION

This paper focuses on the Museum Prototype Project (MPP) which was formed and funded by the J. Paul Getty Trust in 1983 (participating museums were the J. Paul Getty Museum; Solomon R. Guggenheim Museum; The Museum of Modern Art; the Metropolitan Museum of Art; Museum of Fine Arts (MFA), Boston; National Gallery of Art; The Art Museum, Princeton University; and The Hood Museum, Dartmouth College). Specifically described will be the development and outcome of this collaborative effort. Being a member of the MPP team for the Museum of Fine Arts, Boston, allowed this author to work within the parameters of the project as well as to speculate about the role of librarians in the development of art history information systems.

BACKGROUND: THE J. PAUL GETTY TRUST AND THE PROTOTYPE PROJECT

By 1979, trustees of the J. Paul Getty Museum showed a keen interest in understanding the needs of specialists in the field of art. They began to realize their responsibility for administering what then promised—and subsequently proved—to be an enormous endowment set up by J. Paul Getty to support the museum he built for his personal art collection. Given the physical limitations of the Getty Museum building in Malibu, California, they realized it would be impossible to expend enough endowment income annually on the museum alone to maintain the nonprofit status of the trust. During the 1980 annual
meeting of the American Association of Museums meetings in Boston, representatives of the J. Paul Getty Trust interviewed museum curators, conservators, and educators in order to broaden their knowledge of the field of art and test the potential of program and project ideas. They were clearly aware of the possible deleterious effect the Getty Trust's buying power might have on the international art market, yet their ideas were conceived on a grand scale. The trustee who interviewed this author raised an extraordinary question: How would the creation of a world-class art library on the west coast benefit and/or detract from art historical research? From my perspective, this was a naïve proposal because great libraries are not the result of massive book buying alone; there is no substitute for decades of carefully orchestrated collection development. In less than ten years, however, the great scope and depth of the Getty Library has proven that the author, not the trustee, was naïve (Failing 1984; Loomis 1985; Stevens 1984).

J. Paul Getty died in 1976 but the bequest was not settled until March 1982, shortly after Harold Williams, a former head of the Securities and Exchange Commission, was named president of the trust. He and fellow trustees began immediately to expand the trust's operations, planning, as he said, to “develop programs going beyond the reach of others and addressing needs not otherwise likely to be met” (Failing 1984, p. 66). Part of the impetus to expand activities beyond those of the Getty Museum alone was certainly the need to expend annually, as an operating trust, 4.5 percent of the market value of its endowment. In 1982, with the endowment at $1.4 billion, the spending requirement was $60 million (Englander 1982).

Within the next two years, John Walsh was hired to direct the J. Paul Getty Museum, Kurt Forster was selected to head the new Center for the History of Art and the Humanities, and the Art History Information Program (AHIP) was formed. The aim of AHIP was the development of an integrated computerized information system to support international art historical research. According to Nancy Englander, then director of program planning and analysis, the Getty Museum was “the only institution in a position to take an international overview of common problems and discover what might be possible in terms of integration” (Hannon 1985, p. 4).

AHIP, which became an interdivisional unit of the trust, began to support several existing documentation projects including the Avery Index to Archeological Periodicals, the Art and Architecture Thesaurus, The Art and Architectural Technical Abstracts, the Census of Ancient Art Known to the Renaissance, the Provenance Index, and RILA (International Repertory of the Literature of Art) (The Getty Art History Information Program Newsletter 1985; The J. Paul Getty Trust 1986).

One of the programs initiated by the Getty Trust, the Museum Prototype Project, was established to provide a broader forum for the discussion of issues pertaining to computerization of art museum col-
lections. This project was officially announced by Nancy Englander in the fall of 1982 at the annual conference of the Museum Computer Network in San Francisco, California. Six U.S. museums were initially invited to participate in this unique cooperative computerization effort, with two university museums soon added to the project.

**MPP Formulation and Goals**

Each museum was free to assign staff to form the core museum personnel for the project, and the number and positions of team members varied from institution to institution. Between two and five people were involved from each museum with a total of approximately twenty-five working on the project at any given time. Included were administrators, registrars, curators, data processing managers, and, in the case of the Museum of Fine Arts, Boston, a librarian. The time commitment required by the project caused museum staff and administrators to realize the need for additional support staff for the project, a request granted by the Getty Trust. Each institution individually tailored the job description and interviewed and selected its own Getty staff member. Professional qualifications varied widely but most job descriptions required a background in art history rather than data processing. Salaries for the positions were separately negotiated between each institution and the trust depending on the level of staff sought; most but not all of these MPP staff members were employees of the Getty Art History Information Program.

Marilyn Schmitt, program officer, became the Getty Trust coordinator of the MPP; her doctorate in medieval art history gave her the background to formulate the scholarly expectations for the project. William Y. Arms, vice-provost of computing and planning at Dartmouth College, became the part-time project director in fall 1983, to handle administrative and technical matters. His experience included the development of a sophisticated academic and library computing environment for Dartmouth College. His technical experience complemented the art historical and museological strength represented by the Getty staff and MPP members.

Arms visited each museum to assess the unique characteristics of its collection. By spring 1984 the MPP structure was in place and the group began meeting regularly every other month. Meeting locations rotated among each participating institution. From the assigned staff, a primary contact was identified by each museum to facilitate communication and serve as an official institutional spokesperson. Agendas for meetings were established by Arms in consultation with these primary contacts; minutes were taken by one of the MPP Getty-funded staff members. An outside consulting firm, Willoughby Associates, was hired to assist in preparing the data fields for the project.

In September 1984, Arms presented a paper on the history and status of the Museum Prototype Project at the Second International
Conference on Automatic Processing of Art History Data and Documents held in Pisa. The original aim of the MPP was to build an integrated research system which merged various Getty Trust-sponsored projects with selected external databases. In Pisa, more realistic goals were presented. These goals were:

1. To establish a standard cataloging format for paintings.
2. To provide a merged, shared catalog of Western paintings.
3. To build a database of artists represented in that catalog (Arms 1984, p. 28).

By mid-1984, participating museums had drafted specific project goals and refined the scope of the project. The goal statement was never endorsed which was due less to disagreement among MPP members than to the group’s recognition of the enormity and complexity of the document. However, the refined goals, which follow, elaborated upon those announced in Pisa and still served as guiding principles for the project.

**Computer Record Formats**

1. To develop a standard for exchanging information on Western paintings.
2. To strive for agreement on record formats with other art history and museum automation projects.
3. To define data elements capable of containing information normally found in the files of museum curators and registrars.
4. To consider extension of these data elements to other types of objects.
5. To plan for flexible retrieval of information.

**Content**

1. To coordinate the content of catalog records to facilitate data entry and retrieval.
2. To develop or adopt controlled vocabularies or thesauri for descriptive cataloging and proper names.

**Shared**

1. To enter into a shared catalog all data about Western paintings in registrarial and curatorial files of a nonconfidential nature.
2. To mount the shared catalog on a system selected for ease of data sharing, maintenance, and searching.

**Collections Management System**

1. To develop automated collections management systems as needed by each institution.
2. To analyze links between shared catalog and automated collections management systems.

**Development of the Project**

Work progressed simultaneously on many aspects of the Museum Prototype Project. Considerable energy was devoted to the group’s general education about computers including the basic concepts of word processing, data processing, report generation, and relational
databases. This helped to eliminate confusion over standard computer terms and concepts which formed the vocabulary of the discussions. Concurrently, a survey of certain existing art documentation projects began. This was accomplished by visits from key personnel of major art information systems. Greg Spurgeon, database manager of the National Gallery of Canada, described his institution's participation in the Canadian Heritage Information Network (CHIN) and David Bearman of the Office of Information Resource Management, Smithsonian Institution, discussed the design and structure of the institution's automation program. Data dictionaries and other types of project information were frequently circulated which also helped familiarize members of the MPP with the issues relating to automated art documentation (Humanities Data Dictionary 1984).

Occasionally, short, informal papers or presentations were prepared by individual members of the MPP group. This author discussed the Art and Architecture Thesaurus (AAT) in June 1985. The AAT is a hierarchically structured vocabulary with potential for use in cataloging bibliography, archives, visual resources, and art objects as well as indexing and abstracting art information. This report proved to be an introduction to the concepts of authority control for some MPP members and to the process of building a controlled vocabulary for others. Another paper, presented by Phyllis Floyd, art historian and MPP research curator at Dartmouth College, explored the problems of establishing the conventions for dates in an automated system.

Lenore Sarasan, president of Willoughby Associates, Ltd., presented a paper on computerized collection management which provided both a philosophical and practical view of the topic. She identified the need for two basic types of files. One, a queriable data file, contains data on the individual objects and can be searched and sorted to provide reference information. In 1983, according to Sarasan, most of the 600 automation projects underway in American science, natural history, and art museums were this type of file. The second type of file, according to Sarasan, is the collection management system which integrates and tracks such day-to-day functions as acquiring, accessioning, cataloging, locating, and loaning works of art. Her experience led her to question three of the basic assumptions about computerization of museum collections: that comprehensive amounts of information need to be entered about each object; that museum information is static and unchanging; and that curators spend the majority of their time answering research questions. For those contemplating computerization she recommended: Identify a small number of fields of information for phase one of a project; if carefully selected they will answer the majority of reference questions and provide experience with querying and manipulating data which can prove to be indispensable in planning later project phases. Select a system which offers easy correction and maintenance features because object information is dynamic and changing. Focusing
on computerization of collection management functions which constitute much of the time-consuming, repetitive work for curators and collection managers (Sarasan 1984, pp. 58-66).

The MPP group indeed recognized that collections management issues were a high priority within each institution but grew to appreciate that it was perhaps a more difficult component to standardize than an object record itself. Collections management involves information about the acquisition, storage, loan, insurance, exhibition, conservation, and, occasionally, deaccessioning of art objects. A computerized collections management system could produce forms, labels, and reports which would automatically add greater speed and efficiency to daily operations while reducing the amount of clerical and repetitive work in museums, but the museums varied widely in their controls and paperwork surrounding these functions.

In spring 1985, each museum began to examine its own collections management practices. The process of documenting in detail each step of every collections management procedure was a laborious one for the registrarial members of the MPP. Comparison of the different types of forms alone demonstrated how difficult it would be to develop a prototype system which also provided support for widely varying local requirements. Automated collections management was put aside as a realistic goal for the MPP, but by the spring of 1986 the J. Paul Getty Museum had developed a preliminary system independently. (Collections management systems have been released by several commercial computer vendors including ARGUS by Questor Systems, 844 Colorado Boulevard, Los Angeles, CA 90041; ARTIS developed for the Art Museum Association of America by the Williamson Group, 129 Mt. Auburn Street, Cambridge, MA 02138; ERROS by Stipple Database Systems, Ltd., Warren Farmhouse, Thame Lane, Culham, Nr. Abingdon OX14 3DT, England, and MILAM and MIMSY developed by Willoughby Associates, Ltd., 2800 Sheridan Place, Evanston, IL 60201.)

**DATA DEVELOPMENT**

Work on identification and definition of the data fields—the information elements to be included in the system—was a major focus of the MPP. In spring 1984, Willoughby Associates distributed a Data Field Compendium to be studied by the group. MPP members also looked at the data fields of existing projects such as the Data Dictionary of the Canadian Heritage Information Network (CHIN). Lists of potential fields were drawn up, reviewed by MPP members with their institutional colleagues, and revised at MPP meetings. Many problems relating to semantics surfaced. For instance, what one institution might refer to as the materials of a painting were referred to by another as medium and support. Also, in order to search on date ranges for artists or works of art without exact known dates, the date fields needed breaking down into earliest known date and latest known date.
During the laborious data discussions, plans for mounting the information on an existing database were also considered. William Arms suggested using the Research Libraries Group (RLG) database, the Research Libraries Information Network (RLIN). While he recognized this was unlikely to provide a long-range answer to the computerization of museum information, he felt it had potential for the prototype project because it was a tested database which was successfully managing several million bibliographic records. This suggestion proved unsatisfactory to the curatorial members of the MPP because they were convinced that a library system, using the Machine-Readable Cataloging (MARC) format, could not accommodate the complexity of the museum catalog records in spite of the fact that Arms had produced a MARC mapped version of a preliminary set of data fields in February 1984.

THE PC PROJECT

During summer 1984, as the deliberation over computer systems continued, the group decided to launch a scaled-down, test phase which was referred to as the PC Project. The data field lists were examined and sixty-three basic, most significant, fields were selected for the test (see Appendix A). Willoughby Associates, Ltd. was contracted to implement the PC Project. After months of evaluating the capabilities of various software packages, the MPP chose Informix software to run on IBM-XT personal computers. The plan was for each museum to have a separate database of its Western paintings collection structured by the limited fields of the PC Project and maintained by its own IBM-XT. The Metropolitan Museum and the Museum of Fine Arts, Boston, contributed information about their European paintings collections only.

To enter the information into the computers, Willoughby Associates proposed their method of data conversion called “rapid data entry” (Sarasan 1984, p. 4). Willoughby prepared for data capture by visiting each museum and examining the existing manual files to identify the best file from which to gather the information required to produce a record. Working with AHIP Systems Analyst Paul Lowe, they used software for the data capture process which allowed information from certain fields to be repeated from record to record. Thus if inputting records for twenty paintings from one donor, the donor’s name, method of acquisition, and date of gift did not have to be re-entered for each record. In addition to the obvious time savings, this method decreased the number of typographical errors. The inputting was done by high level staff—Sarasan and Sunderland—rather than by clerical workers. Sarasan maintained that their expertise with museum data would allow them to build consistency into the data where minor discrepancies of syntax or punctuation appeared in the manual records. They worked intensively often inputting 1,000 painting records in as little as one day. This speed did not, however, compromise the accuracy
of the data. They employed a method of proofreading by which errors could be spotted easily. They worked from vocabulary frequency lists which put in alphabetical order all the terms for a specific data field along with an indication of the number of times each term was used. Thus if the name Picasso were misspelled it would appear twice on an alphabetical printout of all the names in the Artist Last Name field and could be easily corrected. In some instances, rapid data entry was done off site. Such was the case with the Museum of Fine Arts, Boston, where information was input from a recently published catalog of its European paintings collection rather than from card files in either the registrar or curatorial offices (Murphy 1985).

**Data Analysis**

In 1985, comparative analysis of data was identified as a preliminary step to merging the paintings records of all eight museums. Completion and installation of the European paintings PC database phase of the project in fall 1985 allowed the Museum Prototype Project to focus on this process. Teams of two to three people studied the problems and issues surrounding the data in the following fields: inscriptions/markings, medium/support/materials/technique, dates, nationality and school, names, and painting titles. Vocabulary frequency lists from each of these fields were printed out from the PC databases and supplied to the appropriate team. The cataloging manual of each museum was also supplied to help interpret why and how each museum applied terms and followed certain conventions for recording information. Each team was to make a detailed comparison of the similarities and differences in the data. The results of these separate analyses are being combined into a single study by Patricia Harpring, Getty research associate at the National Gallery. The final result is to be a report that includes the results of these analyses and a history of the Museum Prototype Project written by Marilyn Schmitt (at the time of this article's writing, the publication schedule for the book is unknown).

Monique van Dorp, Getty research associate for the MPP at the Museum of Fine Arts, Boston, wrote the paper on medium, support, and technique. First, the fields under discussion were defined as follows using the MPP Data Dictionary—Material(s): The applied media used in the creation of the work. Support(s): That to which the elements listed in the Material field are applied. Medium for Display: The materials, technique, and support of a work as defined and used by the institution.

Before doing comparative analysis, the data of each museum had to be examined from a number of views. What was the source of the information in the MPP database? The varied answers included individuals with the responsibility of documenting objects and the authority to resolve vocabulary matters, the object records themselves located in the Registrar's Office and/or the curatorial department, and, all too infre-
quently, authority files maintained by the institution to help attain and maintain vocabulary consistency.

Using alphabetical printouts of the four data fields under consideration, certain conventions could be grasped immediately. These included punctuation, word order, and connectors such as "and" and "or." Although it was clear that rules and standards had been followed, the printouts in many cases also revealed inconsistencies within institutions as the following examples demonstrate:

**Punctuation:**
- "Oil colors, freely mixed with turpentine, on canvas"
- "Oil colors freely mixed with turpentine with traces of watercolors and pastel over pen-and-ink drawing in paper, mounted on canvas"

**Singular and plural forms:**
- "Pastel on paper"
- "Pastels on paper"

**Prepositions employed to indicate the relationship of terms:**
- "Fresco, mounted on canvas"
- "Fresco, transferred to canvas"
- "Fresco, transferred to canvas and attached to wood panels"
- "Tempera and gold transferred to canvas, laid down on wood"

**Different terms used synonymously:**
- "Oil on composition board"
- "Oil on composition panel"
- "Oil on pressed board"

**Proper nouns interspersed with generic terms:**
- "Oil on canvas with Weber Picture Cobal Varnish, Wax Finish"
- "Tempera with oil varnish glaze on masonite"

**Proper nouns displayed in both upper and lowercase:**
- "Oil on incised Plexiglas"
- "Oil on masonite"

**Uncertainty expressed in various manners:**
- "Oil on copper?"
- "Oil, perhaps over tempera, on wood"
- "Tempera and/or oil and silver on wood, gold ground"
- "Watercolor [gouache?], and charcoal on paper"

**Spelling variations:**
- "Casein"
- "Cassein"

**Levels of specificity:**
- "Oil on panel"
- "Oil on walnut panel"

The next phase of the work focused on a comparative analysis of the data across the eight museums of the project. The work was supported by the merger of the eight PC databases on the AHIP Intelligent Database Machine (IDM) (Levine 1985, p. 3). Term sheets were created for each separate word with a list of which institutions used the term. The
sheets were then sorted with synonymous terms grouped together. This process did not, however, demonstrate whether or not any given term was used consistently by the institutions. Some identical terms did not carry the same meaning across all the museums. Although spot checking of this phenomenon was possible, it was impossible to verify every term against the actual object. Even if that could be done, identifying variations in usage would not provide license to change the vocabulary of any museum whether it was assigned on the basis of scientific analysis or scholarly speculation.

The synonymous terms were compared in the next phase of the analysis and the term most frequently used within any synonymous group was identified. Further study of vocabulary was limited by time, but, to extend this analysis beyond the eight museums, comparison to usage in scholarly literature could have been undertaken. Further, the thoroughly researched Art and Architecture Thesaurus stands ready to serve as the controlled vocabulary for art automation projects whether they be cooperative or individual initiatives.

