TOWARD GUIDELINES FOR PRACTICE IN THE PRESERVATION AND DOCUMENTATION OF TECHNOLOGY-BASED INSTALLATION ART

WILLIAM A. REAL

ABSTRACT—Unlike most works of art familiar to conservators,installation art is often less object than event, existing initially only for the duration of an exhibition. Nonetheless, institutions and individuals acquire works of installation art for their collections, fully expecting to preserve them into the foreseeable future. While there are conventions within the conservation field for examining, describing, and preserving works of art that exist as objects,there are few such conventions for works of art such as installations that exist for a limited time, are dismantled,and may be re-created at some indeterminate future time and location.The conservation field has little experience in dealing with the preservation of the ephemeral physical components of many technology-based installations, such as electronic media and playback equipment, without which there is no hope of re-creating a piece in the future. This article describes the preservation challenges inherent to this medium, summarizes the current state of conservation practice in the field, and suggests broad guidelines and standards.It is a result of TechArchaeology:A Symposium on Installation Art Preservation,sponsored by the Bay Area Video Coalition, hosted by the San Francisco Museum of Modern Art, and funded by the Getty Grant Program.The goal of the project was to assess challenges inherent in preserving media-based art through discussion among artists, curators, technical specialists,and conservators.

TITRE—Pour des normes de travail dans la préservation et documentation des installations basées sur les nouveaux médias.RÉSUMÉ—À la différence de la plupart des oeuvres d'art familières aux restaurateurs, souvent les installations consistent plus en un événement qu'en un objet et leur existence se limite seulement à la durée d'une exposition. Néanmoins maints établissements et individus acquièrent des installations pour leurs collections et s'attendent entièrement à les préserver dans l'avenir. Tandis qu'il y a des normes déjà établies dans la domaine de la restauration pour l'examen, la description et la préservation des oeuvres d'art qui existent en tant qu'objets, il n'existe que peu de normes pour des oeuvres d'art telles des installations qui existent pour un temps limité,qui sont démantelées et qui peuvent être recréées dans un futur et un emplacement indéterminés.Dans le domaine de la restauration,peu de praticiens ont de l'expérience pour s'occuper de la préservation des composants physiques éphémères de beaucoup des installations basées sur les nouveaux médias, tels que médias électroniques et appareils de lecture, sans lesquels il n'y a aucun espoir de recréer ces oeuvres dans l'avenir. Dans cet article, on décrit les défis inhérents à la préservation de cette forme d'art,on détaille l'état actuel des pratiques de conservation pour ces oeuvres et on suggère des directives et des normes générales de travail. Cet article est un résultat de "TechArchéologie: un colloque sur la préservation des installations"commandité par le *Bay Area Video Coalition* (Coalition vidéo de la région de la baie de San Francisco),qui a eu lieu au musée d'art contemporain de San Francisco et a été subventionné par le *Getty Grant Program* (programme de bourses Getty). L'objectif du projet était de faire le bilan des défis inhérents à la préservation de l'art médiatique, au moyen de discussions entre conservateurs, artistes,techniciens spécialisés et restaurateurs.

TITULO—Hacia lograr guías para la práctica en la preservación y documentación de instalaciones de arte basadas en tecnología. RESÚMEN—A diferencia de la mayoría de las obras de arte con las que los conservadores están familiarizados, el arte de instalación es a menudo más un evento que un objeto, que inicialmente existía solamente durante el transcurso de una exhibición.Sin embargo, instituciones e individuos adquieren obras de arte de instalación para sus colecciones esperando preservarlos para el futuro próximo. Aunque hay pautas en el área de la conservación para examinar, describir y preservar obras de arte que existen como objetos, muy pocas de dichas pautas están destinadas a obras de arte tales como instalaciones, que existen solo por un tiempo limitado, son desmanteladas y quizá recreadas en el futuro en tiempo y ubicación indeterminados. El campo de la conservación tiene poca experiencia en la preservación de los componentes materiales efímeros de muchas instalaciones con base tecnológica,tales como los medios electrónicos y los equipos de reproducción, sin los cuales no hay esperanzas de poder recrear tal pieza en el futuro. Este artículo describe los retos que la preservación de éste medio presenta, resume el estado actual de la práctica en conservación en esta área y sugiere guías y estándares generales. Este artículo es el resultado del Simposio

sobre Preservación de Instalaciones de Arte "TecArchaeology", promovido por la "Bay Area Video Coalition"(Coalición para video del área de la bahía de San Francisco), el cual tuvo lugar en el Museo de Arte Moderno de San Francisco (San Francisco Museum of Modern Art);financiado por el programa de subvenciones del Instituto Getty (Getty Grant Program).El objetivo del proyecto fue evaluar los retos inherentes en la preservación del arte basada en los medios de comunicación, a través de discusiones entre artistas,curadores,especialistas técnicos, y conservadores.