Conclusions about data drawn after compilation of all the data analysis reports await publication of the project by the Getty Art History Information Program. However, the exercise of data analysis on the medium, support, and technique fields does confirm that the greater the consistency within an institution in selecting terms and applying cataloging conventions, the greater the possibility of consistent retrieval of information in a shared environment.

THE PROJECT CONCLUDED

In January 1985, Michael Ester became the first director of the Getty Art History and Information Program. In October 1985, he announced that the MPP would cease operation as an active consortium in December 1986. Although issues central to information sharing such as project goals, record structure, cataloging conventions, and data standards were actively discussed throughout the duration of the MPP, the group's geographical dispersion and cumbersome size were identified as impediments to progressing beyond the PC phase. Ester observed that: "As presently defined and constituted, the Museum Prototype is not serving the purpose for which it was designed" ("Museum Prototype to End in '86" 1986, p. 7).

Although the MPP fell short of the ambitious goals identified in its early phase, the project is viewed enthusiastically and appreciatively by the Museum of Fine Arts, Boston. Valuable professional contacts were established with colleagues within the MPP as well as with those working on automation projects at other institutions. The members of the MPP team from the museum received an education on issues surrounding computerization of works of art. The bimonthly meetings offered a forum to discuss the needs of our own institution in an outside setting uninterrupted by the demands of daily museum business. This
opportunity to learn from one another and to share our knowledge of newly published information and developments in museum automation in both the commercial and nonprofit sector has been continued within the MFA. Short meetings of an informally organized computer committee (CC), held twice a month, are attended by the MPP team and others in the museum eager to prepare for the inevitable automation of the vast and varied collections of the institution. In the tradition of the MPP, presentations on other projects, specially designed software, and hardware developments which improve storage of visual documentation are arranged. Visits to projects within the area are made by the Computer Committee and necessary travel outside New England for one member of the CC offers the impetus for formal visits to projects in other cities for both that member and others on the CC.

On a more specific level, the Museum Prototype Project PC database proves its worth in the MFA in various ways. As a model, it demonstrates to the museum family of curators, administrators, support staff, and trustees some basic capabilities of computerized management of art information. Because the database contains records of our own collection, it better captures the imagination of both the uninitiated and the computer skeptics among us. The reinstallation of the museum's Evans Wing painting galleries after renovation began shortly after the PC database was installed and the data proofread. Although our database consists only of information from a published source, the ability to manage that information on a computer provided invaluable time savings. A report format was created which sorted specific fields of information in the database in the standard format for gallery labels. This information was provided to the printer on diskette which eliminated the need to spend time typing label copy or on the labor intensive work of proofreading the text for the European paintings. The time expended on these same tasks for the American paintings provided a telling comparison of the costs of manual v. electronic production of labels. The PC database has also been utilized in the preparation of grant proposals. Lists of portions of the collection can be quickly created, printed, and appended to funding requests without proofreading, saving both curatorial and clerical labor.

Perhaps the single most important and tangible benefit of the Museum Prototype Project to the museum was the impetus it provided to create a new position—that of computer documentation coordinator. The responsibilities of this position include the development, implementation, and maintenance of existing and future computerized art information systems. Monique van Dorp, Getty MPP research associate at the MFA accepted the position in January 1987. Her experience on the MPP and leadership capabilities will form an important component in helping the museum reach its long-term commitment to computerize museum records and object information.
Although the active phase of the Museum Prototype Project has ended, the commitment to support art historical scholarship through the development and maintenance of computerized database projects worldwide continues at the J. Paul Getty Trust. Clearly there is need for the trust, or some other cohesive body, to offer assistance in the study of some of the most critical issues of museum automation—i.e., systems management, vocabulary and cataloging standards, interrelationships of information, methods of capturing both scholarly inference and debate, and national and international communication and cooperation.

CONCLUSION: OBSERVATIONS ON MUSEUM AND LIBRARY AUTOMATION

As a museum librarian, issues of automation in both library and art collections are this author's constant focus of attention and study. Is there a relationship between computerizing libraries and museums? What might the role of the librarian be in documenting works of art on computer?

In the arena of art information systems, the Getty Art History Information Program has established an office of vocabulary coordination to examine the vocabularies used across six of its documentation projects. Presumably this will help provide consistency to the vocabularies and links between the various terminologies, a process very similar to (in library language) authority control. In the arena of bibliographic networks, the Research Libraries Group has established the Program for Research Information Management (PRIMA) to "explore areas of research information valuable to scholars, not currently managed by libraries...." A vast array of information resources critical to scholarly research could be targeted by the program including archaeological field notes and museum objects ("The Program for Research Information Management" 1987, pp. 11-12). Are the worlds of art and bibliographic automation converging?

While I have no answers to these broad questions, experience on the Museum Prototype Project has led this author to identify certain points of comparison between library and museum automation which are summarized in Appendix B. The points include the purpose of automation, the difference between books and objects, cataloging formats, and controlled vocabularies. Whether correct or incorrect, the observations will serve well if they cause librarians to consider both the parallel and divergent aspects of library and museum automation and if they encourage librarians to lend the benefit of their expertise in handling bibliographic information to the challenge of automated management of art documentation.
APPENDIX A

Museum Prototype Project Getty Art History Information Program Proto System Data Fields

MUSEUM ACRONYM
The name of the institution responsible for the object, the holding institution. Not necessarily the owner.

ACCESSION NUMBER FOR DISPLAY
The identification number assigned to an object by the institution responsible for it.

YEAR OF ACQUISITION/ACCESSION
The year an object was acquired by or accessioned into the collection of the institution.

ACCESSION SEQUENCE NUMBER 1
The order in which an object, or a group of objects, was received into the collection in a particular year.

ACCESSION SEQUENCE NUMBER 2
A subsidiary sequence number used when more than one object is accessioned in a particular lot.

PART(S)
This field indicates that the object has multiple parts or is part of a larger work.

LETTER CODE DESIGNATOR
An alphabetic character(s) in an accession number having specific coded significance to the institution.

LONG TERM LOAN
This field indicates that the object is on long term loan to the institution.

PREVIOUS ACCESSION NUMBER
A previous accession number assigned by the responsible institution or by a previous owner to the object, but is no longer in use.

INPUTTER INITIALS
The initials of the inputter.

DATE OF ENTRY
The date of entry or the date of the most recent change to the record.

NUMBER OF ARTISTS
This field identifies the total number of known artists who worked on an object. Although only two may be identified by name in INFORMIX.

ARTIST DATES ACTIVE FLAG
This field indicates that the years recorded in the ARTIST EARLIEST DATE fields reflect dates of activity rather than known birth and death dates.

ARTIST RELATOR
This field indicates the relationship of artist to object if more than one artist is involved.

TITLE
The title of the work as used by the institution for reports, lists, etc.

LONG TITLE FLAG
Flag indicating TITLE exceeds 150 characters.

DATE OF EXECUTION
The date of the work's execution as determined by the holding institution.

EARLIEST DATE OF EXECUTION
The earliest date of execution of the work, whether known or approximate, expressed in a form that is range searchable.

LATEST DATE OF EXECUTION
The latest date of execution of the work, whether known or approximate, expressed in a form that is range searchable.
APPENDIX A (Cont.)

*Museum Prototype Project Getty Art History Information Program Proto System Data Fields*

MEDIUM FOR DISPLAY
The materials, technique, and support of a work as defined and used by the institution.

LONG MEDIUM FLAG
Flag indicating MEDIUM exceeds 150 characters.

MATERIAL(S)
The applied media used in the creation of the work.

LONG MATERIAL(S)/SUPPORTS FLAG
Flag indicating MATERIAL(S) or SUPPORT(S) exceeds 60 characters.

SUPPORTS
The support(s) to which the elements listed in the MATERIAL field are applied.

DIMENSIONS
The dimensions of the object, including shape if not rectangle or tondo, as defined and used by the institution.

LONG DIMENSION FLAG
Flag indicating DIMENSION exceeds 200 characters.

ARTIST DISPLAY
For unknown artists, can include name variations. For known artists, the ARTIST DISPLAY NAME may include nationality, school, and life dates or active period. This field intended for display purposes.

LONG ARTIST NAME FLAG
Flag indicating that the ARTIST DISPLAY NAME field exceeds 80 characters.

ARTIST BIOGRAPHY FOR DISPLAY
The artist’s nationality, school, and life DISPLAY dates or active period as defined and used by the institution. For display purposes.

LONG ARTIST BIOGRAPHY FLAG
Flag indicating ARTIST’S BIOGRAPHY FOR DISPLAY exceeds 80 characters.

ARTIST LAST NAME
The name under which the institution in its records indexes or alphabetizes the artist. This would be either the artist’s last name, or where appropriate, the name by which s/he is commonly known—the index name.

ARTIST FIRST NAME
The artist’s first and middle names.

ARTIST TITLE
Any personal title or title of rank normally part of an artist’s name.

ARTIST QUALIFIER
A word or phrase qualifying an artist’s name and usually prefixing it.

ARTIST NATIONALITY
The nationality of the artist as defined by each institution.

ARTIST SCHOOL
The school of the artist as defined and used by each institution as part of the artist’s identification.

ARTIST EARLIEST DATE (YEAR OF BIRTH)
The year of birth, first recorded date, or earliest date of approximation for an artist’s active period.

ARTIST LATEST DATE (YEAR OF BIRTH)
The year of death, last recorded date, or latest date of approximation for an artist’s active period.
APPENDIX A (Cont.)

Museum Prototype Project Getty Art History Information Program Proto System Data Fields

SIGNED FLAG
Flag indicating that the maker of the object has signed the work.

DATED FLAG
Flag indicating that the maker of the object has dated the work.

INSCRIBED FLAG
Flag indicating that the work bears an inscription or inscriptions other than the artist's signature and/or date.

INSCRIPTIONS
A display field for the transcription of all inscriptions on the work, whether by the artist or by others, with locations of inscriptions designated.

LONG INSCRIPTION FLAG
Flag indicating INSCRIPTION exceeds 200 characters.

DIACRITICS FLAG
Flag indicating that diacritics appear in the record.

CREDIT LINE FOR DISPLAY
The credit line maintained by the institution for the object.

LONG CREDIT LINE FLAG
Flag indicating CREDIT LINE FOR DISPLAY exceeds 200 characters.

METHOD OF ACQUISITION
The method by which the object was acquired.

NUMBER OF DONORS
This field indicates the total number of donors giving a work, whereas the names of up to three donors only can be recorded in the available DONOR NAME fields.

DONOR LAST NAME
The last name of the person, organization, or group which donated the work to the institution.

DONOR FIRST NAME
The first name of the person, organization, or group which donated the work to the institution.

DONOR TITLE NAME
The title part of the name of the person, organization, or group which donated the work to the institution.

NUMBER OF FUNDS
This field identifies the total number of funds used to purchase a work.

FUND NAME
The name of the fund from which the work was purchased. The system can record only up to three FUND NAMES.

LOCATION
The location of the object, either within the museum or outside it.

FLAG 1 - Execdate
Flag indicating that the source inscribed date for the date of execution is the date inscribed by the artist on the work.

FLAG 2 - Object has parts
Flag indicating the object has more than one part, whether or not reflected in the format of the Accession Number.

FLAG 3 - Record contains special characters
Flag indicating that the record contains special characters (besides diacritics) which cannot be transcribed in INFORMIX.
APPENDIX A (Cont.)

Museum Prototype Project Getty Art History Information Program Proto System Data Fields

FLAG 5
Flag undefined at present. For local use.

FLAG 6
Flag undefined at present. For local use.

FLAG 7
Flag undefined at present. For local use.

FLAG 8
Flag undefined at present. For local use.

COMMENT
Field used in ENTRYPOINT to record questions or problems during initial data entry.
### APPENDIX B

**Comparison Between Automation of Library and Museum Collection**

<table>
<thead>
<tr>
<th>LIBRARY</th>
<th>MUSEUM</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HISTORY OF COOPERATION</strong></td>
<td>No model for standard manual cataloging format or technical cooperation</td>
</tr>
<tr>
<td>Strong tradition of cooperation and adherence to models established at Library of Congress</td>
<td></td>
</tr>
<tr>
<td>Professional degree from accredited graduate school provides some common background</td>
<td>Variety of museum professionals with scholarly qualifications including art historical degrees scientific training, professional experience and/or training in museum registration, design, publications, development</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LIBRARY</th>
<th>MUSEUM</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PERSONNEL</strong></td>
<td></td>
</tr>
<tr>
<td>Networks supporting shared cataloging (OCLC, RLIN) tended to precede local systems which merge cataloging with other standard library functions of acquisition, serials maintenance, fund accounting, and circulation</td>
<td>Development has tended to be in separate institutions establishing isolated systems rather than in cooperative networks within U.S.; notable examples of networks outside U.S. include: Canadian Heritage Information Network; Museum Documentation Association in the United Kingdom; and The Inventaire Générale des Richesses Artistiques de la France in France</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LIBRARY</th>
<th>MUSEUM</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HISTORY OF AUTOMATION</strong></td>
<td></td>
</tr>
<tr>
<td>Automated systems developed to offer benefits of shared cataloging and on-line access to authorities information</td>
<td>For unique objects, shared cataloging is not applicable and much of the community sees cooperative authorities as unnecessary or undesirable</td>
</tr>
<tr>
<td>Primary purpose is bibliographic access</td>
<td>Automation supports research, education, conservation and management</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LIBRARY</th>
<th>MUSEUM</th>
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</thead>
<tbody>
<tr>
<td><strong>SYSTEM CHARACTERISTICS</strong></td>
<td></td>
</tr>
<tr>
<td>Professionals undaunted by bibliographic networks which tended to be &quot;unfriendly&quot; and cumbersome; local, integrated systems increasingly &quot;friendly&quot; allowing direct patron access</td>
<td>Professionals are visually oriented user group which required from the start systems with high degree of accessibility</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LIBRARY</th>
<th>MUSEUM</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RECORD CHARACTERISTICS</strong></td>
<td></td>
</tr>
<tr>
<td>Books have title pages which provide information in written form</td>
<td>Objects generally lack self-evident information; cataloging relies on scholarly interpretation</td>
</tr>
<tr>
<td>All information in traditional manual records is maintained in standard automated systems</td>
<td>Manual files contain descriptive factual and narrative information; replicating such records is an impractical goal</td>
</tr>
</tbody>
</table>
APPENDIX B (Cont.)

Comparison Between Automation of Library and Museum Collection

Bibliographic records are seldom a means to an end; they are primarily a finding aid

Art records are often a surrogate for the object itself; some research can be done directly from the database

RECORD MAINTENANCE

Generally, once cataloged there is relatively little maintenance for such operations as location changes, loan, insurance variations, exhibition, and conservation; title, attribution, medium, and date of works also change

Object records undergo constant change after acquisition for such operations as location changes, loan, insurance variations, exhibition, and conservation; title, attribution, medium, and date of works also change

STANDARDS: CATALOGING RULES

Anglo-American Cataloging Rules-AACR developed in 1967; AACRII, 1978

No tradition of standardization

STANDARDS: COMMUNICATION FORMAT

Machine-Readable Cataloging-MARC; study initiated in 1964; implemented at Lib. of Congress, 1970

No standardization

STANDARDS: VOCABULARY CONTROL

Library of Congress Subject Headings, 1898

No tradition of standardization; developing vocabularies include Art and Architecture Thesaurus and vocabularies growing out of manual and computerized projects

Using standardized communications format, MARC, library systems can/will communicate with one another

Absence of any standardization makes system to system communication improbable; following the model of CHIN communication could occur for selected, limited data with bulk of information cataloged and maintained on local, nonstandard systems

The vendors of off-the-shelf systems, rather than art historians, may provide the standards


REFERENCES


An Art Information System:  
From Integration to Interpretation  

PATRICIA J. BARNETT

INTRODUCTION

Before addressing the components of an integrated art information system in a model setting—i.e., an art museum—one must draw a comparison between bibliographic systems and those systems being planned for art objects, and explore the qualities of the bibliographic and object entities themselves that contribute to the similarities and differences of the data describing them. More data, for example, may be required to describe adequately an object for purposes of research than may be necessary for bibliographic research. And the uniqueness of data on objects as compared to bibliographic data may be merely a quantitative difference. Whatever the differences are, the sharing of information and the methodology implicit in that sharing will become more and more important if research is to be expanded rather than impeded.

This article focuses on how those responsible for documenting art objects—art historians, curators, and registrars—might work cooperatively with those responsible for art bibliographic documentation. Those engaged in object documentation could not only tap applicable documentation principles already extant for bibliographic systems but also share in the expansion of these standards and the building of art information systems. The role of authority control may be seen as the linking component between bibliographic/research information and object/interpretive information toward the ultimate goal of an integrated art information system.
COMPARISON OF BIBLIOGRAPHIC AND ART OBJECT SYSTEMS

Development of National Bibliographic Systems

Independent art research libraries, in particular the museum libraries, adopted automation much later than the art research libraries which are part of large university library systems. Both chose the same route: first, beginning with cataloging, automating technical processes through a shared, nationally centralized bibliographic system; and only much later turning to the systems that would serve within each of their institutions to integrate a variety of functions for the ultimate purpose of information retrieval. The actual passage from the historic bibliographic systems to the decentralized information retrieval systems was accompanied by decades of development and refinement of standards for cataloging, information transfer as contained in the MARC format, and vocabulary control as practiced by the Library of Congress and other national enterprises such as the Name Authority Cooperative Project (NACO).

The national bibliographic systems and networks, over two decades old, are unquestionably the de facto systems for the library community. Products of an era that had as its goal one nationally centralized database, these systems now enter a technological age that is shifting the emphases to separate, local systems linked to these larger databases via "arteries" and "switching stations" for the purpose of exchanging and sharing information on local, national, and even international levels. Rather than being viewed as replacement systems, the local systems serve as extensions—cooperative networks of library systems where most of the advancements in user interfaces, controlled vocabularies, and integrated authority control will be realized.

Evolving technology was not the cause for this shift in emphasis, but it served as a tool to save the monolithic databases from collapsing under their own weight. Intended to address prohibitive telecommunication costs and limited system capacity, linked systems represent a different approach with a different set of opportunities to serve the needs of specialized subject areas—for the purpose of this article, art and architectural history and research. With the development of personal computer systems and optical storage capabilities, technology supports local systems in a way that it could not have done ten years ago.

No matter what technological means are at hand to enhance systems—whether centralized or distributed systems—the goal of bibliographic documentation has always been to exchange and share information—to make information accessible in an organized manner. Libraries early on developed cooperative relationships to improve standards. Networks are only a means to this objective. It is through
standards for cataloging and indexing, information transfer, and controlled vocabularies, that special subject areas can be identified, isolated, and, in the current information science jargon, "massaged" from mere data into information and ultimately into knowledge-bases equipped with artificial intelligence to relate, infer, and interpret.

Bibliographic standards evolved over the same period as the building of systems—i.e., toward uniformity with an emphasis on hierarchical formats designed with the printed word in mind: cataloging with hierarchical main entries and controlled vocabularies with hierarchical main terms. In the last few years there has been a reassessment of ethnocentricities (Allen 1987, pp. 21-23) and a reassessment of the necessity for predetermined patterns and structures (Molholt 1987, p. 8), resulting in a more open-ended approach to standards that could only have occurred, along with recent developments in technology, to support concepts such as faceted indexing, transparent or invisible term switching, hierarchical thesauri, and multilingual and multithesauri systems.

The principle of medium merging with its message and reshaping information is nowhere more evident than in the field of information science. It is important to note that this is an additive process that enriches information by continually expanding access to it. Lenore Sarasan (1984) described this process for visual access systems, but it could as easily apply to bibliographic systems:

Technology has brought us to the brink of a major redefinition of how art history will be pursued in the future....Much of the potential of automation, though, depends on how data are defined and structured in a computer. If we simply transfer manual systems to computers without substantive changes, we will do nothing more than speed up the answering of the same questions we can now answer using manual systems. If instead, we expand the accessibility of both visual and non-visual data by exploring and experimenting with new methodologies and by rethinking how we approach fine art information, we can take art history studies far beyond the reaches of conventional research. (P. 406)

Retrieval, no matter how sophisticated, is dependent on how an item was indexed or, in Sarasan's words, "how data are defined." The dramatic research of the last ten years in information science impinges on two areas: indexing methodology and retrieval capabilities, and the symbiotic relationship between them. Whereas new technology may dramatically shape the ability to retrieve—even without substantial changes in indexing practices—it will have less effect on how indexing is performed. Although much is being written about artificial intelligence and reasoning, it has yet to go beyond the research and development phase in its attempt to mimic and surpass human intelligence. In other words, technology will not dramatically change how an item is indexed without the cataloger or indexer first changing how he/she goes about the process of documentation.
Cataloging and indexing methodology, within the historic bibliographic systems and thus within the cataloging departments of large research libraries throughout this country, is unlikely to change substantially; or if change comes, it will come slowly in the form of acceptance of subject specific vocabularies and thesauri and reformatting of the MARC subject indexing fields. It is more likely that new applications will occur initially in the area of special collections and special media—e.g., periodical indexes, architectural drawings, and visual resources—which have not evolved as part of the historic bibliographic systems and their accompanying standards.

**Development of Systems for Art Objects**

Much has been, and will continue to be, written about the early attempts to computerize information on object collections in museums. These early attempts occurred in the same era as the groundwork was breaking for the large bibliographic systems. The pioneers in museum computerization of the 1960s foresaw a “universal museum index (Vance 1985, pp. 36-37).” Unencumbered by mammoth historic card catalogs, their dream of universality went far beyond the national boundaries of the developing bibliographic systems.

Libraries had their opportunity to develop international standards in 1961 with the *Paris Principles*, a statement of cataloging code principles developed by the International Federation of Library Associations and Institutions (IFLA) meant to serve as a foundation for national codes that would facilitate universal bibliographic control. The resulting Anglo-American cataloging code was a compromise between acceptance of international standards and the inertia of the large long-established American research libraries to change their card catalogs (Clack 1980, p. 6). Not until the second edition of those codes in 1978 was the impact of internationalism felt on the library card catalog. But by then most of the research libraries were beginning to plan for their online catalogs.

On the other hand, museums having only local or grassroots standards had much to gain from the development and acceptance of international standards for museum documentation. Out of these very early attempts at museum computerization came not just a system unable to carry the weight of undeveloped and inconsistent documentation, but the beginnings of international work—i.e., committees and forums such as the International Council of Museums (ICOM) and its International Committee for Documentation (CIDOC)—that would slowly, over the next two decades, work to develop museum standards for defining data and controlled vocabularies. At the same time, national organizations, particularly in Great Britain and Europe, worked cooperatively with ICOM and CIDOC toward mutual ends. The United
States, lacking a unified museum system and national directives, participated with somewhat less enthusiasm than their European counterparts, much like the library world of two decades earlier.

While this international work on museum documentation was slowly developing, a new generation of computers came into being—personal computers—bringing with them flexibility and the means (or the illusion) of creating databases quickly. Inventories, collection management, and cataloging projects could take place on the local level. Often, data managers and computer scientists served as advisors. With no experience in library science, little in information science, and less experience with standards beyond the machine level (e.g., ASCII), they reinforced idiosyncratic systems building and personalized vocabularies. So, while one area of the museum and art history world attempted to develop international standards, another area forged ahead to develop databases in the absence of these slowly evolving standards.

Since the pioneer days of museum computerization, many of the automation projects delayed or abandoned attempts to computerize cataloging for more practical in-house collection management activities. This was not the approach taken historically by libraries, to automate cataloging first before turning to collection management areas. The incentive to share cataloging data does not have the same relevance to unique objects that it does to bibliographic items. Unique objects, cataloged uniquely, cannot be seen to benefit easily from shared records in a database. The expediency of cloning records is simply not applicable. Unless items are treated in some collective, generic way, as in the case of archives, the cataloging of each object is labor intensive and requires original cataloging procedures. Furthermore, the practical need to develop systems that would benefit museums immediately, shifted work away from the building of large data files and their in-house negotiated documentation standards to functions such as acquisitions, loans, inventory, access, and care of the collections—functions similar to the divisions of library collection management, and, ultimately, to the modular approaches of automated library systems.

**Comparison and Bibliographic and Art Object Information**

The very basic elements of documentation evolved out of library science. The bibliographic documentation systems—data structures, cataloging codes, classification schemes, nomenclature and their syndetic and thesauri structures, and the online systems built to house them—were designed to evolve and expand. For nonbibliographic disciplines and fields to accept these principles and standards as they presently exist would be foolish without first undertaking a thorough investigation.

A few years ago the Society of American Archivists set up task forces to work with the Library of Congress on defining data relevant to
archivists. The MARC format for Archives and Manuscripts was the result (Floyd 1984). The visual resource world is currently setting up its own committees to begin a similar investigation which may result in the adoption and/or expansion of the MARC format for visual materials and other bibliographic standards. The art history and object world has yet to take this step. In the last decade, a number of conferences, workshops, and papers have appeared dealing with art history and museum computerization. Many of these papers recommend tapping the computer and information sciences, but few make mention of library science, and where restrained mention has been made, the assumptions and conclusions seem questionable. What follows is an attempt to pinpoint the issues that contribute to this misunderstanding of methodology and hamper cooperation toward the mutual goal of an integrated art information system.

**Modular Systems Versus Total System Approach**

Reading about bibliographic databases from the art historian and museum perspectives, one encounters again and again the assumption that there is a very limited number of fields in bibliographic databases—"at the most, thirty different fields." In museums, there may be "well over a thousand of what could be construed by different people to be very useful information" (American Society for Information Science [ASIS] 1983, p. 11). This useful information includes loans, insurance value, exhibition restrictions, artist biographical information, and other data, some of which can be categorized as collection management information rather than cataloging information. Library science makes a clear distinction between cataloging information and acquisitions, circulation, interlibrary loan, and authority control information. In an integrated online catalog system, all information on a bibliographic item or object would be brought together from these different files and subsystems into one unified catalog.

Viewed from the librarian's perspective, information on an item breaks down into modular processes, and these processes are described by distinct sets of data elements. These elements are then slotted into fields that may then be "subfielded." A bibliographic item is monitored as it crosses through separate and administratively distinct territories from acquisitions, cataloging, circulation, and interlibrary loan through the user or researcher's own interaction with the system for the purpose of information retrieval. These divisions of labor have been translated into the modules or subsystems of library systems.

In the same way, the categories of nomenclature—names, subjects, and uniform titles—are, in turn, capable of being faceted into types. This methodology of categorizing information from data to knowledge is fundamental to library science. But for the nonlibrarian—e.g., the art historian and curator—to apply these same principles to objects, may,
on the surface, seem an oversimplification. Historically, museum information has not been so easily slotted. The integrated online catalog is not viewed as the final stage but rather as the process itself. Thus the catalog takes on mammoth proportions as the attempt is made early on to gather all data into one file. For the library world, the cataloging system remains the core system around which in-house collection management subsystems and authority control rotate. For the art historian and curator, information extraneous to the object itself—its provenance, exhibition history, or artist’s bibliographical information—takes on historical relevance for the cataloging record. For both the bibliographic and art object systems, answers to queries such as what paintings were “exhibited by one artist during the years that another lived in proximity” or what paintings were “bought by patrons of a certain nationality during a particular period (Arms 1984, pp. 30-31)” are dependent on how the data were structured, how the nomenclature was applied, and how the files are designed to interact.

**Intrinsic/Extrinsic Issue or Pointer Versus Surrogate**

Most of the literature documenting the differences between a bibliographic item and an art object goes to great length in dealing with the intrinsic/extrinsic issue. The information used to document a bibliographic item is generally *intrinsic* to the book itself—i.e., its author, title, or publication date—whereas the information used to document an art object is mostly *extrinsic* to the object—i.e., the scholarly opinions, interpretations, and attributions of an art historian. These are real and basic differences that ultimately make one set of documentation acts as a pointer to the literature contained in the book, and the other set of documentation acts as a complete description of an otherwise mute object. Whatever there is to say about that object may be totally contained in the surrogate record, including a surrogate image of that object. Do the differences between a pointer and a surrogate record have grave ramifications for the ability of the museum and art history world to tap bibliographic documentation principles and systems?

While half the purpose of a bibliographic catalog is to function as a pointer to a known entity—the desired book—the other half is to locate unanticipated documents through its system of subject descriptors. In this latter case, the catalog could be said to be pointing at the contents of a book—contents that might also contain an art historian’s opinions, interpretations, and attributions. The usual method of making comparisons, item-for-item, needs to be suspended in order that the record information about the art object may be compared with the information contained within the pages of the book—not the usual one-to-one, record-to-record, comparison.

A massive task has taken place in the bibliographic catalog through subject analysis: the construction of a scheme of knowledge that seemingly unbinds the book. If it could be said that the art object is much
enriched by the art historian’s documentation, then that same information, elaborated on and published as unique documentation in articles and books, needs to be linked to that object. The real difference between object and bibliographic item information is that the object description enumerates and the bibliographic content description ("descriptors") abstracts. But whether enumerative or abstracted, the basic elements of subject description—the descriptors—remain the same. Those same questions posed to an object catalog can be posed to a bibliographic catalog. The former answers them for specific art work, the genre of object databases; the latter, for the whole realm of art historical research beyond the physical object. Elements of conservation, technique, and iconography are being linked into a broader conceptual scheme of knowledge including conservation, techniques, and iconography with each aspect maintained within a distinct syndetic structure of faceted subject knowledge.

**Inference Issue**

A major misconception about library systems and documentation is to assume that the large network systems now in place for bibliographic control are the model systems desired by the library community for both management and retrieval of information. This is to ignore the large body of library and information science literature of the last two decades directed toward the need for interactive online public access catalogs and integrated authority control, enriched vocabularies to augment Library of Congress headings, changes in the syndetic structure of authority files, the mounting of subject-specific thesauri, the expansion of the MARC formats for nonbibliographic materials, and the restructuring of this format for indexing purposes (to list but a few major research issues).

William Y. Arms (1984), then director of the Museum Prototype Project, in his paper given at the 1984 Pisa Conference on Automatic Processing of Art History Data and Documents, remarked that "library systems are poor at searching for ranges or combinations of information, much less for drawing scholarly inference from complex data" (pp. 33-34). Later in his paper he acknowledges that inference relates to artificial intelligence which is still in the early stages of research. The obvious conclusion might have been that library systems, like object systems, are intended to incorporate inference capabilities. But that is not the conclusion drawn in his paper; rather, he states that "the fundamental differences of design philosophy makes real difficulties in attempting to use library systems for scholarly inference." In assessing the Research Libraries Information Network (RLIN), he states that: "It makes no attempt at the scholarly inference required by Museums. It does not know that Florence is in Italy or that painters are artists...it makes no inference." But just as the Art and Architecture Thesaurus with its hierarchy Agents (i.e., People and Organizations) treats the term
p*nter as a narrower term under artist, a hierarchical gazetteer could
define Florence as a narrower term under Italy. With state-of-the-art
computer technology and integrated authority control, so-called infer-
ences can be incorporated into our systems. But such links have to be
constructed as separate, ongoing, properly funded projects (Barnett
1985, pp. 10-11).

Perhaps the art library community as a whole has not been ada-
mant enough in demanding changes from their bibliographic utilities
nor enthusiastic enough in supporting subject-specific research sup-
port projects such as the Art and Architecture Thesaurus (AAT). Or
perhaps librarians are waiting out these applications for their linked
local online retrieval systems. After decades of computerizing the cata-
loging and related work of library systems and over a decade of adapting
to changes in the bibliographic cataloging code, the library world
appears to lack enthusiasm and motivation to bring its formation
together to the satisfaction of its users and researchers. Librarians need
to be making demands on the vendors of local systems to produce these
very sophisticated information retrieval and authority control capabili-
ties so that when local systems are in place the queries posed by their
researchers can be answered. In the same way, the library world and the
art library world in particular, resist the tasks involved in refining the
subject-specific indexing fields that will complement the mounting of
thesauri and contribute to more refined information retrieval.

Scholarly inference is needed for bibliographic systems as well as
object systems. Research not only needs to focus on specific aspects of an
object's provenance, exhibition history, conservation, or iconography,
but it also needs to broaden its scope of the more general categories,
concepts, or facets of knowledge. Object catalogs are focused on the
objects themselves; bibliographic catalogs mirror research, whether
object specific or encompassing more conceptual and expansive areas of
subject knowledge.

While the museum world lacks motivation to work together to
exchange and share information so as to define, adapt, and build its data
structures and standards, the library world lacks motivation to refine
and bring all of its data together into knowledge bases for the purpose of
research.

Document Description Versus Knowledge Description

Jim Anderson, at Rutgers University and designer of the bilingual
art history database for the merging of the U.S. based International
Repertory of the Literature of Art (RILA) and the French based Réper-
toire d'Art et d'Archéologie (RAA), noted that bibliographic database
design provides extensive structure and definition to elements of docu-
ment description while "knowledge description is frequently relegated
to a few relatively unstructured fields.... The MARC format exemplifies
this practice, devoting the major portion of its structure to bibliogra-
phic details of documents” (Anderson 1986). Document description in this context stands for the intrinsic elements such as title, imprint, and physical description; and knowledge description stands for the subject content represented. As with the earlier Arms description of the limitations of library systems, the critic could stop here or pursue a remedy. For those outside of libraries, it may appear easier to abandon MARC and start over; but for those with catalogs and databases already tied to MARC, the work required to expand these formats lies ahead. It should also be pointed out that to design a system that is not MARC formatted probably means that a MARC conversion table will eventually be required if the database is ever to be transportable.

If today’s library systems are being redirected away from the monolithic system concept and extended to a distributed local system and if the structured subject vocabularies may be moving in a similar path—i.e., away from the single predetermined preferred term to a switching term with its emphasis on local preferences—then too MARC can be made capable of expansion beyond its bibliographic roots into more generic labeling useful for objects as well as printed materials. The item in hand can no longer be assumed to be a book.

The “few relatively unstructured fields” for knowledge description in the MARC format, referred to by Anderson, are being closely scrutinized by subject specialists in the art and architecture fields (Research Libraries Group [RLG] 1987). If a field such as the topical subject (650) field includes a code to identify which subject-specific thesauri are to be used, then the “subfielding” within that field could be coded specifically for the thesaurus identified. For example, if the thesaurus to be applied is the Art and Architecture Thesaurus rather than Library of Congress Subject Headings, the subject indexing within the 650 field could then be subfiled to correspond to the AAT’s unique scheme or facets of knowledge. In this way, those “few relatively unstructured fields” can be expanded to provide a structure and definition to knowledge, in this case, art and architecture. By assigning a term to a facet, that term is given a relationship. These relationships allow for an interpretive process in which inferences can be based on structured context rather than data content alone. Until the work to expand the MARC format is done, these MARC subject fields remain few and unstructured, speaking to and for an earlier age.

**Unique Item Versus Multiple Copies**

If the unique aspects of objects impose labor-intensive work on catalogers, the sharing of data has little relevance for cataloging unique objects. The advantages of shared systems for building bibliographic databases are simply not present for object cataloging. And yet, without the cataloging standards for description and form of names, and the painstaking application of common, or at least, compatible controlled vocabularies that are implied in the use of a shared system, object
databases would be quite as idiosyncratic online as they are in their present manual states. What, then, prompts data sharing? Perhaps it is that refined stage of information retrieval in which the researcher poses questions that demand more of the data than is presently provided. There are no real research advantages to labor-intensive time spent searching separate unrelated files. When the knowledge bases begin to act as collaborators (Molholt 1987, p. 3) in exploring and aiding in making correlations and relationships, research will expand and the benefits of shared knowledge will be realized.

**COMPONENTS OF AN INTEGRATED ART INFORMATION SYSTEM**

Most of the needs of art object system builders are shared by art bibliographic system builders—i.e., the need for integrated information systems, the need for expanded MARC formats to support more specific knowledge structure for both indexing and retrieval, and the need for an enriched subject controlled vocabulary. As integration is seen more and more as the goal of information systems, the symbiotic relationship of parts is evident between cataloging system and authority control, between authority control module and mounted thesauri structures, and between mounted thesauri structures and linked bibliographic or object records.

The field of art and architecture is ultimately concerned with objects and therefore primarily visual. But along with image access, objects are enriched by their accompanying research, both descriptive and interpretive. Different document formats should not hamper access. The information should still flow in spite of the physical properties that house it—whether book, periodical, or object catalog. To make this integration possible, complementary data fields are needed to allow access to both image and text. Beyond this, complementary applications of standards are required—i.e., standards for cataloging and indexing, standards for the formats that house this data and transport it, and the standards that apply to the nomenclature that describes concepts and names names.