1. BACKGROUND:THE PRESERVATION CHALLENGE OF INSTALLATION

Although the conservation field is still relatively young, it has developed fairly well-defined conventions for examining, describing, and preserving collections such as paintings, works of art on paper, material culture, and other media that persist through time as tangible physical objects. These kinds of objects can be exhibited and stored, researched and cataloged, photographed and loaned, monitored and treated;barring disaster or negligence, they will generally survive into the future with little or no deterioration or unwanted change.While knowledge in the conservation field continues to evolve and deepen, conservators nonetheless generally understand why objects deteriorate, how the agents of decay can be minimized or eliminated, and how and when an object's condition is compromised to the point that conservation treatment is necessary. Conservators, along with professional colleagues such as curators and historians,have also developed tools of connoisseurship and technical expertise with which to judge an object's authenticity or to assess how faithfully its condition reflects the maker's intentions.

A conservator confronted with a work of installation art,[1] however, may be on unfamiliar ground. An artist often creates an installation at the outset of an exhibition, starting with an incomplete plan that evolves and shifts as the artist works within the site. What is successful or unsuccessful about the outcome may only become apparent over the course of the exhibition, and the artist accordingly may view the "finished"installation as a work in progress,subject to ongoing future revision. When the installation is taken down at the end of the show, its fate remains uncertain. It may or may not be re-created at some point in the future;may or may not be acquired as a finished piece by an institution or collector; may or may not be viewed by the artist as a finished piece; may or may not be adaptable to a location other than the one for which it was first created.

If a piece is in fact acquired,it may be unique or may be an edition;may or may not include the specific equipment such as video recorders, speakers, projectors, and monitors required to present it; may or may not be subject to a sales agreement or contract;may or may not come with the artist's specific instructions or stipulations,and may or may not have been created in the same space where it will be recreated following its acquisition. It may not be recreated at all anytime soon after its acquisition,existing indefinitely only in memory and on paper.

The significance of an installation is also generally unknown at the time of its creation or acquisition. Whether or not the artist is considered an important figure today, the fate of an artist's reputation decades hence can never be known in advance. Furthermore, the defining characteristics of an artist's oeuvre over the course of a career may not yet be discernible.The particular importance of a particular piece in the evolution of the artist's expression must await the wider context and longer view that will become possible only in the future. These considerations differentiate installations from more traditional art forms, for which practical conservation priorities depend as much on a curator's judgment of an object's quality or significance as they do on a conservator's assessment of its condition or vulnerability. With installations, conservators, curators, and others are called upon to participate—actively, and from the outset—in the preservation of works of art whose relative value has not yet been established by the passage of time, history, and criticism.

To complicate matters further, technology-based installations generally include material that is either inherently ephemeral or subject to rapid obsolescence, or both,such as machine-readable media that provides much of the sensory experience of the piece. Examples include videotapes,laser discs, DVDs, color slides,and film and the corresponding playback equipment such as video and disc players,cathode ray tube (CRT) or liquid crystal display (LCD) monitors, amplifiers, speakers, projection screens, computer equipment, and video, slide, and film projectors. Depending on storage conditions and other factors, electronic media such as videotape may remain in acceptable playback condition for only a few years or for several decades (ANSI 1996;Howard and Murray 2000). Even when storage conditions are ideal and

the material remains perfectly intact into the distant future, it is almost certain that the original format and playback method will sooner or later become obsolete (Stauderman and Messier 2000) and that spare parts and expertise to repair or maintain original playback equipment will become increasingly scarce.

In the analog realm, migrating obsolete formats to newer formats will lead to repeated "generation loss," resulting in an increasingly degraded signal and unrecoverable loss of playback quality. Like a medieval painting that has undergone repeated insensitive cleanings, magnetic media, when it is copied to a new format, becomes more and more remote from what the artist created. Unlike a painting, however—which theoretically can be cleaned with no loss of original material whatsoever—generational loss in reproduced magnetic media is inevitable.