Authority control can be seen as the linking mechanism that supports integration between object information and research/bibliographic information and ultimately collaborates in making relationships, inferences, and interpretation possible. By mutually supporting the expansion of already established standards, both art object system builders and research support system builders will find their paths converging toward the ultimate goal of an integrated art information system.

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Considerations in the Design of Art Scholarly Databases

DAVID BEARMAN

INTRODUCTION

THE CONCEPT OF AN INTEGRATED information source containing art historical data and images has been immensely attractive to the art scholarly community. Since the creation of the J. Paul Getty Trust Art History Information Program, which has the goal of realizing this dream, it has become a possibility. Yet the very nature of the vision was that it could be all things to all people—i.e., a catalog of art objects, a biographical dictionary, histories of auctions and exhibits, thesauri and dictionaries of technical terms, the definitive compendium of art criticism, and a comprehensive image base suitable for scholarly research. Realizing such a database in a universally accessible electronic information system requires more precise definition than the vision needed, and it turns out to be very challenging to achieve a database design without sacrificing the benefits which each community of art historical professionals has imagined for itself.

The requirement to be more specific about what is meant by an art scholarly database, and how such a database could be realized, can build upon a considerable body of work—unfortunately largely unpublished—which has grown out of three major systems definition efforts which are currently underway: (1) the discussions of the Architectural Drawings Advisory Group (ADAG), (2) the intellectual framework of the Art and Architecture Thesaurus (AAT), and (3) the data architecture models of the Smithsonian Institution.

Together these projects provide a basis for defining the fundamental considerations which will need to be incorporated into art scholarly
databases. They suggest that, with modest revisions, the MARC formats for bibliographic description and authorities existing in bibliographic information networks might be carriers of the data which support an art scholarly (indeed of any scholarly) database. However, it is clear from the analysis that, if existing bibliographic information networks, as applications were used to support the requirements of art scholarly use, they would need to be fundamentally transformed. The author argues that such a transformation is due anyway, and that the library community has much to gain from participating in the effort to realize art scholarly information systems as capabilities of their existing networks.

**The Concept of an Art Scholarly Database**

The art scholarly database is an idea which has been heralded by prophets in a variety of art scholarly communities: among curators, art historians, and conservators; from the perspectives of connoisseurs, iconographers, and collections managers; and in museums, libraries, and archives. And in the world where believing is being, it supports the scholarly needs of each. To the curator, the art scholarly database has an object record at its center, a description of a work of art as an artifact, created at a specific time, titled by its creator, made by a specified technique, and accompanied by a history of prior ownership and exhibition and provenance. Surrounding the objects at the core of the database are files containing information about artists, donors, exhibitions, styles, periods, techniques, and other recurring attributes of the universe of art.

As imagined by the art historian, the art scholarly database is a vast network of assertions, made by other art historians, about the world of art. These consist of attributions of works to artists, demarcations of stylistic periods and the assignment of works to them, and assertions about influences and about the meaning of specific drawings, paintings, or sculptures. The art scholarly database supports the reorganization of these assertions and their systematic exploration by reference to all the entities to which they refer—i.e., artists and works of art, schools of art and patrons of art, symbols and forms and techniques and styles and media and anything else about which it might be interesting to reexamine the received wisdom.

As a tool designed for the conservator, the art scholarly database is a repository of chemical and physical knowledge, a history of the materials which went into a work of art, and of the conditions to which that work might have been exposed throughout its life including the degradation—precipitous or incremental—which brought the work to his attention. The art scholarly database is also a reservoir of information about all prior treatments to which the work has been subjected and a library of information about similar works or about treatments of the sort the conservator intends to apply.
From the perspective of the connoisseur, the elements of the work of art is the most important attribute, and that art lies in form, color, motion and balance, in technique, and thus not in just materials, but also in how they have been worked. Art is aesthetics and description of the work is a description of the work as art.

As envisioned by the iconographer, art is intellectual and appreciation of the work involves finding its message and its meaning. Describing what the work is about takes precedence over description of what it is or how it achieves its effect.

To the collections manager, the work of art is a responsibility, an item which must be accounted for, stored, and loaned, an object with physical characteristics and a specific set of circumstances under which it was obtained. All this governs how the work of art must be treated within the repository and the innumerable actions which will be taken with it over the course of its life. The collection itself, and the actions taken on it, provides important units of analysis through which to understand the item.

In the museum, individual works of art are vehicles for interpretation of art, understanding of an age, or appreciation of a movement. The art scholarly database is a search room, a window into the numerous collections that might potentially hold items which will stage a magnificent show and an "exhibit" in itself in which the publics that "attend" the museum (perhaps by telecommunications) may participate.

At the library, the art scholarly database is a reference source for bibliographic citations to the hundreds of thousands of articles and books, films, slide collections, and now, optical discs, which present, discuss, and define art. The art object may also be published as well as representations of it.

For the archives, the art scholarly database is a pointer to primary materials of the world of art ranging from original architectural drawings to decorative ephemera, from the personal letters of artists to the records of an art gallery or publisher, from the field notes on a cave painting to the programs for a computer generated graphics display. These are all evidence of the world of art as it lived and as it was retained because, in the judgment of the archivist, it has historical value.

Can this mirage, seen by so many observers—none of whom agree on its shape—be engineered into being? The deliberations of three major projects in the art historical world suggest that they can.

The Architectural Drawings Advisory Group

The Architectural Drawings Advisory Group was established in 1983 at the instigation of Henry Millan, the dean of the Center for the Advanced Study of the Visual Arts (CASVA) at the National Gallery of Art in Washington, D.C. The impetus for its organization was the expectation that the J. Paul Getty Trust would support the construction
of an architectural drawings database. An organizational meeting in May 1986 attracted representatives from the American Institute of Architects, the Cooper-Hewitt Museum of the Smithsonian Institution, the Library of Congress, the National Archives, the Canadian Center for Architecture, the Avery Library, and the National Gallery of Art. At subsequent sessions, RILA/RIBA, Marburger Index, L’Ecole supérieure des Beaux Arts (Paris), and the Public Archives of Canada were also represented.

In the summer of 1983, ADAG’s earliest discussions premised the use of the MARC format for Visual Materials, AACR2, and Elisabeth Betz (Parkers’) newly issued rules for cataloging graphics materials, if all three could be revised to meet ADAG needs. (The ADAG minutes were distributed to participants but not published. Subsequent references to ADAG meeting minutes are made in the text in its preferred notation—i.e., ADAG II means the second meeting.) It remained for the group to determine what revisions were required, and this opened up a lengthy discussion over the next two years.

Among the problems noted in these discussions were:

— An object catalog is only one file among the many in an art scholarly database (ADAG III).
— Whether multiple images on a single sheet are reported separately or together depends on whether the image (art) or sheet (artifact) is primary. A variant issue with the same problem is how best to describe multiple sheets which comprise a set (ADAG III).
— The representation of time is different where hours and minutes are less interesting than twilight or dawn and dates less important than cultural time periods like Lent or Advent (ADAG IV).
— What it means to be the creator of a drawing is not self-evident—e.g., whether a firm or an individual is responsible, and whether it is the same for apprentices and partners, draftsmen and designers (ADAG V and ADAG VIII which notes the conflict with AACR2).
— Buildings seem to defy unique identification, when one accepts that the same building may be built in a number of places, a building may be built in a different place from that for which it was designed, and that a building may not be built at all and yet be represented by a full set of drawings (ADAG V).
— How to account for the fact that scholars see every piece of information in the record as potentially arguable and would like to see a provision for sources for each item of information given (ADAG V).
— What we mean—if not nationality, citizenship, or place of residence—when we say that an artist or architect is French; what is the meaning of “locus of activity” (ADAG VI).
— How to accommodate the fact that a photographic reproduction of a work of art is a work in its own right and requires its own entry, credited to the photographer (ADAG VII).
—What to do with the distinction between history of ownership and administrative history in provenance (ADAG VII).
—How to treat the vernacular, whether it is a local calendar time (ADAG VII) or the language of the repository, artist, or location of the building (ADAG X).
—What to do about the fact that geographical places change their boundaries, features, and come and go (ADAG IX).
—How to reflect the relationship between drawing, model, and structure (ADAG IX).
—How an art historical database treats the multiplicity of roles which a single person may hold throughout life or even at one time, in describing that person (ADAG cataloging procedures comparison meeting, 24-25 July 1986).

These issues, discussed by ADAG, are not peculiar to architecture or even the arts but are features of historical and scholarly databases in all fields of endeavor. Historical databases all need to accommodate the fact that the world changes but that our language for representing it is contemporary and has changed along with what it represents. Thus cities are no longer what they were, nor are river valleys, styles of painting, or occupations, but our words for them do not reflect this change any more than our names for people or organizations reflect their maturation.

Scholarly databases all have to deal with the legitimacy of a large number of incomplete perspectives on the same reality. Thus people are parents and architects, school board members and gamblers, all at once. Works of art are images and artifacts, they were created by someone and produced under the creative responsibility of a corporate entity. And dawn is an important time for an art historian, just as years of great military victories are for architects and seasons are for ecologists. ADAG members, in their deliberations, uncovered the complexity of scholarly realities and identified the kinds of relationships which must exist between entities that are central to distinct worlds of scholarship. They have not yet developed solutions, but during 1986 the author was able to demonstrate that the data which ADAG wished to share, in spite of its complexity, were compatible with the structures established by the MARC format for bibliographic data and authority data and widely used in the library and archives communities for sharing information about primary and secondary reference resources (MARC Mapping of the ADAG Skeletal Design 1987). Thus an envelope for sharing art scholarly information may already exist if we can agree on the meaning of what we put inside it.

**The Art & Architecture Thesaurus**

In 1976, Pat Molholt and Toni Petersen submitted a proposal to the National Endowment for the Humanities (NEH) to develop an Art and Architecture Thesaurus as a way to resolve some of the problems of the
meaning of language in art historical scholarly databases (Petersen 1983). After several years of NEH support, the Getty Trust continued to fund the project which has been discovering the vocabulary we employ to represent parts of the multifaceted realities facing art scholarship. After more than a decade of effort, the AAT has defined 30,000 terms in thirty-six separate "hierarchies." Each hierarchy is an attribute or data element in the description of an object of art historical research. An item described using the AAT vocabularies could thereby be indexed according to thirty-six separate facets of description.

The hierarchies developed by the AAT do not describe the content of the work of art at all; iconographic representation and subject description is beyond the scope of the AAT. What the hierarchies do describe are physical attributes, styles and periods, agents, activities, and materials and objects (including built environments, material culture, art forms, and documents). Figure 1 lists the hierarchies in the AAT and Figure 2 illustrates some of these hierarchies with sample terms.

The power of the AAT as a descriptive language derives from the explicit genus-species and whole-part relationships it defines between terms, its definition of synonymy, the increasingly complete scope notes it provides to distinguish among terms, and its identification of the sources that provide warrant for the use of a term. The placement of terms within a hierarchy partially resolves the legitimately different requirements of different users. In an architectural drawings database, the distinctions between Corbel arches and Extradosed arches, or even between the two types of Corbel arches, Bell and Maya, may be necessary while in a database of landscape paintings we can stop with the term arches.

But the AAT does not address the question of how its hierarchies are related to each other in a database. It assumes that all these terms could be assigned to the description of an object of art and does not consider how each dimension serves to qualify another. Since the purpose in developing the AAT was to provide catalogers with terminology with which to describe objects, documents about objects, and object and document surrogates, this problem was seen by the project itself as one of providing implementation instructions to indexers. As such, the AAT staff eschewed defining relationships because most implementation of object and document catalogs would not be able to implement them.

In a recent theoretical analysis of the way in which the AAT represents art scholarly discourse, however, former codirector Pat Molholt (1987) has suggested that these terms form a semantic network as illustrated in Figure 3. Her exploration of the syntactic relationships among terms within a single vocabulary reveals eighteen distinctive types of linkages between related terms—i.e., not just genus/species and whole/part linkages which are the relationships
most commonly treated in thesauri. Molholt examines these relationships further and identifies them as operating equally between facets much in the manner in which entity-relationship modeling of the database would define them (see Figure 4).

Molholt's insight permits us to map an art historical statement to the AAT, but it does not schematically represent the universe of possible
**Figure 2. Sample terms**

<table>
<thead>
<tr>
<th>ASSOCIATED CONCEPTS</th>
<th>ASSOCIATED CONCEPTS</th>
<th>PHYSICAL ATTRIBUTES</th>
<th>STYLES AND PERIODS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disciplines</td>
<td>Design Elements</td>
<td>Nymph motif</td>
<td>Colonial American</td>
</tr>
<tr>
<td>Art history</td>
<td>Oval</td>
<td>Arabesque</td>
<td>Dutch Colonial Revival</td>
</tr>
<tr>
<td>Semiotics</td>
<td>Chevron</td>
<td>Medieval</td>
<td>Anatolian</td>
</tr>
<tr>
<td>Industrial archaeology</td>
<td>Egg and dart</td>
<td>Late Antique</td>
<td></td>
</tr>
<tr>
<td>Civil engineering</td>
<td>Wreathed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nymph motif</td>
<td>Gabled</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Figure 3. Semantic network illustration (letters indicate AAT hierarchies; numbers indicate link-types)**

The cabinetmaker carved vines on the fronts of the three drawers of the 20th century

Art Deco Cyprus secretary.
Figure 4. Links between hierarchies (small letters indicate hierarchy levels; numbers represent link-types within hierarchies; capital letters with numbers in squares represent cross-hierarchy links).

art historical statements nor give us the tools with which to determine that a given statement is within the realm of art scholarship. Thus, the schematic representation in Figure 3 links DATES as a qualifier of STYLES & PERIODS, and those in turn are linked to FURNITURE. In a different formulation of this art historical statement, DATES could be an attribute of the description of MATERIALS, TOOLS & EQUIPMENT, PEOPLE & ORGANIZATIONS, DISCIPLINES & OCCUPATIONS, or any of a number of other hierarchies.
Smithsonian Art Bureaus' Data Architecture

While the AAT focused on naming art scholarly entities—such as roles, materials, or periods—a data modeling effort undertaken by the Smithsonian Institution is attempting to define the attributes of each entity and define the relationships between entities required by its art "bureaus" or museums. The Smithsonian Institution includes seven art bureaus (the Archives of American Art, the Cooper-Hewitt Museum, Hirschhorn Museum and Sculpture Garden, National Museum of African Art, National Museum of American Art, National Portrait Gallery, and the National Museum of Asian Art comprised of the Freer Museum and Sacker gallery) as well as numerous collections of art in non-art bureaus. In 1986-87, as one phase in planning for implementation of the Smithsonian's new Collections Information System, representatives of these bureaus worked with Smithsonian data administrators and contractors to define the architecture of art information including both content data and administrative (collections management) information. A report on the development of the Art Bureau data model appears elsewhere in this Library Trends issue; I want only to comment on its implications for design of art scholarly databases.

The most important finding of the modeling exercise is not likely to be much discussed: it is simply that art museum information is mostly museum information. The model identified no entities which were unique to art. (Actually, the draft with which I am working, dated 10 September 1987, seems to imply an entity named "sitters" but it appears to be left over from earlier drafts and I am confident it will not remain when it is clearly only one of many "roles" which a person might play, and "role" is a recognized entity.) The number of attributes which are unique to art are trivial compared with the number of data elements in the logical model. The largest number of entities and attributes in art museum information systems are reflections of the fact that museum holdings are acquired, stored, exhibited, and interpreted. As such, the data are about such entities as addresses, bibliographic items, educational and exhibit events, museum facilities, materials, methods of creation and care, persons and organizations, their roles and skills, and time and space.

While one is first tempted to explain this fact by noting that museum information systems exist to support collections management and only incidentally to support scholarly research and discussion, the data model constructed for the Smithsonian art bureaus forces us to consider that art scholarly discourse is also, largely, about entities other than objects of art. It too is about persons and organizations and their roles as revealed by the attribution discussions within ADAG. It too is about methods, actions, and events as revealed by the hierarchies of the AAT. Even when it is about objects of art, it is frequently about such "entity intersections" as their production (objects and methods) or reproduction (objects and A/V objects), their exhibit and publication
history (objects and events), or their provenance (objects and title transfers), etc. The entities which populate the art scholarly database, like those of other scholarly databases, are agents in our cultural world.

Indeed, art historical discourse can be about ideas abstracted from objects of art or about creators, collectors, and critics of art independent of any objects of art. Thus the art scholarly database is dependent on the development of authority reference files regarding persons, places, concepts, and events as is the political science scholarly database or the geological scholarly database. The art museum collection management database contains authority reference data on donors and collectors of art, on exhibitions and publications of art, and on methods of care and treatment as well as methods of creation. As such, its system architecture will not be significantly different from those of the purely scholarly database even if scholars will be answering different questions for themselves when they are asking similar questions of the system. Thus the scholarly query about provenance may be directed at finding a pattern in the collecting activity of an important connoisseur while the same question posed by a registrar may be intended to assist the development office in attracting another major gift.

What the Smithsonian data model is demonstrating is the intimate relationship between all the entities in the art scholarly/museum collections management database. For logical reasons, the two universes of information are interdependent. The data model identifies the interdependencies or relationships between attributes of intersecting entities which combine to form data sets used in particular museum or scholarly processes.

Interestingly, the model, which is based on a year of bottom-up (derived from actual data being collected now) and top-down (derived from internal logic of the model) work by a number of art museum staff and technical consultants, still adheres to the model the author drew up in 1982 in an invitation to vendors to bid on building such a system (Smithsonian Institution 1984). That model (illustrated in Figure 5) was intended only as a top-down framework and was illustrated with a "data dictionary" consisting of data imagined to exist based on the theoretical model.