Even when both the original media and the playback equipment are available and fully functional, the appearance of the imagery in a reconstituted installation may vary—not only from one iteration to another but even over the course of a single presentation—and may or may not faithfully reflect the artist's vision. Electronic media are uniquely vulnerable to the accidental jostling of connections, or inappropriate tweaking of dials, or even the slowly changing intensity or color temperature of a projection bulb or cathode projector gun.

Digital media formats, unlike analog media, may be reproduced with no generation loss; nonetheless, they are subject to an ever shortening cycle of market-driven obsolescence. The integrity of a digitally based signal may also be compromised if it is reformatted using inappropriate or incompatible compression formats, further complicating its prospects for preservation. Digital copies, or clones, also require us to modify our conventional understanding of originality and authenticity, because aside from compression artifacts—which in some cases could prove to be substantial (Gromov 2000; Stauderman 2000)—digital copies are identical to "originals" in content. Proprietary software programs, sometimes used by artists to control an installation's sequences of video and audio signals or slides, are absolutely critical to a correct presentation of the piece but are at least as vulnerable to obsolescence as more commonly used application file formats and operating systems (MacLean and Davis 1998; Lawrence et al. 2000; Besser 2000).

The virtues of lossless digital reformatting are also somewhat offset by the fact that digital media are much more vulnerable to catastrophic signal damage than analog media. A damaged analog tape can generally be recovered, albeit with some degradation in the signal, while a similarly damaged digital tape might have unrecoverable gaps where the signal is missing altogether.

The role of the audiovisual playback equipment itself varies from installation to installation. In one installation, the playback equipment might primarily be a means to present the imagery and sound (video, film, slides, etc.), either hidden from view or otherwise not considered by the artist to be a meaningful visual component of the piece; only the proper presentation of the audiovisual material itself is important, regardless of the equipment used. By contrast, the equipment in another piece might also play a sculptural or conceptual role that is critical to the viewer's experience and understanding of the piece.

Aside from electronic and media components, there are often other material components of an installation that may or may not be unique and may or may not be replaceable. While it might come naturally to a conservator to regard any material remains related to the installation as sacrosanct and worthy of the highest level of ongoing care, such an approach would in some cases be counterproductively zealous, costly, or labor-intensive. On the other hand, in some instances high-level conservation care may be the only way to guarantee a faithful and accurate future rendition of the work. Immaterial components such as live performance are sometimes integral to an installation but not always practical to re-create meaningfully when the piece is reinstalled, however desirable and appropriate it might be to do so.

2. PREVIOUS WORK ON PRESERVATION OF INSTALLATION ART

Previous work on this subject has provided some answers to these dilemmas. *Playback: A Preservation Primer for Video,* a publication issuing from a 1996 symposium sponsored by the Bay Area Video Coalition (BAVC) (Fifer et al. 1998), and *Wie haltbar ist Videokunst? How Durable Is Video Art?* (Kunstmuseum Wolfsburg 1997), resulting from a 1995 symposium, are notable examples. Another symposium, TechArchaeology, sponsored by BAVC in January 2000, brought together conservators, artists, curators, and technical experts to examine and discuss several installations in the exhibition *Seeing Time: Selections from the Pamela and Richard Kramlich Collection of Media Art* (Ross et al. 1999) at the San

Francisco Museum of Modern Art (SFMOMA). A number of papers arising from this symposium are published in this issue of the *Journal of the American Institute for Conservation* (Bishop 2001; Laurenson 2001;Messier 2001;Vitale 2001).The general session of the 2000 AIC Annual Meeting and the Electronic Media Specialty Group sessions from 1997 to 2000, devoted to the subject of conservation of electronic media, included a number of relevant papers (Berry 1999; Laurenson 2000; Stauderman 2000; Sterrett 2000;Eamon 2000).The Variable Media Project symposium at the Guggenheim Museum,March 30–31, 2001, and associated website (Ippolito et al. 2001) proposed an approach to the care and preservation of installation art,with several case studies as examples. Several recent conferences and symposia,with associated publications, focused on the broader preservation issues in contemporary art and included work in the area of installation art and electronic art,such as Modern Art: Who Cares? (Hummelen and Sillé 1999; Stringari 1999; Laurenson 1999a; Balch 1999; Pullen 1999; Groenenboom 1999), Mortality/ Immortality (Corzo 1999; Viola 1999; Hanhardt 1999), and Project "Conservation of Modern Art" (Kuene 1996; Hummelen 1996).

3. CURRENT APPROACHES TO THE PRESERVATION OF INSTALLATION ART

In current practice, conservators facing the challenge of providing for the preservation of technology-based installation art might begin by posing a series of questions,such as:

In what ways is an installation more like a performance than an object? The preservation of performances is somewhat different from the preservation of objects.

- In what ways might an installation change in future iterations, while at the same time retaining its authenticity? What is the "heart" of the piece, and how can its survival be guaranteed? In some cases reinterpretation of a piece using other than its original material components might be the best way to preserve its "heart."
- Can re-creations or "repeat performances" or iterations of an installation be thought of as a vehicle for preservation, memory, and connoisseurship?
- What risks to the future integrity of an installation should be anticipated? In addition to the risks commonly understood in the preservation of conventional objects,installations are especially threatened by technological obsolescence and amnesia.
- What resources (staff, material, expertise, space, facilities, utilities, services, funds, etc.) will be necessary to preserve a piece? The cost of ownership should be understood from the outset.
- What are the appropriate roles of artist, conservator, curator, and others in the creation and preservation of a piece? Installations are particularly dependent upon the artist's participation, the interdisciplinary collaboration of various professionals,and the sharing of accumulated knowledge and experience.
- What existing methodologies in the conservation and preservation of other kinds of objects can be applied to the conservation of an installation? Fine arts conservators may look to conservators of other materials such as architecture, science and technology, and library and archives for some guidance.
- What technical expertise outside the conventional museum community will be required both to create and to maintain an installation? Conservators must be able to communicate effectively with others to whom preservation ethics are not a given.
- How can a piece be documented in such a way that both its tangible and intangible elements are captured? What documentation techniques should be used? Should the creative process itself be captured? Who is responsible? The documentation of installations involves recording both what should not be changed as well as what might be allowed to change, and how.
- Who has control over the future of a piece? Is the ownership of the piece and its components established in such a way that it is favorable to the piece's long-term preservation? Total artist control may interfere with an owner's ability to preserve a piece.
- When is intervention,or treatment,indicated? Which aspects of an intervention, if any, should be executed by the conservator? Which should be performed by other experts? With no established specialization for treatment of this kind of material, each case requires careful analysis and interdisciplinary cooperation.

TOWARD GUIDELINES FOR PRACTICE IN THE PRESERVATION AND DOCUMENTATION OF TECHNOLOGY-BASED INSTALLATION ART

3.1 INSTALLATION AS PERFORMANCE

Unlike most static works of art, installations frequently include the dimensions of experience, movement, sound, and time that also characterize the performing arts, such as dance, theater, and music. The video artist Gary Hill (b. 1951) has stated that just as there are good performances and bad performances of a piece of music, in the same way an installation could be "performed" well or poorly, depending upon the sensitivity and awareness of those responsible for its re-creation (Laurenson 1999b). Bill Viola (b. 1951) has voiced a similar notion of the installation artist as composer, leaving a "score" (set of instructions) for future "conductors" (curators). How well the conductor "orchestrates" the choice of equipment and its placement and adjustment, the architecture, the lighting, and other environmental factors will determine how successfully the performance renders the artist's original idea (Viola 1999). Viola's decision to work with Peter Sellars, a stage director in theater and opera, as co-curator of his recent retrospective underscores this point (Viola 1998).

The idea of considering works of visual art primarily as performances is not entirely new. The "happenings" produced by artists of the Fluxus and Nouveau Realistes movements beginning in the 1960s are good examples (Futurist Productions 1995–2001). The artist Yves Tinguely (1925–1991), for example, created self-destructing exploding sculptures that left behind no trace of their original "performance." The very idea of preservation in such cases is the antithesis of the work itself.

Considering installations as events rather than as static objects would predicate a somewhat more fluid interpretation of exactly what is to be preserved, wherein the work of art as an expressive medium is essentially distinct from its specific material components (van Wegen 1999). This interpretation also pertains to conceptual art by such artists as Sol LeWitt (b. 1928), whose wall drawings exist primarily a set of instructions that can be reiterated in multiple ways.