Implications

While the data required by the art scholarly database can be shared using existing MARC formats (with minor modifications to the format for bibliographic description and extensions of some general principles across the authority formats), the systems which currently support the sharing of bibliographic data are inadequate to support scholarly databases. Their most serious limitation is their uni-centricty—one file is the focus, and the others merely elaborate on it. In this case, the bibliographic item lies at the heart of the data structure with all other information simply pointing to it.
In the art scholarly database, as the Smithsonian model demonstrates, different entities take on the central role depending upon the perspective of the user. The linkages between files must be traversable in any direction; thus all files are authorities to other files and each may be linked with any other. This linked authority structure, which the author has discussed elsewhere (Bearman and Szary 1987; Bearman 1986), is demonstrated in a database developed by J. Penelope Small at Rutgers University to house the *Lexicon Iconographicum Mythologiae Classicae*, a database describing images of Greek, Etruscan, and Roman objects which illuminate ancient myths (Small. In press). Unfortunately, no bibliographic utility is yet close to being able to support such multiple-linked authority structures, although the work of the Research Libraries Group PRIMA project, which is endeavoring to add scholarly files to the Research Libraries Information Network (RLIN) will certainly face the challenge of linking at least some scholarly files to bibliographic files in a two-way connection which permits either one to serve as the organizing center of a user's query (Hume. In press).
CONCLUSIONS

The design of art scholarly databases requires that we keep in mind the complexity of scholarly realities, the potential richness of languages for describing those realities, and the value of explicitly relating entities and attributes in these databases. It also requires that we be cognizant of some political and financial dimensions of implementing national systems including constraints imposed by the most likely vehicles of the exchange of data—i.e., library bibliographic networks, MARC, and the library community.

It is important that the logical model developed by the Smithsonian Institution also demonstrates that the database must be the product of cooperative development, with values for particular attributes contributed by distinct departments in the museum and by a variety of scholarly communities including art historians. The range of information required in art scholarly discussions, as the ADAG project has shown, requires that the values for particular attributes in the database must be contributed by specialists in various disciplines. It is not sufficient, if this discourse is to be intelligible, for such databases to be constructed from commonly defined data elements. It is critical that the disciplines also accept common vocabularies for specific fields of information such as those being developed and maintained by AAT. Thus the logical design, linguistics analysis, and philosophical debate support the conclusions reached by planners of networks in which one might realize an art scholarly database—i.e., the only practical means to achieve this end is to provide to the holders of the art objects (largely museums) capabilities which will encourage them to build databases containing information which is required in the conduct of scholarship. The informational objectives of scholarly and collection management systems are distinct from one another, but their informational content overlaps, and neither function can be supported solely by the data it provides to the system; the symbiosis is complete for an intellectual point of view and is compelling as a practical matter. Only in the fusion of the needs of collections managers with the requirements of scholars will the cultural world be able to afford to construct art scholarly databases which satisfy both.

REFERENCES


Thinking About Museum Information

PATRICIA ANN REED AND JANE SLEDGE

INTRODUCTION
IMAGINE CATALOGING without AACR2 (Anglo-American Cataloguing Rules, 2nd ed.), Library of Congress Name Authority, and Library of Congress Subject Headings. Welcome to the world of museum cataloging. This article discusses work in progress at the Smithsonian Institution (SI) in developing a system to understand and to articulate the information needed to support collections-related functions.

During the course of this work four major points emerged: (1) technology is not the answer to information problems; (2) a structured process of information analysis is essential to the understanding of information requirements; (3) the structured process requires allocation of scarce resources—people, money, and time; and (4) the resources expended on the structured process to analyze museum functions and data yield significant benefits that pay off in the design and implementation of systems.

In the spring of 1987, members of the "art community" began a structured process of information analysis to develop a graphic model of art data. (The "art community" is a group of seven Smithsonian museums with major art collections: The National Museum of American Art, the National Portrait Gallery, the Hirschhorn Museum and Sculpture Garden, the Freer Gallery of Art, the Arthur M. Sackler Gallery, the National Museum of African Art, and the Cooper-Hewitt Museum of Design and Decorative Arts.) What follows is a description of the use of a structured methodology and a progress report on some of the insights gained as a result of this work. Although the Smithsonian environment
may be unique because of the size and diversity of its collections, the functional analysis and data modeling methodologies provide insights applicable to other museums.

**Smithsonian Background**

Information processing at SI has been characterized by computer applications developed in response to individual or departmental needs. Standardization and exchange of data across departmental boundaries were not immediate goals. Each division of each department of the SI museums assumed responsibility for, and separately developed, its own data standards.

SELGEM (SELF-GEnerating Master), a computer system developed for museum collections by the Smithsonian Institution in the early seventies, served well; but it relied on magnetic tape technology, batch processing, and hard copy output for which Smithsonian staff often had to wait as long as two weeks. These constraints severely limited the ability to maintain an inventory for collections of objects numbering in the hundred millions; although when the U.S. Congress mandated and funded a complete collections' inventory, SELGEM was the only available repository for the inventory data.

Museum staff and data processing personnel agreed that there must be a better way. The better way for the Smithsonian, the Collections Information System (CIS) (an IBM 4381—a mainframe running the VM/CMS operating system—and Infodata’s INQUIRE—a text-oriented database package), is formulated upon the realization that while individual solutions may be practical for the short term, they are less effective in the long term. The understanding that the Smithsonian is a community, where neighbors have common interests, precipitated a search for solutions beyond traditional hardware and software technology.

**Data Administration and Information Architecture Project**

In the spring of 1985, the Office of Information Resource Management, the Smithsonian's computer services department, staffed a data administration function to define and manage the Smithsonian's data as an institutional resource. Data administration proposed a comprehensive approach to systems development using an Information Architecture project to analyze and define both the functions performed at the Smithsonian and the data required to support those functions. (In April 1986, a Request for Proposal was released to acquire a methodology for building the Information Architecture. The contract was awarded to Technology Information Products (TIP), Wakefield, Massachusetts.) The project will produce a blueprint for the integration of all Smithsonian information systems. The project has two phases: Phase I will define and analyze functions and Phase II will define and analyze data.
Phase I

Phase I (functional analysis) identifies and defines the major activities of the Smithsonian and the staff doing the work. The Collections Information System will support information needed by collections management, research, and public programs. Museum collections management work requires an information system that supports the acquisition of objects, title transfer, shipping, object tracking, conservation, maintenance of collections documentation, and much more.

Figures 1 and 2 are examples of functional analysis blueprints which document workshop discussions about "Plan Collections Acquisitions," part of the broad function "Manage Collections." Figure 1 illustrates the component activities of "Plan Collections Acquisitions."

The Smithsonian collects objects both opportunistically and with predetermined intent. Not all objects offered to the Smithsonian are accepted, while other objects are purchased or solicited. Rejections and acquisitions are based on established criteria and are dependent on functions outside of the "Plan Collections Acquisitions" process. Figure 2 supports Figure 1 by showing other functions and information resources that contribute to "Plan Collections Acquisitions." Other functions, illustrated in detail on separate diagrams, that contribute information or criteria to Figure 2 are "Define Collections Policies," "Evaluate Research Possibilities," and "Identify and Select Objects." These other functions, represented in Figure 2 by three-sided boxes, send information to and receive information from "Plan Collections Acquisitions."

External factors also influence Smithsonian collecting. Collections are offered to the Smithsonian for acquisition, or government agencies are legislated to transfer collections to the Smithsonian. External factors, beyond the Smithsonian's direct control, are illustrated by a three-sided box with a bar. The type of information sent to and received from the internal and external functions is recorded on connecting lines with arrows showing the direction of the information flow.

Information is also received from and sent to "information stores." These are illustrated in Figure 2 with the name of the "information store" held between two parallel lines. The stores may be physical collections of objects, filing systems, computer systems, staff expertise and knowledge, Smithsonian policy, etc. Again, information sent from the "stores" to the function is recorded on the connecting lines with arrows showing the direction of the information flow.

Phase II

Phase II (data analysis) identifies information needed throughout the Smithsonian Institution and uncovers the relationships among sets of information. It employs a rigorous data modeling process that focuses on data rather than function. "Data modeling is the process of trying to 'uncover' the natural structure and meaning of data required
Figure 1. Functional business model plan collections acquisitions

Figure 2. Simplified information usage model plan collections acquisitions
by the entire organization...a data model describes the inherent relationships of the data within a business rather than how data is currently used or will be used in the future" (Technology Information Products 1985, p. 3).

An important distinction separating the data modeling phase from the functional analysis phase of the Information Architecture project is that in the data modeling effort there is no orientation to actions. The diagrams say nothing about who does what with what information. There is no flow of information; the information is at rest. This separate study of data, without consideration of functions or automated systems, reveals the structure of the data to be used by the new Collections Information System.

**Data Elements**

The first step in Phase II (data analysis) began before the Information Architecture project started. Existing SELGEM data, manual records, and new data needed for the Collections Information System were defined to the data element level. This meant that each piece of data was defined and separated into component parts. For example, "Artist Name and Life Dates" was stored in SELGEM as a text field. During the process of data analysis, the data elements in "Artist Name and Life Dates" were identified as LAST NAME, FIRST NAME, MIDDLE NAME, BIRTH DATE, and DEATH DATE. Also defined was a data element called DATE QUALIFIER which holds values such as "?", "CIRCA," "BEFORE."

Teams of museum staff (curators, registrars, librarians, archivists, etc.) and data administration staff met to clarify each data element. The effort required staff to question the meaning of their data. For example, three different people defined DATE OF ACQUISITION, DATE OF ACCESSION, and DATE DONATED. Through discussion they realized that four different concepts were represented. At the Smithsonian, acquisition is different from accession as the Smithsonian may acquire objects it does not accession. Accessioning implies acceptance of additional responsibility for long-term maintenance and care required by the public trust. Donation implies an acquisition or accession by method of a gift which in turn can be a bequest. These actions occur on a particular date. After each data element is defined, staff in the Smithsonian museums understand its meaning.

The Smithsonian uses an automated data dictionary to document: the data dictionary name for each data element; the data element definition; the format of the data element; the length of the data element; the number of occurrences of the data element; and the users of the data element. The definition of data elements continues throughout the data modeling effort. The data dictionary is updated to reflect new insights on the organization and relationships of data elements.
**Entities—Groupings of Data Elements.** The next step in Phase II (data analysis), groups data elements into entities. An important concept is that of the primary entity. A primary entity is a person, place, thing, concept, or event which exists independently and about which the Smithsonian keeps information. The data elements that describe or define an entity are placed in a Logical Data Group (LDG) that represents the entity. Each LDG for a primary entity contains a data element, called the primary key, which uniquely identifies each occurrence of the entity.

An example of a primary entity represented in an LDG is an object. The data elements that define and describe an object are identified and grouped into an LDG called OBJECTS. Some of the data elements placed in OBJECTS describe an object's size, color, storage location, accessibility, and credit line.

Another primary entity considered by the teams seemed to be PEOPLE. In looking at the data elements which describe people, a tendency to confuse data values (the contents of fields) with data elements (the names of fields) became apparent. For example, some of the data elements originally defined included:

- **NAME OF ENGRAVER**
- **NAME OF ARTIST**
- **NAME OF CREATOR**
- **NAME OF DONOR**
- **NAME OF BORROWER**

Analysis showed that the same data elements describe and define any individual, regardless of what he or she does, and a new concept emerged. There are two primary entities—ROLE PLAYERS and ROLES. The Logical Data Group for the primary entity called ROLES contains the names of the roles that role players can play such as engraver, artist, creator, donor, and borrower.

**Data Relationships—Intersection Entities.** When the primary key of a ROLE PLAYER is combined with the primary key of a ROLE, an intersection entity—ROLE PLAYERS & ROLES—is created. One primary entity is now associated with another primary entity forming a meaningful data relationship. This structure, illustrated in Figure 3, has many advantages. An important space-saving advantage is that information about a particular individual occurs only once in the ROLE PLAYERS file. The name of a role occurs only once in the ROLES file. A ROLE PLAYER entity can link to one or more roles as often as necessary by combining the primary key of a particular ROLE PLAYER with the primary key of a particular ROLE. These links appear in the intersection entity ROLE PLAYERS & ROLES. The intersection entity ROLE PLAYERS & ROLES contains additional pertinent data elements such as the begin and end dates during which
the role player played the role. Another advantage is that additional roles can be added to the ROLES file at any time—data values are expandable.

The intersection entity of ROLE PLAYERS & ROLES can be combined with the primary key from the OBJECTS entity to form a more complex intersection entity called ROLE PLAYERS & ROLES & OBJECTS, illustrated in Figure 4. Role player A, for example, can be the creator, owner, or donor of object A, object B, or object C. The intersection entity documents these relationships.

A problem arose when the realization came that there are primary entities for persons (which we have been calling ROLE PLAYERS), organizations, and culture groups. Each of these is a separate entity because the data elements kept within them are different. For example, an organization may have specific product or brand name associations, while a cultural group may have hierarchical affiliations to other cultural groups.

Each of these entities, however, can play many of the same roles. A person, an organization, and a culture group can create an object and play the role of creator.

Two solutions emerged for this problem. First, the primary entity ROLE PLAYERS became three primary entities—ROLE PLAYERS-PERSONS, ROLE PLAYERS-ORGANIZATIONS, and ROLE PLAYERS-CULTURE GROUPS. Second, a new data element—ROLE PLAYER TYPE (person, organization, or culture group)—was added for each occurrence of the ROLE PLAYERS & ROLES intersection entity to show whether the role player is a person, an organization, or a culture group.

Besides primary and intersection entities, the methodology defines other kinds of entities. A type entity contains data for a primary entity that does not apply to all occurrences of the primary entity. Data documenting objects in the art collections differ from data documenting objects (specimens) in the natural history collections. The primary entity OBJECTS remains, but the Logical Data group representing it contains only the data elements that describe both man-made and natural history objects. OBJECTS-MAN-MADE is a type entity containing data elements used only for man-made objects, while OBJECTS-NATURAL is a type entity containing information used only for naturally occurring specimens. Within these broad types, there are subtypes. Certain data elements are needed for textiles or apparel and not for paintings, or for fish and not for minerals.

A repeating entity contains data that repeat for any given occurrence. For example, a single man-made object can have many marks. The data elements that describe a mark become a repeating entity represented by a Logical Data Group called OBJECTS-MAN-MADE-MARKS. Data elements for this entity are type of mark, material of mark, method of application, language of mark, alphabet of mark, text
Figure 3. Data relationships—intersection entities

Figure 4. Elements of the complex intersection entity ROLE PLAYERS & ROLES & OBJECTS
of mark, and location of mark. Another example of a repeating entity is OBJECTS-DIMENSIONS. Dimensions are often recorded in both inches and centimeters.

**The Data Model**

The purpose of the data model, which resembles an electrical diagram, is to represent visually the data relationships and dependencies discovered during the data analysis process.

The model is a series of named boxes, each of which represents a Logical Data Group. Each box connects to another box with a single line. The line leading into a box may have a trident that appears to "plug" into another box. The presence or absence of the trident shows whether there is a one-to-one, one-to-many, or many-to-many relationship. In Figure 3, both ROLE PLAYERS and ROLES have a one-to-many relationship with the role PLAYERS & ROLES box, meaning that one role or ONE ROLE player may occur in the intersection box many times.

When the data modeling process is complete, the data elements needed for the Collections Information System will be represented in specific entities, and entity relationships will be shown. There will be too many entities to model in an intelligible fashion on a single sheet of paper. A high-level conceptual model will show the major primary entities and related intersection entities. The complexities created by repeating and type entities will be shown in separate models. A model will be drawn for each primary entity to show its type and repeating entities. Models will also be drawn to group together all entities needed for a particular function such as "Plan Collections Acquisitions."

Finally, the Information Architecture project will merge the results of Phase I (functional analysis) and Phase II (data analysis) to create matrices that show the relationships between data and functions. The matrices will show which functions create what data, which functions use what data, and which functions send changes to the database. The matrices will help to establish priorities for automation by showing what functions produce the information needed to automate other functions.

The goal of data modeling is to develop systems that are data driven rather than process driven. Processes are subject to change while data tend to be constant. Staff change jobs, organizations reorganize, and technology advances. In contrast, the data collected at the Smithsonian will remain essentially stable. Corrections may change data content, areas of interest may expand to support new research, and data may be used in new ways to support new activities; but the base-level data are not expected to change radically. Object and role player information will remain essential to the Collections Information System.

The data model for the Collections Information System is the ideal or utopian view of the data, independent of hardware or software
considerations. It is important to realize that there is a distinction between the data model (the ideal) and the system implementation (the reality). Hardware, software, time, staff, and financial resources will impact upon the system implementation. The model is the blueprint for the ideal reconfiguration and migration of SELGEM data. In translating the logical model (ideal) into the physical design (reality), the system design and development team will need to make tradeoffs and compromises to accommodate system limitations and resource constraints. The blueprint enables the system design team to preserve the data relationships and ensures that, as the system expands, all the pieces fit.

Lessons

The most astounding "whack on the head" to date is the discovery that the rigorous application of the Information Architecture methodology in Phase II (data analysis) produces a view of the data that is different in kind rather than degree. The difference in kind begins with the ability to distinguish clearly between data values (artist, donor, etc.) and data elements (i.e., NAM-ROLE) and continues with the precise definition of data elements. This creates the groundwork needed to build Logical Data Groups which relate data in new ways, providing increased flexibility and freedom to reflect the complexity of museum information.

Museum information consists of complex structures of related data groups. Data analysis shows that, while museum information may be lengthy, it is much more than paragraphs of descriptive text. Data analysis identifies and names the ideas embedded in language. The naming of concepts (such as ROLE PLAYERS, ROLES, and OBJECTS) provides the ability to associate one concept with another in a multidimensional fashion. For example, bibliographic references usually refer to the accession or catalog record as a whole rather than to specific data groups. As illustrated in Figure 5, the model attaches references by their primary keys precisely to the data groups referenced—people, places, events, concepts, and objects.

When defining data elements to build the data dictionary, museum staff exhibit a very human desire to continue cataloging traditions. Many of these traditions are implicit rather than explicit in nature. Days were spent discussing such things as object-part relationships; related objects; subject matter; classification systems; geographic naming conventions (What is a region?); multiple artist attributions; calendar schemes (Aztec, Islamic, Jewish, and Chinese); and relative time scales (eras, periods, dynasties). Data analysis provides a forum to question practices found within museum cataloging. Are labels marks? Can there be more than a single alphabet in an inscription, and how is this
handled? What is the difference between decor and motif? What information is in classification systems and why? When is a photograph an object, and when is it documentary material?

Much of the success of the project is attributable to the use of graphic communication tools. The process used in the project, including the diagramming techniques and symbols, proves to be an excellent mechanism for promoting discussion. The old adage that "a picture is worth a thousand words" holds true.

One of the greatest rewards occurred during the 1987 annual meeting of the International Council of Museums' Documentation Committee. The Data Standards Subcommittee began to develop a data model by combining information produced by (among others) the Museums Documentation Association—United Kingdom, the Smithsonian Institution, the British Museum, the Victoria and Albert Museum, the National Museum of Ethnography in Sweden, and the National Museum of Civilization and the National Museum of Natural Science, Canada. Committee members compared data models developed within individual museums. The commonalities were startling. The subcommittee decided that the development of an international standard for museum information was an achievable goal and committed itself to the sharing, analysis, and integration of existing models. A representative of the International Standards Organization attending the meeting expressed interest and support for the project.

CONCLUSION

Museum staff involved with the development of the Collections Information System are pioneers of the Smithsonian's Information Architecture project. As other areas of the Smithsonian using or developing automated systems—such as personnel, finance, facilities management, libraries and archives, and security—participate in the Information Architecture project, greater benefits will be realized.

Functional analysis provides a means of establishing links and ties between different areas of the Smithsonian. Information systems are an important component in the synergy of the Smithsonian. Many areas
require access to data to support work in progress and in turn generate information of interest to others.

Data modeling provides a means of standing back and examining closely-held ideas about the way museum information works while studying the realities of the data. We are beginning to relinquish our preconceptions about the way data "must be." Instead, we are on the way to understanding the reality of what information is and, equally important, how it can be structured and stored to serve our many needs.

**Reference**

At the Confluence of Three Traditions: Architectural Drawings at the Avery Library

ANGELA GIRAL

Next to airlines, libraries today boast one of the most successfully shared databases of information. As with airline reservations, the initial impetus for the computerization of library cataloging was economic—the computer as a speedy way to communicate essentially repetitive information over vast distances. This is based on the assumption that many libraries across the land would all be cataloging the same book, and that the costly intellectual work could be shared by many libraries if there was an easy way of copying the first record entered into the database (American Library Association 1978).

It was not easy to develop the international standards necessary for this cooperative effort. It took approximately 100 years for the adoption of the Anglo-American Cataloguing Rules (AACR2) that are today the "Bible" of book cataloging in this country.

But unlike libraries, both archives and museums collect materials that are, by definition, unique. The economic incentive of "copy cataloging" has no validity for archives or museums and thus it has taken longer for these two kinds of institutions to agree to the concessions and compromises that are necessary to achieve standards. Two incentives seem to exist for the creation of standards for museum cataloging practices. One is the proliferation of cross-disciplinary collections and the desire for integrated catalogs (architecture as part of material culture as well as of art history and socioeconomic history). The other is the ability to incorporate the image into an automated cataloging system.

Trevor Fawcett (1982), in his criticism of AACR2, called for an effort to "harmonise standards" and said that "if the potential scope of
catalogs is to be all embracing, the characteristics of artworks and many other candidates for inclusion will need pondering as much as the familiar book” (p. 30). And Wendy Sheridan (1981) of the London Science Museum) wrote that “if the coming decade, with signs of economic decline and microtechnological growth, is to produce transferable data records, it follows that liaison to achieve total compatibility of fields and discuss common problems may be timely and mutually beneficial” (p. 30).

A simply stated goal within the mission of the Avery Architectural and Fine Arts Library at Columbia University is the provision of integrated access to the contents of the collection regardless of the format. Ideally, a user should be able to find in one spot an answer to a question such as “What do you have on Frank Lloyd Wright?” and know that there are 156 books by him, 136 books about him, at least 178 periodical articles on him, and approximately 600 drawings by him.

The specific subject of this article is the work that has been done at the Avery Library on a project named AVIADOR (Avery Videodisc Index of Architectural Drawings on RLIN). The name tells it all: it is a project for the creation of a cataloging (or indexing) system for architectural drawings that will allow integration of bibliographic and intellectual access to that collection into the databases of the Research Libraries Information Network (RLIN) along with the bibliographic access to information for the more traditional collections of books and periodicals. We propose to utilize the new technology of videodisc for the incorporation of a graphic data element into this cataloging and indexing system.

This project has often been referred to as a prototypical application of emerging national standards, and thus the word that the acronym spells is a name appropriate both to this notion and to the national origin of the project director, for AVIADOR means pilot in Spanish. The project has received funding from the Mellon Foundation, the National Endowment for the Humanities, and from the Eastman Kodak Company.

The goal of project AVIADOR is to create a computerized catalog of a select group of 45,000 architectural drawings in the Avery Library collection incorporating a videodisc image as a graphic data element in the system. A fuller description of the project and its goals is published in an article in the spring 1986 issue of Art Documentation (Giral 1986); this present article will focus on some of the problems encountered in the implementation.

This present article’s title, “At the Confluence of Three Traditions,” describes appropriately where we find ourselves today with architectural drawings in general and with the project in particular. The three traditions referred to in the title are the archival, the curatorial, and the library traditions.
Architectural drawings are a significant component of the personal archives of individual artists and designers, the corporate files of architectural and construction firms, or the official files of state and municipal building and public works departments. Architectural drawings can also attain singular heights of beauty and as such have traditionally found their way into museums and artistic collections. It has been suggested that, given the prices attained by some contemporary architectural drawings, surely their designers make more money from selling their drawings than from selling their buildings. The proliferation in recent years of architectural exhibitions, gallery sales, and even architectural museums (of which there is a burgeoning international association, the International Council of Architectural Museums [ICAM]) is but the latest manifestation of a strong curatorial tradition in the handling of architectural drawings.

As tools for the study of architectural history and for the scholastic training of new professional practitioners, architectural drawings traditionally have also been found in libraries. Some librarians have gone as far as seeing somewhat of a parallel with the book in 20th century sets of architectural working drawings. They both have elements such as title blocks and cover sheets, sequential numbering (or pagination), and they are produced in multiples, thus enhancing the possibility that exactly the same set of drawings may be found in various distant repositories, one having come from the architect, one from the construction firm, one from the owner, etc.

This article is written from the point of view of a librarian about a collection that exists in a library. It was found, however, in the process of defining the cataloging elements that were necessary for the intellectual control of the collection as a library collection, that we neither could nor wanted to discount important elements that come from either the curatorial or the archival tradition. The word *confluence* in the title was chosen in order to acknowledge that just as in the confluence of strong streams of water, the initial result is turmoil—turmoil that appears to impede progress—so it is also in AVIADOR although this author wishes to retain the vision of a calmly flowing estuary through which the records are beginning to glide into the ocean of orderly intellectual information for the study of architecture and allied disciplines.

At a conference convened in early 1981 by the American Institute of Architects Foundation, bringing together people from diverse disciplines under the title “Toward Standards for Architectural Archives,” it took the good part of a day for some librarians to figure out that the insistence of archivist colleagues of the importance of appraisal as a preliminary to cataloging did not mean that they wanted to bring in an outside expert to place a monetary value on the collection so that the donor could take a tax deduction. That is what appraisal generally means to librarians.
To quote Dennis McFadden (1981), "the need for consistently used terms and for developing a naming methodology is of primary importance" (p. 3). In spite of this early warning, months into the project, it was realized that one of the impediments to progress was a lack of consensus among the project principals on the meaning of some basic words. A set of working definitions was produced for the words *collection*, *project*, and *set*, and a chart was prepared (see Figure 1) outlining the relationships among these three concepts ("Working Definitions for Cataloguing" 1986).

This schema in turn has clarified that what we are describing, cataloging, and indexing are the drawings and not the building projects for which they are working documents. However, the project (its name, its owner, sponsor, occupant, etc.) is a key concept in unifying the set and in making the link to other types of information (books, periodical articles) related to it that may be found in the library and thus in the integrated database.

The next barrier that was encountered was the concept of authorship. In the development of cataloging rules for books, one overarching principle was that "the catalog should both identify a particular book and assemble the works of a particular author" and that the "fundamental basis for the organization of the catalog [was the recognition of authorship]...this principle has been basic in western librarianship from earlier times, although eastern cultures have usually preferred to consider title as more important" (Wright 1976, pp. 39-40). The AACR2 that we use describes the main author as "the person or persons responsible for the intellectual or artistic content of the work." Easy, we said, it clearly means the architect. Invoking the library tradition we told ourselves that it is not the typist or the typesetters, but the author of the book who gets the credit and is symbolized by the main entry. In the same manner, it is the architect, and not the draftsman who puts pencil to paper, who should get the credit. Thus Cass Gilbert is the author of a drawing in the Avery Library of the New Haven Railroad Station, although it clearly states in the drawing that it was "drafted by T.R. Johnson."

Ben Tucker, head of the Descriptive Cataloging Division, at a meeting held at the Library of Congress, volunteered the same explanation by way of telling us there was no problem that needed a rule interpretation. He was not so sure however when we expressed faith in the prevalence of corporate authorship of architectural drawings, for the current trend in book cataloging is to move away from corporate authorship. Rule 21.1B2, in the current *Anglo-American Cataloguing Rules*, lists the categories under which a work must fall in order to warrant entry under a heading for a corporate body. A strict interpretation of this rule prohibits using corporate entry for architectural drawings. But it is the case in modern architectural practice that design and...
Choice of Treatment
The decision on how to treat the drawings in a collection is primarily a curatorial one, i.e. the drawings will come for cataloging with a list on which the preferred treatment has been indicated by the Curator. Catalogers can challenge that choice if it presents them with special problems and may suggest an alternative.

The primary choice in this project is to create a record for a group of drawings (i.e. the whole set for a project) unless:
1. The significance of the individual drawing(s) in a set or a collection warrants single item records, or
2. The large number and/or complexity of the drawings warrants breaking them up into various sets.

Figure 1. Chart of relationships for the terms collection, project, and set

construction are team efforts in which it is frequently hard to pinpoint individual responsibility.

Until, and unless, further guidance on the matter is received, we have established as a working principle that the appearance of one or more names in the title block of a drawing followed by the word architects (in plural) implies corporate authorship and we must establish the name as such. Thus the design of the John Hancock Tower in Boston is credited to "I.M. Pei Associates" although those in the know are aware that the partner in charge was Henry N. Cobb whose design it really is, and that the drawings were executed by the hand of several 
draftsmen in the Pei offices. Similarly "Lever House," although primarily the work of Gordon Bunshaft, should properly be entered under "Skidmore, Owings, and Merrill."

In reaching this decision, the concept of legal responsibility was invoked, and we risked being led astray by this when we considered for a moment whether logic required the creation of a corporate entry for the work of one "Frank Lloyd Wright, architect" when his name was found so listed in a title block, for there surely was an implication of legal incorporation. We have tentatively settled on the use of the plural as the touchstone that will determine when to opt for corporate entry versus personal entry.

We then began to catalog Hugh Ferriss's collection and stumbled upon the problem of the renderer—i.e., someone who works independently and not only for architects but sometimes directly under commission from the client (corporate or individual), or for a newspaper in search of illustrative matter, or sometimes even on his own, like Ferriss.

Here we were tempted to use the archival tradition in order to claim that since the focus of the collection was Ferriss, with a donation from his daughter at its core, Ferriss should be the main entry. But we were not altogether comfortable with deriving a rule from the preeminence of a single renderer and we welcome input from the experience of colleagues in other repositories. When the rendering was clearly done for an architect, it is the architect who gets the main entry. At this point you might say "Why bother with main entry?" One of the beauties of the online environment is the ability to give equal standing to all access points.

The notion of doing away with main entry was adumbrated by Henriette Avram in the first document describing the MARC format (Avram 1975), and it has been embraced by the Avery Index to Architectural Periodicals when it went online in RLIN in 1979. Those who have consulted the Avery Index online must be aware that the lxx (or main author) entries have been eliminated. Each record begins with a 245 (or title) entry and has a varying number of 7xx (or added) entries.

There are at least two reasons for not abandoning the concept of main entry. The first is pragmatic (and some might even call procrustean) in that, since we have chosen to work in the RLIN environment, we want to take cognizance of the parameters of that environment.

In RLIN, when the result of a query matches more than a single record, the first display received is called a MULtiple which contains up to seven records per screen with very abbreviated information for each individual record. It was considered important to have an author, as well as a title, as part of that MULtiple display, thus the need to determine who is that author—i.e., the main entry.

The second, and perhaps more significant, reason for retaining the concept of main entry brings us to the third stumbling block, which is more in the nature of a coral reef (both in its magnitude and its potential
for beauty). And this is the question “What is the title of an architectural
drawing?”

In this area there is a strong response from the curatorial tradition
that bluntly says “The title of a drawing is what I say it is,” and that is in
direct conflict with the library tradition that says “The title of a work is
what it says it is on the work itself.” Let us examine these two traditions
a little more closely. The curator is an interpreter of collections and a
creator of exhibitions, and in that role she/he has both the right and the
obligation to name things appropriately. Appropriately to the task at
hand that is. Thus if a drawing with a title in Italian is being exhibited
in front of an American audience, clearly the obligation of the curator is
to translate the title. In preparing an exhibition with a unifying theme,
the curator has the responsibility of consistently labeling the items
exhibited, and that can justify perhaps the relabeling of some drawings.
In an exhibition of the work of a single architect, the name of the
architect need not appear on every label.

But librarians see the task as describing the collection as accurately
as possible for the use of curators, historians, preservationists, practi-
tioners, etc.—i.e., for a multitude of users. Aware of the fact that we are
using words, treacherous words, for the description of documents that
contain mostly images, the words inscribed on that document are con-
sidered as a singularly unequivocal identifying element that we are not
entitled to change.

The solution hinges upon an adaptation of the concept of a uni-
form title developed in the library tradition. There are two titles given
for almost every drawing, recording the “title proper” in the 245 field,
and creating a “uniform title” for the 240 field, the function of which is
to collocate, in an orderly manner, all the drawings that pertain to a
particular project. In this manner, the librarian’s desire can be accom-
modated for “truth in labeling” in giving a drawing by Hugh Ferriss a
245 title that corresponds to the seemingly fitting title given on the
drawing proper in his own hand: “Eight plazas and a park” and
acknowledging in the uniform title that this is one of the design devel-
opment drawings for Lincoln Center by Harrison and Abramovitz.

It is not always as easy to recognize the “title proper” even though
one may think so from the notion that most 20th century architectural
drawings contain what is known as a title block. But that title block may
not have significant information, may have been stamped later, and in
other cases there may be no title at all. When there is no title, the rule in
Graphic Materials (Betz 1982) is that the cataloger may devise a title, at
which point the librarian is given the same freedom as the curator.

Subject headings constitute another group of problematic access
points. When this project was first designed, it was thought that we
would like to have subject access to the drawings collection, which is
something unavailable now. The Art and Architecture Thesaurus
(AAT), then under preparation, seemed to be a promising vocabulary,
and in turn a collection with no prior subject indexing seemed like an ideal testing ground for the AAT. The AAT is also being tried as a source of new terminology for the *Avery Index to Architectural Periodicals* and one of the eventual, albeit ambitious, goals is to see the AAT as a way of unifying or standardizing subject access in Avery’s diversified collections. The AAT has provided the Avery Library with copies of the completed hierarchies. Among these are four dealing with the built environment: (1) Built works components; (2) Single built works and open spaces; (3) Built complexes and areas; and (4) Settlements, systems, and landscapes; and three dealing with documents: (1) Document types, (2) Drawings, (3) Visual genre. The AAT also sends us review copies of the hierarchies under development.

We have worked with the AAT and with a task force of the Art & Architecture Program Committee of RLG on the development of an applications protocol for implementation in RLIN. What is meant by an applications protocol is a set of rules for composing headings or strings out of AAT terms. We have just begun to develop an implicit indexing policy for AVIADOR and in doing so have encountered some problems with conflicting standards.

The archival profession should be thanked for the introduction of the concept of genre into the MARC formats. First made available in the format for Archival and Manuscript Control, it was given the tag 655, and it is now also available in the Visual Materials format. Parallel to this is the 755 tag for an access point based on physical characteristics. We are giving at least one 655 heading and one 755 heading for each record. In a recent article entitled “Analyzing the Subject of a Picture: A Theoretical Approach” Sara Shatford (1986) relies on Erwin Panofsky’s theory in the identification of three levels of meaning in pictures.

The first level of meaning Panofsky calls “pre-iconography,” defined as “primary or natural subject matter,” which Shatford equates with generic description. The second level, iconography, Panofsky calls “secondary or conventional matter,” and the last one, iconology, is “intrinsic meaning of content” or interpretation. It is possible to describe Panofsky’s first two levels of meaning as each having two aspects: of and about. At the pre-iconographic level, the of aspect is generic description of objects and events; at the iconographic level, it is a specific, or proper, appellation of those objects and events.

Shatford (1986) then goes on to make a comparison between meaning in pictures and meaning in language and she states “words are different from images...pictures are simultaneously generic and specific: any picture of a bridge, including a diagram, is of a particular and specific bridge, even if it does not represent an actually existing, named bridge” (p. 47).

Shatford’s theoretical discussion is very useful in clarifying some elements of the evolving subject indexing policy of AVIADOR. We are
creating headings, or access points, that deal only with what drawings are of and not attempting to interpret what they are about or what are their stylistic characteristics. But in creating these headings, we are violating the word-based library tradition and giving both generic and specific headings. Thus there is always a heading for the name of the specific building depicted in the drawings as well as a heading for the building type it represents.

In the case of genre headings (field 655 of the MARC record) we are also indulging in this redundancy by giving every drawing that merits it the heading "architectural drawings" in addition to whatever specific type of drawing heading that corresponds to it—i.e., "blueprints," "working drawings," "plans," "elevations," etc. This convention allows these records to be retrieved as a subset of the larger file of Visual Materials records in RLIN and also allows them to be distinguished from those drawings in the collection that are made by architects but are not architectural (ornament drawings and nudes by Louis Sullivan, airplanes and nightscapes by Hugh Ferriss, etc.).

Building names present a serious problem: few of them have been established in the authority files of the Library of Congress, and those that have been established follow a somewhat peculiar division of the world which relates to the division of labor at the Library of Congress. In this division, the names of buildings such as banks, churches, or abbeys, occupied by a corporate body that could also be the author of a publication are established by the Descriptive Cataloguing division and tagged as 610. Names of buildings whose corporate occupant is not expected to publish—i.e., schools, villas, fire stations, and houses—are established by the subject analysis division and tagged 650; some buildings such as airports, farms, and parks are inexplicably tagged 651 because their name presumably starts with a geographical component.