3.1.1 The Performance Model: Change Versus Authenticity

Preservation of installation art, like preservation of other performance-based art forms such as dance, theater, and music, may allow for the idea that each rendition or "performance" of a piece may be different. Indeed, in the fields of theater and music especially, though less so in dance (Keens et al. 1998; Acocella 2001b), a performer's interpretation of the original is both implicit and frequently encouraged. In music there has emerged, relatively recently, an approach to performance practice based strictly on historical accuracy, using only historically correct medieval instruments, for example, and taking literally a composer's omission of scored musical notations such as *crescendi* or *diminuendi*. Nonetheless, most musicologists would agree, for instance, that Bach, whether performed on a harpsichord, a piano, or even a Moog synthesizer, and whether performed with or without *cresecendi* or *diminuendi*, is still Bach, though there would be considerable and passionate disagreement about whether a particular performance is good or bad.

In theater, there is an even wider latitude for contemporary performances of historic plays. It would be absurd to suggest, for example, that Shakespeare must be performed only in Elizabethan English and only within a precise recreation of the Globe Theatre, or Aeschylus in ancient Greek upon the ruins of 5th century B.C. amphitheater. To do so would be in a sense to "embalm" the work and make it inaccessible and irrelevant to contemporary audiences. In the same way, an installation that is measured and defined too narrowly risks becoming frozen, contrary to the spirit of evanescence, temporality, and change inherent to the medium.

Conversely, in the field of fine arts there is a strong ethic of authenticity, originality, and historical accuracy that does not fit well with the ephemeral nature of installation art. In all but extreme cases, the original object is sacrosanct; facsimiles are taboo. By contrast, in a re-created installation, nothing "original" may survive through time: the architecture, lighting, projection surfaces, props, electronic components, and even the media bearing the image and sound may all be replacements or copies or approximations (Gantzert-Castrillo 1997). It is unlikely, given the pace of technological evolution and obsolescence, that future audiences will have the same kind of "authentic" experience of a work of media art that audiences today might enjoy in a performance of Bach on a 17th-century harpsichord (although there are other less-tangible elements of an "authentic" musical performance beyond the particular instruments used). On the other hand, it is conceivable that in the future there will be access to museums or repositories of "period" playback equip-

ment and media that could be deployed in a reconstituted installation to evoke the particular historical era in which the installation was first created.

A challenge to the idea of reinterpretation and change, if it should be decided that such change is allowable or desirable, is that, unlike theater and music, an installation rarely has a text or score that can be safely regarded as the objective starting point for any subsequent re-creation. This situation presents a philosophical problem for museums, collectors, curators, artists, and conservators that appears to have no easy solution (van Wegen 1999) and can be considered only on a case-to-case basis.

For example, an artist might view a particular piece as a work in progress, subject to ongoing modification, while the owner of the piece could justifiably resist such change, preferring instead that it retain an unquestionable permanence and authenticity. Conversely, an artist's or owner's stated wish for the permanence of the electronic components of a piece may prove to be impossible to honor due to the inevitability of future technological obsolescence.

A particular artist might accept, embrace, or even wish for future change, such as the substitution of the original presentation equipment or media with whatever is the best available equipment and media at any given point in the future. However, a future curator might choose to go to great lengths to present a piece as belonging to a particular moment in history, requiring that the original equipment, or something plausibly close to it, be used. For example, a piece by Reinhard Mucha (b. 1950), *Auto Reverse* (1995–95, Collection of Pamela and Richard Kramlich), includes a 16 mm film projector that is central to the work's themes of nostalgia, memory, the passage of time, and retrospection (Ross et al. 1999). These qualities could easily be undermined if the medium and projector were to be replaced by more contemporary formats. On the other hand, while for us the experience of the projector may be imbued with nostalgia, it is impossible to say what kind of technology will evoke a similar response in a future viewer, to whom a 16 mm film projector may be so remote, archaic, and unfamiliar that the point is lost (Danto 1999). Hence, in theory, it may be possible to present this piece faithfully in the future with different equipment and media, so long as its essential spirit and experience are preserved, albeit at the expense of historical accuracy. In this hypothetical example, the preservation approach clearly crosses the line from considering the installation primarily as object to considering it primarily as performance.