The address could be an important access point, not only because frequently it, rather than a name, is what we find stated in a drawing, but also because a retrieval of architectural information by address is a potentially useful tool for the study of the architecture of cities. There is no acknowledged standard for the construction of street indexes except perhaps for the graphic coding of city sections that is used in Sanborn atlases. This author has fantasized along with a few others on the creation of an ISBN (International Standard Building Number) or ISLN (International Standard Lot Number) that could be developed with the aid of geo-coding principles already in existence. Such a number would retrieve information on the same building for those who call it "Saint Sophia" and those who call it "Ayasofia," or in another case for those who call it "St. Peters" and those who call it "San Pietro in Vaticano." But there do not appear to be any significant steps in that direction.

An underlying principle in the conduct of the project activities can be stated simply as: "We will not reinvent the wheel, but instead we will
find appropriate wheels designed for other machines and fit them together in the development of a mechanism suitable for architectural drawings.” In that process of fitting wheels together, there are inevitable gaps that need to be filled as well as instances where an existing wheel may need a modification in order to best serve the need. In the latter case, we have taken it upon ourselves to work with the original wheel designer to make the necessary modifications. It is in this spirit that we have developed working relationships with Elisabeth Betz Parker at the Library of Congress Prints and Photographs Division (for the interpretation and expansion of her Graphic Materials), with Ben Tucker at the Library of Congress Descriptive Cataloguing Division (for the interpretation of AACR2), with Toni Petersen of the AAT, and of course with the development staff at the Research Libraries Group (RLG) who, in designing software modifications or enhancements to the RLIN system for the project, are constantly keeping in mind how those enhancements and modifications may be useful to and used by other projects and institutions.

The link between bibliographic record and videodisc image will be created through the use of the 789 (component item entry) field. Designed by RLIN specifically for this project, it is a repeatable field that has been defined in a manner that could be useful to other projects and other formats as a field that “contains the entry for a component item when the record in hand is a bibliographic description of a collection containing the item described in the linking entry field.” Using the 789 field, it is possible to identify, index, and describe the individual drawings that make up a set and to create a one-to-one link from each accession number listed in the RLIN record to its image in the videodisc (Lucker 1987).

In closing, a word of warning to anyone embarking on a similar project in which the goal is to advance the development of standards through a specific application. One of the most difficult tasks is that of careful navigation where, in addition to the specific stumbling blocks, one must beware equally of the Scylla of endless, if fascinating, theoretical discussions and the Charybdis of an excessively pragmatic approach that says “let’s just pick a way that suits us and do it.” The task can be frustrating in turn to the pragmatists and the theoreticians in the team, but it can also be immensely satisfying.

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Achieving the Link Between Art Object and Documentation: Experiences in the British Architectural Library

Jan Floris van der Wateren

INTRODUCTION
In 1983, the British Architectural Library (BAL) initiated an ambitious scheme to automate all of its systems into one integrated database. It was ambitious in the sense that the declared aim was to maintain the specific requirements of the architectural curator who deals with "objects" while introducing the systems and standards already accepted and used by the librarian. In short, marrying two traditions to the satisfaction of both partners. Although fully forewarned by textbooks, it was perhaps fortunate that the complexity and the difficulties which were to be encountered in the process were not clearly acknowledged at the time. Textbook cases are validated only by actual applications. The first phase of the project was completed when the Architecture Database went online on DIALOG in 1987, the first online database exclusively devoted to the subject of architecture and to include different types of documents and objects. In its first phase—which is now online—books and periodicals are treated; in its second phase—to be introduced in 1989—drawings, photographs, and architectural books as "objects" will be added (see the discussion in the section dealing with The Printed Book as Object). The third phase will incorporate "realia"—i.e., models, medals, architects' instruments, etc. This article will briefly describe the way in which the BAL went about achieving a link between the object and its documentation.
THE BAL AND ITS COLLECTIONS

The British Architectural Library is the private library of the Royal Institute of British Architects (RIBA) which was founded in 1834. The library has been accessible to the public since the 1850s, and its policy has been, from the beginning, to make information about its collections available as widely as possible through publications which vary from simple listings to scholarly catalogs and monographs. This is in line with the RIBA's purpose as set out in the first Royal Charter granted in 1837, namely:

the general advancement of Civil Architecture...and promoting and facilitating the acquirement of the knowledge of the various Arts and Sciences connected therewith; it being an art esteemed and encouraged in all enlightened nations, as tending to promote the domestic convenience of citizens, and the public embellishment of towns and cities. (Royal Institute of British Architects 1971, p. 7)

Linking the objects collected by the RIBA to information about them has been formulated as "the collecting, conserving, organising and making available as a unified and coherent collection materials relating to the history and practice of architecture for the benefit of users working for the 'general advancement of civil architecture' " (Van der Wateren 1988. In press)

In the field of architecture, the BAL is preeminent. Its collections are of such importance and significance that the BAL is recognized as the de facto British national architectural library. The objects in its five main collections (Books, Periodicals, Drawings, Photographs, and Manuscripts Archives) cover, alongside traditional documents, printed ephemera, drawings, lithographs, engravings, etchings, models, photographs, slides, films, tape recordings, furniture, instruments used by architects, medals, coins, busts, portraits, paintings, etc. In fact, when viewed from the point of view of objects, the BAL could be described as a museum with traditional museum curatorial functions developed in parallel with the documentation functions of a traditional library service. The fact which made the successful linkage of these two functions possible was the advent of automation and placing emphasis on the area of information output which was much neglected in the past and which played a predominant role.

EARLY ATTEMPTS AT CATALOGING

The research activities of the library resulted in the first publication of a catalog of its holdings in 1838, nearly thirty years before the publication of the Universal Catalogue of Books on Art. This was augmented in 1848 by a further book catalog and a third published catalog of printed books and manuscripts appeared in 1865. The growth of the object collections led to the publication of the Catalogues of the Drawings, Prints and Photographs in the Library of the RIBA in 1871 and a Catalogue of Medals, Busts, Casts, Marbles, and Stones in the
Collection of the RIBA in 1874. In 1889, a consolidated catalog, the Library Catalogue: Printed Books and Manuscripts 1834-1888 appeared. The last comprehensive printed catalog of books and manuscripts appeared in 1937 and 1938 in two volumes as the Catalogue of the Royal Institute of British Architects' Library: volume 1 Author Catalogue of Books and Manuscripts, and volume 2 Classified Index and Alphabetical Subject Index. The first of twenty volumes of catalogs exclusively devoted to the drawings collected since 1834 was published in 1969 (vol. A), and volume T through Z appeared in 1985. The archives of the RIBA were, for the first time, systematically described in The Royal Institute of British Architects: A Guide to its Archive and History in 1986 (Mace 1986). The photographs collection has had a checkered career and a systematic catalog to it is only now underway.

Indexing of periodicals dates back to 1900 with a purely in-house system (now being microfilmed) (The Grey Book Index. In press), the first published format appearing as part of the 11 November 1933 issue of the RIBA Journal and culminating in the Architectural Periodicals Index from 1972 onward. Online access was achieved with the Architecture Database in 1987.

AN INTEGRATED SYSTEM

It will be seen from the previous discussion that the BAL, from its inception, collected a variety of art objects and documentary resources, and that it followed a policy of linking these through various forms of publication. By the 1960s, the massive increase of published documents and a proactive archival collecting policy resulting in the taking in of large numbers of architectural drawings and other objects relating to the practice of architecture promoted the development of differing cataloging systems for the different collections in the absence of a cohesive policy of linkage. Although printed documents benefited from the development of international standards of description (AACR2 was introduced in the BAL in 1972), the lack of similar standards of description for the other objects in the library's collections resulted in an in-house development of a special code for the cataloging of drawings. It was felt that object description should take precedence over bibliographic standards, and when printed documents were referred to in the drawings catalog, the general rules used in the collections of books and periodicals were not applied. For instance, AACR2 was perceived as irrelevant to the construction of name and title entries and separate sets of rules were established for use in the drawings catalog. Subject and geographical descriptions also developed independently from the usage in the book and periodical collections. The task was to demonstrate to the satisfaction of the curatorial side that library standards could satisfy curatorial requirements and that using common standards would enhance the effectiveness of information retrieval.
In fact, the BAL's history shows that the needs of the researcher and user were not yet perceived to include the effectiveness of being able to approach material relating to one subject or architect in at least the same way in all catalogs, if not in one unified catalog. Both staff and users had to become agile in jumping from one set of rules to another within two physically adjacent catalog cabinets and this general development was perpetrated in various other catalogs and indexes in the library. But this was, of course, a situation not unique to the BAL, and different institutions tackled the problems in different ways.

The opportunity to rationalize practices arrived with the development of automation. It was understood that automation alone could not solve the problems, but that cohesive systems could be achieved only through adopting common standards. Great difficulties were expected and encountered through adherence to entrenched traditions; again, this was not unique to the BAL. Similar resistance existed and exists on an international scale, the resolving of which this issue of Library Trends addresses.

In the BAL, a contributing factor to resolving this resistance was surely the fact that as those of the older generation who resisted new technology either left or moved to senior managerial posts in collection development fields, the younger generation replacing them as the primary researchers cataloging the holdings brought with them experience of the new technology and a desire to exploit its potential. They displayed a general eagerness to investigate the already established systems developed over a very long period in an effort to prevent attempts to reinvent the wheel (Giral 1987).

Another helpful ingredient in achieving an accommodation was the work of the Architectural Drawings Advisory Group (ADAG) of the Center for Advanced Studies in the Visual Arts at the National Gallery of Art in Washington, D.C. Under the chairmanship of Dean Henry Millon, ADAG became a forum for the practical exchange of views between an international group of documentalists (librarians and archivists) and curators, resulting in great benefits for both communities. Proposed by Angela Giral, Avery Architecture and Fine Arts librarian, Columbia University, ADAG early on adopted AACR2 and U.S. MARC as standards. As the ADAG system for computer cataloging of architectural drawings is developed, a MARC mapping exercise will go on simultaneously.

The third factor assisting the achievement of an internal accommodation between the object and information about it was the capabilities of the automated system specifically developed for the BAL. In 1983, the RIBA purchased a Prime 2655 minicomputer and a free-text software package (STATUS) adapted for use on Prime by the research organization BNF (British Non-Ferrous Metals), originally developed by the United Kingdom Atomic Energy Authority, for use in the BAL. STATUS has powerful retrieval capabilities and one of its strengths is its...
ability to cope with a variety of record formats. BNF, employed to do the necessary development work for the BAL, had developed various other software packages for use in conjunction with the STATUS free-text system—STRIDE, a special thesaurus software system; SCREED, a text editor; and SPEED, a data entry system. Another attractive feature of STATUS is its ability to accommodate other databases on it. At present, the text of the RIBA: Guide to its Archives and History (referred to earlier) is mounted in the BAL automated information system, and the second edition of Ruth Kamen’s (1981) British and Irish Architectural History: A Bibliography and Guide to Sources of Information is being developed on the computer as part of the BAL system. It is planned to enhance this multibase in-house system to achieve greater effectiveness in both research and information fields. For instance, it is envisaged that the 1987 text of the Banister Fletcher History of Architecture, 19th edition, will be included at a future date (Musgrove 1987).

The incorporation of these three texts into the BAL database system indicates its general outline. It consists of a central integrated database (the IDB) with satellite databases linked on the inner circle of satellites through the release of common data to the IDB, and on the outer circle by being searchable on a word-by-word basis achieved through the free-text application of indexing each word (excluding nominated common words) in STATUS. The satellite databases cater to those fields of object description which are unique to the object described and specifically provide the opportunity for adding free-text essays in which research results can be recorded and retrieved. The research satellite bases presently comprise: drawings, photographs, manuscripts and archives, early imprints catalog, biodata (described later), and the periodicals catalog (in which the histories of the titles held by the BAL are recorded). The early imprints catalog deals with the book as “object” in that the printing, publishing, and ownership histories are fully described in addition to its characteristics as an object (watermarks, binding, etc.).

The management satellites include a special database for periodicals acquisitions and another acting as an accessions register for all original (object) material acquired. The original materials are predominantly archives from architects’ offices, usually comprising drawings, photographs, and correspondence, possibly printed documents, and perhaps equipment, models, and other “realia” or art objects.

The accessions register is the only database in the system not available for access by the public. In the past when collections of original materials were acquired by the BAL, the material was sorted into groups destined for different library departments and then accessioned separately by each. This practice destroyed the potential of viewing the material collectively, not recognizing the dimension of archival history. The implementation of an automated accessions register enabled new practices to be introduced. Now a central accessions
number is allocated to a group of materials and the register contains the following information: title, description, quantity, location, accessibility, type of deposit, price, source, provenance, ownership, copyright, conservation condition, and relevant correspondence. When the accessions register record has been completed, the material is dispersed to the individual "object" departments for detailed research and cataloging. The retention of the central accessions register number as part of the final departmental accessions and location number allows for the possibility to reconstitute the material as a unit when required to do so at a future time. Each accession is individually assessed to decide what information should be released to the IDB.

A further unifying element has been the development of Biodata, a database devoted to (individual and corporate) biographical data. (The BAL project, British Architectural Biography 1834-1914, is sponsored by the Getty Grants Program, one of eight entities of the J. Paul Getty Trust. Research data from this project will be incorporated in the Architecture Database on DIALOG as from 1989.) At the first level, this satellite database acts as a names authority file, and on a second level it allows for a central collection point for research done on a person/corporate body in the course of cataloging, whereas, in the past, different departments duplicated their research efforts. The names authority aspect ensures that the same form of name is used throughout by all departments using the STRIDE thesaurus software for automatic verification. AACR2 is used throughout, incorporating, to the general benefit of the researcher, the practice of using the fullest form of the name with the addition of birth and death dates and descriptors for all members of a category of people identified by the BAL as significant. These include all architects of whom original material is held and will eventually also include all members of the RIBA. Presently, it excludes names of more transient journalists and authors, etc., as encountered, for instance, in periodical indexing.

Similar standardization is achieved through the use of standard subject headings; previously different sets of subject headings were used for different materials. Both the name authorities and the subject headings are manipulated by the STRIDE thesaurus software. When entering data, the validity of names/subject headings is checked in STRIDE and the correct forms are transferred to the data entry screen. At present, the system of subject headings used is Architectural Keywords, the machine readable form of the BAL's periodical keyword list published in 1983. The Biodata satellite provides the first new application in the BAL to allow experimentation easily with the Art and Architecture Thesaurus (AAT) as the source for standard descriptors.

Although STATUS is a stand-alone system, a BAL requirement was the linkage with other systems internationally. For this purpose MARC was adopted, which provided a further basis for aligning different in-house practices and provided the opportunity to combine a
rigorous structure with the free-text retrieval capabilities of STATUS. A special program was developed by BNF for converting the data created in STATUS to the MARC format as defined by ISO 2709. (The conversion program was built with funding from the Getty Grants Program as part of the BAL Early Imprints Project.) This conversion program makes it possible to release the BAL data to other networks. The next stage will be to develop programs to receive data from other sources. Ultimately the BAL aims to become a participant in the Research Libraries Information Network (RLIN) once RLIN has established a window for users in Europe. After initial resistance and debate, the BAL satellites dealing with nonpublished documents eventually grasped the value of MARC and agreed to follow the structures prescribed. In a sense, the incentive to use STATUS was the free-text searching ability that allows information contained in essay-type notes to be retrieved. Although the MARC application was seen to be a compromise by the nonpublished document satellites, the full-blown system does respect the integrity of each object-collection as well as the recognized standards relating to each type of object (where these exist).

Each relevant satellite releases data required for information needs in the IDB (intended for eventual direct public access). The data are extracted from the satellites by a special program which reformats the data and enlarges it for the IDB. Basic information includes all name, title, and subject entries. The IDB is therefore the center which allows the user to find, in a standardized format, information about different objects and about the documentation relating to them. One enquiry will, for instance, retrieve all the manuscripts, photographs, drawings, books, and periodical articles (and models if any) concerned with Lutyens’s Viceroy House in Delhi. However, if the user is interested only in one format, the IDB can be bypassed and the drawings satellite, for instance, directly approached.

U.K. MARC had, by the time the project was being developed, not yet developed standards for all the objects in the BAL’s collections, and other MARC standards had to be borrowed or specially developed to augment U.K. MARC. For instance MSS U.S. MARC standards were adopted in the manuscripts and archives database. For periodicals, which are indexed directly and exclusively in the integrated database (requiring no satellite base of its own), the BAL followed the MARC format developed by the Avery Library at Columbia University for its own architecture database on RLIN. The reason for this being the proposed merger between the Avery Index of Periodical articles and the BAL’s Architectural Periodicals Index.

THE PRINTED BOOK AS OBJECT

Agreements between the curators and the documentalists were largely based on clarifying definitions. The greatest difficulty encountered was the underlying attitude that documentalists do not have the
experience of treating objects and could therefore not appreciate the special requirements of the curatorial departments. An important role in dispelling this misconception was played by the setting up of a project to produce an automated catalog of the BAL’s important collection of imprints published before 1841. The curators were finally persuaded that the librarians not only had a healthy respect for the (book as) “object” but that a cataloging system was possible which could satisfy this need at the same time as dealing with the book in a more traditional bibliographic manner.

The prospect of this linking seeks to address a neglected area of research in establishing the techniques to arrive at the true identity of graphically orientated materials by recording and describing the publishing history and physical makeup of the major titles in the architectural canon. The need for this connection springs from the role that printed visual images have played in the history of art, particularly before the arrival of photography. In order to interpret the influence that such images had on the practice and study of architecture at a given time, one requires the exact identification and description of these images and the documents in which they occur.

Research into the history of various states of a book caused by printing technology, especially during the hand-press period, is well established in the fields of literary texts but has not yet been achieved in the field of books containing graphic information. In architecture, the fact that the same plates could be reused, altered, or copied indefinitely, resulting in different states of the book containing different images, has potentially had an enormous influence on the development of building.

The accurate description of early architectural books is particularly difficult because, in many instances, the text, if it is present at all, has been subordinate to the image, and descriptive techniques capable of recording the transmission of graphic images had only rarely been attempted. The project therefore aims at research into the history of why copies of the same book show confusing variations of plates, and from the concrete historical evidence drawn from the book as object itself and from other sources, to identify the part played by the people whose task it was to implement the author’s intentions. The research will aim to establish the “definitive” copy of a document against which other copies can be assessed for correct identification and completeness. The accent on the graphic content of the books will open up unprecedented access to the work of particular artists, engravers, printers, and others working in the field.

In expanding the Eighteenth Century Short Title Cataloging format (ESTC), particular attention was given to graphic images—i.e., the medium and processes involved; their size and distribution in relation to the letterpress pages; the subject matter and manner of representation; the names of those responsible for the drawings; of those making the engravings, etchings, etc. onto plate for printing; of those working
directly on stone or zinc; and the names and addresses of those responsible for printing the images. The notes fields amply provide for full explanation and information concerning the making of the book being described, establishing the author’s intentions in publishing, the involvement of patrons, the previous or subsequent appearance of the same images, variant copies, etc. The specific copy cataloged is described in a separate section in relation to its binding, inserted extraneous matter, imperfections, and provenance.

CONCLUSION

A final innovation which helped the linking of information was to create the data input screens in such a way that they appeared to follow traditionally used formats for “object” cataloging. In the case of drawings, for instance, the name of the architect/designer appears at the head of the entry although its MARC code might be that for an added entry. And this points to the fact that many of the differences encountered between the curator and the librarian could be sorted out with relative ease without compromising standards. The end result has been a much more effective and sophisticated system for information retrieval without sacrificing object-specific or document-specific requirements.

REFERENCES


One-Stop Shopping: RLIN as a Union Catalog for Research Collections at the Getty Center

JAMES M. BOWER

The cryptic title, "One-Stop Shopping," refers to the potential use of the Research Libraries Information Network (RLIN) as a union catalog for the bibliographic, archival, and visual research collections of the Getty Center for the History of Art and the Humanities. The perspective of this article is that of the visual resource librarian, and examples are drawn from the experiences of the Getty Center Photo Archive in translating cataloging records from its local system into RLIN. More specifically, the focus will be on the Photo Archive's effort to reconcile its cataloging formats with the MAchine-Readable Cataloging (MARC) formats for Archival and Manuscripts Control (AMC) and Visual Materials (VM), as implemented in their respective RLIN cataloging files, AMC and VIM. From that narrow frame of reference, however, this author hopes to draw conclusions which should be of benefit to any visual curator faced with similar problems of control, access, and integration.

First a brief explanation of the Getty Photo Archive and of the circumstances which compelled us to investigate methods to provide integrated access to the Center's collections. The Photo Archive was founded in the early 1970s by the Getty Museum's curator of paintings, Burton Fredericksen, as a visual supplement to the curatorial library. Its collections of documentary photographs directly paralleled those of the museum's objects: European painting, Greek and Roman antiquities, and French decorative arts. Acquisitions in the Photo Archive were closely supervised by the curators who also determined what kinds of information would be recorded for the photographs and the formats in which to record it. Cataloging (such as it was) focused entirely on the objects represented within the pictures with only the most cursory
information about the photographs themselves. For access, each curator developed separate card indexes to satisfy his or her own needs, and each had a unique method of arranging the material on the shelves. No one felt the collection would ever grow much beyond 30,000 photographs or that its scope would ever expand beyond that of the museum’s collections.

By 1983, however, the Photo Archive had cataloged nearly 100,000 photographs. Most of the material was purchased directly from museums and commercial photographers, but the Photo Archive also acquired subscription sets (such as the Illustrated Bartsch), maintained standing orders with major auction houses, and on rare occasions purchased scholars’ entire study collections—sometimes in concert with the Getty Museum Library as, for example, with the library and photographs of Ulrich Middeldorf. Yet no matter how closely the two departments collaborated on acquisitions, there was no attempt made to correlate the cataloging or processing of materials. By this time, the Library had begun cataloging into RLIN; the Photo Archive was still firmly entrenched in its manual scheme of item-level object cataloging.

The Library and Photo Archive remained in the basement of the Getty Museum in Malibu until July 1983 at which time the newly founded Getty Center took its first physical form in an office building in Santa Monica. This physical relocation was paralleled by a major redirection of scholarly thrust—i.e., from that of a museum library serving a select curatorial clientele, to that of a major art research library serving the needs of multidisciplinary studies in the history of all Western arts and humanities.

This transition was particularly difficult for the Photo Archive. As the scope of the collection increased to include new subject areas—e.g., Medieval art and architecture, European sculpture, and post-antique architecture—the volume of material purchased increased dramatically: over 300,000 photos in 1983 alone. The resultant backlog of nearly 1 million photos, coupled with the cumbersome maintenance of the manual card indexes, and the need to devise new cataloging schemes for new subject areas, led us to adopt an automated system for cataloging. We eventually chose the STAR system from Cuadra Associates primarily because it allowed us to prototype databases quickly, with no programming skills, and it had remarkable reporting features which would allow us to generate the necessary—and elaborate—photo labels and cards for the various subject sections.

We prepared for the advent of automated cataloging by undergoing a rigorous systems analysis of every facet of Photo Archive processing—from the ordering of photos to their reshelving after patrons’ use. One key component of this self-study was analysis of the data used to catalog the photographs—or, more accurately, the objects within the photographs. From this analysis, we attempted to create a single data format which could be used for all photos—what came to be known as “the big
Unfortunately, in an attempt to arrive at a consensus in labeling the resultant data elements, the fields were so homogenized that the staff of art historians rebelled, insisting that the inherent differences between Roman coins, Medieval cathedrals, and Dutch still lifes were insuperable, and that each should be mounted in a separate cataloging file.

To make a long story only slightly less long, we eventually reached a compromise: as far as possible, each subject section's database was defined along a consistent model, varying only in the object information needed to identify uniquely the work of art. The other parts of the model—fields for photographic description, bibliography, and geographic information (both for current and original location or manufacture)—were defined identically for each database and controlled by integrated authority files.

At this point you may rightly wonder, "how is it that he has gone on at such length without once mentioning the MARC formats?" Partly because library standards such as MARC had no place in what was still a thoroughly art historical department. More importantly, however, none of the cataloging or indexing systems that we found in use elsewhere—whether MARC-compatible or not—provided the depth of description and access which we were able to build into our own local system.

The automated system was implemented in phases beginning in Summer 1984 with the Medieval material; as the most recent addition to the Photo Archive, it had no card catalogs and no predetermined data format. Over the course of a year, and after 200 separate iterations of the data definition, the Medieval section produced its first automated cataloging labels. Antiquities shortly followed suit, with modifications from the Medieval prototype, as did Paintings and Sculpture. By Summer 1986, only Decorative Arts—with the most convoluted manual scheme—remained unautomated (although a prototype had been devised).

As the sections began developing their individual cataloging files, we began to prototype a database which would, in fact, constitute the "big bucket"—a compilation of all the separate object description fields plus the fields for photography, bibliography, and geography which had been applied consistently among all the files. It was in this database that we would truly achieve the goal of our automation effort—i.e., integrated, item-level access to the intellectually and physically disparate subject section catalogs within the Photo Archive.

This dream has been only partially realized, however, due to reorganization of the Photo Archive in late 1986. It was felt that the continuing bias toward "connoisseurship" in Photo Archive cataloging was out of step with the emerging focus of research in the Getty Center—i.e., art historiography rather than art history.
The first manifestation of this change in research focus had occurred even as the Center relocated to Santa Monica, with the founding of the Center's third resource department, the Archives of the History of Art. The Archives quickly established an important collection of primary documents on the history of art and became the repository for archival materials which had come to the center as part of collections purchased by the other departments. Similarly, the Archives acquired large collections containing significant visual materials, some of which were transferred to the Photo Archive for storage and description. By 1986, virtually all of the Archives' holdings were being reported to RLIN's Archival and Manuscripts Control file, in a mixture of item- and collection-level records.

For the Photo Archive, this restructuring meant a total reconceptualization of collection development, processing, cataloging, and reference. The photographs would no longer be considered secondary records of the objects they depict but would be primary records of the documentation of art.

Under this new weltanschauung, object-based, item-level cataloging was unsupportable. Instead, the dozens of special collections which formed the major part of the unprocessed backlog would be brought forward as integral collections, these being documents of the history of visual documentation. Where once a scholar's archive would have been cannibalized, its constituent parts dispersed to boxes in different corners of the department, emphasis was now placed on developing collection-level descriptions, both for those groups left intact and for those already cataloged into the "core" collections.

As models, we used descriptive records created by the Archives of the History of Art—in some cases, for collections split between our two departments. Yet while the Archives was doing all of its cataloging in RLIN's AMC file, the Photo Archive developed another database within its local system to house information about our special collection holdings. This holdings database had as its core a lengthy notes field containing narrative text about the collection. Occasionally, we made explicit reference from a holdings record to yet another STAR database, whether intended for inventory control of negatives, as an alternate access tool to a self-indexing collection, or for full item-level indexing to a special archival photo collection. Where applicable, we noted that related materials were being deposited in the Archives of the History of Art. Ultimately, the only link between the Archives of the History of Art's AMC description and the Photo Archive's holdings record was the similar use of notes. Again, we had diverged from an available and clearly applicable standard—the MARC AMC format—in preference of a locally-defined format which more aptly suited our department's specific needs.

There was, however, one major need which was not met by the Photo Archive's many databases. In spite of its rich indexing and
reporting features, STAR could not be used to access the records of either the Library or the Archives. Each department was performing reference from a different automated system: the Library from its RLIN records downloaded onto UCLA's ORION system, the Archives from its AMC files in RLIN, and the Photo Archive from its STAR databases. In support of Getty Center research, and almost as a matter of conscience, the Center's resource departments began to investigate possibilities for merging their databases or, as an alternative, for providing integrated access to the separate files.

Clearly RLIN was the logical place to begin, since two of the three departments had already made significant investments in the RLIN cataloging files. The Photo Archive quickly identified several potential benefits of contributing records of its special collections to the RLIN database: broader awareness among the research public of the unique material; creating a basis for exchanging records with other photo archives through MARC-based communication; and, of course, being able to provide a single point of reference for the three Center resource departments. A less tangible but important benefit of Photo Archive records in RLIN would be a stronger profile for the historiographic collections being formed at the Center, especially if we were to mingle collection-level records in the AMC file with those of the Archives of the History of Art. Finally, we recognized the tremendous advantage of being able to search the RLIN Name Authority File for use in all collection management, cataloging, and reference work.

What were the disadvantages of contributing to RLIN? Technical issues were not problematic, as we have library staff at hand to guide us through the physical installation process. Cost is a factor; if we only contribute records for the 144 special collections, it does not seem worth the high cost of even a single leased phone line and modem. In light of the potential benefits, however, we feel the cost can be rationalized. Committing ourselves to one RLIN workstation, however, means the inevitable conflicts among staff members wanting to use RLIN for authority work and catalogers entering and maintaining records.

The most pressing problem was the total lack of expertise on the part of the Photo Archive staff in the use of MARC formats. Rather than involve the entire cataloging staff in a retraining program, however, it made more sense to develop "maps" between existing STAR record structures (from which RLIN records could be constructed) and the MARC Archival and Manuscripts Control and Visual Materials formats. By doing automatically as much of the record construction as possible, we could minimize the amount of cataloger time spent editing and "fine-tuning" the resultant pseudo-MARC records.

The Photo Archive staff responsible for this mapping project have so far devised a preliminary concordance between the item-level Paintings database and the MARC VM format. As would be expected, there are gaps from both perspectives; much of the fixed-field data required
In addition to mapping between STAR and MARC VM on the item level, we have constructed over a dozen sample VM format record worksheets for Photo Archive collections, identifying conceptual and formal differences between the record structures. In this case, the extreme flexibility of STAR as a database management package allows us to change the actual structure of our holdings records, bringing them into closer conformity with MARC. Such a radical redesign would be impractical with the other cataloging databases, where the conceptual data model already satisfies our current needs.

Mapping between record structures is a difficult exercise; another difficulty is the choice of files into which to place our records once the mapping is finished. As with many repositories of archival visual materials, our dilemma has been to recognize both the visual nature of the material and its integral, collective organization. Because of the nature of RLIN, we have seriously considered placing collection-level records into the AMC file. First, AMC is attractive because the Archives of the History of Art has a rich presence there. As sample records indicate (see Figures 1, 2, 3 and 4), the Archives' collections relate closely to material in the Photo Archive. It would certainly serve the purpose of integrated access at the Getty Center for our scholars to find both departments' holdings from the William Suhr collection juxtaposed within a single RLIN display from the AMC file. Second, but less valid as a criterion for such a decision, there is a lot of material currently in RLIN's VIM file which we would find "distracting" to a researcher looking for archival holdings. The preponderance of material in VIM seems to be published visual material (video-cassettes, films, slide kits, etc.) treated on the item level. It is a valid concern to wonder whether, over time, more collection-level materials will be contributed to RLIN's VIM file.

Ultimately, this author believes that we will decide to utilize both the AMC and VIM files for our collection-level records. Some collections, like that of the restorer Suhr with conservation reports, articles, correspondence, and clippings, contain a heavy textual component and are most reasonably placed as archives in the AMC file. Others, like the John Henry Parker collection, are principally visual and are appropriately placed in the VIM file. This author can offer no hard and fast rule for making these decisions; perhaps the forthcoming summary of use for the MARC VM format will offer guidance on this choice.

Once we have established a pattern of contributing collection records to the RLIN database, we hope to expand upon this basic record in certain instances—i.e., for collections which lend themselves to

32 p., 7 p. of plates : ill. ; 28 cm.


Figure 1. RLIN (BKS) records for John Henry Parker materials
In the 1860's and 1870's Parker, an English amateur enthusiast of classical and medieval archaeology, undertook the documentation of Roman aqueducts, gates, walls, and other sites, hiring local photographers. Between 1868 and 1879 over 3,300 photographs, executed under his direction, were published in a multi-volume series. The photographs were also sold separately as sets. The Photo Archive owns 556 images attributed specifically to Parker's work. Due to the loss of almost all of the Parker Archive negatives in a fire in 1893, the historical value of the collection is especially great. Other parts of the Parker Archive may be found at the Fototeca Unione (which owns the few hundred remaining negatives), the Vatican archive, Princeton University, and the University of Michigan. The Parker photographs are currently stored separately within Antiquities.

A xerox copy of the 1879 catalog to the Parker Collection is kept in Antiquities. The PARKER database gives full textual descriptions for individual photographs.
A condition report on Petrus Christus’ "Death of the Virgin" for Knoedler. A reproduction of the painting is included.

Open for use to qualified researchers.

Christus, Petrus dca. 1410-1472 or 3.

Painting x Conservation and restoration.

The Getty Center for the History of Art and the Humanities, Archives of the History of Art, 401 Wilshire Blvd., Suite 400, Santa Monica, CA

William Suhr Collection

Type: Restorer
Size: c. 11,000 photos + numerous negatives
Shelved: Special Collection - partially integrated
Descrip: Negatives and prints from the archive of William Suhr, paintings conservator in New York City, c.1935-1982. Suhr worked on paintings in many important private and public collections in America, photographing them at nearly every stage of the conservation process.

Suhr’s detailed analyses, treatment notes, and related documentation will be kept in the Archives of the History of Art.

Information about the negatives and prints is indexed in the SUHR database. A large unindexed clipping file is also available.

Stored: Paintings

Figure 3. RLIN (AMC) and Photo Archive Holdings records for William Suhr materials
French and Company.

Registration records, 1909-1964.
30 linear ft.


Open for use by qualified researchers.

Location: The Getty Center for the History of Art and the Humanities, Archives of the History of Art, 401 Wilshire Boulevard, Suite 400, Santa Monica, CA.


French and Company

Holdings: A,D,M,P,S

Type: Dealer
Size: c. 40,000 photos + negatives
Shelved: Special Collection - integrated
Descrip: Negatives, photographs, and stock sheets from the New York firm of French and Company. Of special interest to decorative arts scholars as documentation of collections assembled in the United States in the early 20th century. Concentrations lie in 18th-century furniture, tapestries (all periods and countries), and paintings. Antiquities, Medieval art, and post-Medieval sculpture are occasionally represented.

Prints have been distributed for cataloging; stock sheets are filed by number. Negatives are indexed in the FRCO database. Some older negatives on nitrate film have been destroyed.

Stored: Various

Figure 4. RLIN (AMC) and Photo Archive Holdings records for French and Company materials.
"subunit" cataloging. The Max Hutzel Collection contains nearly 120,000 negatives documenting Italian art and architecture in photographs remarkable for their rich visual context. The photographs are taken on "campaigns" through the Italian countryside, and the site documentation is remarkably complete, everything from the antique through the Baroque and often in the same photograph. To a "host" record for the full collection we could link subunit records for each site or campaign. Such records would be rich with added entries for the buildings and artists represented in the photographs—valuable access points which would be impractical to establish from a single collection record.

The scenario described may sound scattered and inconsistent in terms of our potential application of the MARC AMC and VM formats in RLIN. The results of a recent survey by the Art and Architecture Program Committee (AAPC) of the Research Libraries Group, however, indicate otherwise. Their survey of visual materials in the RLIN database shows that usage of the AMC and VM formats in general seems scattered and inconsistent. Many survey respondents indicated that they catalog the same visual medium at more than one level, although most appeared to use only one RLIN file per medium—for example, the Books (BKS) file for microforms, VIM for videorecordings, and AMC for photographs. The AAPC survey represents a handy barometer of current usage as we consider different implementation options for the Getty Photo Archive.

What, then, is the lesson we have learned from our investigation into RLIN as a union catalog for Getty Center holdings? First and foremost, we are reminded of the fact that MARC formats exist solely as a means of data communication and are not intended as any sort of cataloging standard. Given its original curatorial audience, the Photo Archive responded with a home-grown data model which was far more useful than the MARC structure in every way. As cataloging and research policies changed, however, there was more impetus for the Photo Archive to translate its records into a format which could be easily and directly communicated to the Center's other resource departments. For that specific, functional reason, the MARC AMC and VM formats became useful and appropriate.

The Photo Archive was fortunate to have selected a local system which is highly adaptive and lends itself to rapid, self-guided development of sophisticated output formats; as such it was the perfect tool for "mapping" between our own formats and those of MARC. Visual resource curators considering purchase or development of local systems would do well to realize that this is an essential bridge—the one you least want to burn. As more visual resource curators make the ability to export MARC-formatted records a requirement of candidate systems, vendors should respond and help eliminate a major hurdle to development of union catalogs of archival visual collections—such as RLIN will be for the collections of the Getty Center.
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