At the opposite end of the spectrum, there are cases in which details that appear to be agonizingly trivial might turn out to be important to the artist and critical to a correct presentation of the piece. For example, when James Coleman's (b. 1941) installation *I N I T I A L S* (1993–94) was first installed in exhibition *Seeing Time* at SFMOMA, the artist noticed something wrong about the appearance of the projected slide images. After ruling out all other possible variables it was finally discovered that the projector bulb, though otherwise identical to the one specified in the installation instructions, was rated for 30 hours rather than 75 hours, a difference that was visible to the artist (Vitale 2001). At first glance one might dismiss the importance of a detail \that only the artist can perceive; however, Coleman is an artist who intuitively orchestrates subtle effects of light, color, sound, and space to control a viewer's experience of the work. That the resulting experience might be beneath perception or description by even an attentive viewer does not negate the reality of the experience or of the means the artist used to create it. Here is a case where erring on the side of memorializing every detail would be the more appropriate approach to preservation. At the same time, what is at issue is very much related to the notion of the work as a performance, in the sense that the artist has designed not so much an object as an experience.

At the same time, it could be argued that the question of apparently minor changes, such as the projector bulbs, in the height or width of a projected image, or in the image-bearing medium or format, is already to some extent familiar to conservators of more conventional objects. Obvious examples include a change in the frame of a painting or the use of contemporary lighting technology to illuminate an object as opposed to a historically "accurate" light source. These changes will certainly have a significant impact on the object's appearance, on the experience of anyone looking at it, and on our ability to perceive the object as the artist would have wished, and yet for the most part we accept such changes as a matter of course. In practice, with a few exceptions, we do not regard these aspects as materially a part of the work of art, and we seem able to accept on faith that the work of art is robust enough to retain its essential impact despite the inevitable "flaws" in the way it is presented. Even changes of relatively cataclysmic scale, such as the transplantation of a medieval Italian altarpiece from the chapel for which it was painted to a modern museum gallery, do not for us overwhelm the fundamental authenticity and spirit of the origi-

nal object, even as we realize that we are seeing it in a way the artist could never have imagined or accepted.

Whatever the essential elements of a piece, and whether and to what degree future change is acceptable, it is critical for the conservator to enter into the "spirit" of the piece and to thoroughly anticipate future risks to its successful presentation. In many ways this approach is no different from the approach to the conservation of object art: the conservator has to envision what might go wrong, how it will affect the piece, and, whenever possible, take preemptive measures. With object-based contemporary art, conservators have come to understand that, as with installations, change is sometimes an integral part of the work and need not be uniformly prevented in all cases (Albano 1996), although conversely, the acceptance of or desire for change does not necessarily make such change inevitable (Coddington 1999). What might be different is that in the case of installation art, while many of the details are straightforward and mundane, the conservator may have to work rather hard at extracting information that the artist might consider self-evident and not at all worth mentioning. If the conservator does not fully grasp a piece's essential qualities, it will be impossible to fully identify the risks to its future presentation or to comprehend which aspects of the piece may change and to what degree. With objects, conservators are adept at looking for and documenting what is wrong and how to fix it; whereas with contemporary installations, the task is primarily to record what is "right" and take pains to preserve that quality for a future that may be technologically very different from the present. Finally, beyond the usual physical risks that installation art and its components may share with object art, there is the added dimension of memory. The future will recall of an installation only what has been recorded and documented; there may be no original physical object or other evidence to act as a guide.

3.1.2 Connoisseurship and Memory: "Repeat Performances" as Preservation

Aside from documentation (see sec. 3.3), "repeat performances" of installations are perhaps the best guarantee for survival. Unfortunately, this variable is impossible to control and is entirely dependent upon the perceived current value of the artist's work. Bill Viola, for example, was fortunate enough to have a major retrospective of his work within his own lifetime, including versions of many of his most significant installations. In preparing for the exhibition Viola discovered that some of his early tapes had become nearly unplayable. He had archival masters made of his work up to that point in digital Betacam format (Viola 1998, 1999). Had Viola's reputation as a preeminent video artist emerged a generation later, it may have been by then too late to recover much of the material. As an additional benefit of the retrospective, Viola created dossiers on each piece, with extensive documentation including full sets of architectural drawings, decibel-level readings, lighting specifications, and so on.

It is almost inconceivable to the contemporary Western mentality to consider repetition as a form of preservation, but there are many interesting historical examples. For example, the Shinto temple at Ise in Japan has been reconstructed every 20 years since the 7th century and appears today almost exactly as it did originally, in every detail, even though the material itself is no more than 20 years old (Viola 1999; Asahi Shinbunsha et al. 1965). Tibetan Buddhist sand painting, medieval monastic scribing of Latin texts, and the oral traditions that preceded Homer are other relevant examples. In every case, the faithful repetition of a given practice depends upon how central that practice is to its own culture. Paradoxically, in every case, authenticity persists even as the original itself disappears.

Similarly, it is possible to imagine establishing a "track record" for an installation: each time it is installed, its essential characteristics continue to clarify and are understood and experienced by more people, adding to the collective connoisseurship of that artist and piece. This exposure can only increase the odds of that piece's survival. Conversely, an is insensitive re-creation of an installation could have the reverse effect of validating mistakes as part of the piece or of emphasizing and memorializing insignificant details. In this eventuality, a re-created piece risks becoming a caricature of itself.

It is also possible to imagine that in the future, re-created installations might be presented not as works of art but rather as historical depictions (Stringari 1999) or facsimiles, much in the vein of period rooms or Civil War reenactments, which retain a certain claim to historical accuracy but lack the authenticity implicit in living traditions such as the Ise reconstructions and Tibetan sand painting. Similarly, it is possible to envision the presentation of "exhibition copies" of the original work as reinterpreted by later

curators, much as works of theater are reinterpreted by succeeding generations of directors (van Wegen 1999)

3.2 INTERDISCIPLINARY COLLABORATION AND COMMUNICATION

Understanding the essential qualities of a piece and, by extension, planning for its future preservation require the collaboration and input of various disciplines, particularly artist, curator/scholar, conservator, owner/custodian, and technical expert. The idea that the work of art's survival depends upon a healthy "ecosystem" consisting of shared knowledge, philosophy, expertise, and ethics among allied professionals concerned in one way or another with the preservation of art (Norris 1999) may be unfamiliar to conservators who are accustomed to thinking of the conservation perspective as the only really legitimate or defensible one. With installation art, like the blindfolded men of the Chinese proverb trying to describe an elephant by touch alone, we and our colleagues alike cannot know a piece fully from only one particular point of view. To get at the essential understanding required to preserve a piece, conservators may find themselves playing the role of *agent provocateur*, challenging colleagues to envision a very different future many decades hence and posing "What if?" questions to extract responses that might otherwise remain unspoken. This role is not so different from the approach to conservation of other kinds of contemporary art, except that in the case of installation art, there may frequently be no tangible object left behind to reveal its to intention and meaning.

The active participation of conservators and curators in the actual creation of a piece and its subsequent preservation may come at a price: without the usual distance between maker and custodian, a standard of scrupulous objectivity—an unquestioned principle in the conservation of more conventional art forms—may be more difficult to maintain.

The kind of discussion and collaboration required was exemplified by the recent symposium *TechArchaeology* (Sterrett 2000), at which working groups consisting of artists, conservators, technicians, curators, media professionals, and registrars were charged with examining a group of technology-based installations and considering their preservation for the future (Bishop 2001; Laurenson 2001; Messier 2001; Vitale 2001).

3.2.1 Application of Conservation Methodologies Outside the Fine Arts

It has been noted by Michalski (1999), among others, that some of the conservation dilemmas commonly ascribed exclusively to contemporary art in general and installation art in particular are in fact dilemmas confronted regularly by conservators and other professionals who care for architecture, science and technology, and archival and library materials. In this sense, many of the difficulties in preserving installation art are actually only unprecedented to conservators experienced primarily in the traditional fine arts. For example, the methodology for describing and preserving structures and spaces, such as those containing installations, has been rather well developed by conservators of architecture. Architectural conservators are also accustomed to dealing with material that is not necessarily "original" or without consequence to a structure's formal or functional attributes, yet is no less a part of the structure's historical fabric than material that is literally original. Professionals engaged in the preservation of library and archival materials have grappled for some time with the difficulties of ephemeral and obsolescence-prone contemporary media such as videotape and digital media, also present in much technology-based installation art. Systematic protocols and standards for reformatting, storing, and describing such media have begun to emerge (see sec. 3.6) and will be useful to conservators dealing with the same kinds of materials within an art museum context. Similarly, conservators of industrial, science, and technology collections have significantly more experience than fine arts conservators in dealing with the preservation challenges of moving parts, motors, and other functioning equipment that is also found in many installations.

3.2.2 Relationships with Technical Experts

Many conservators already possess the communication skills to work with professionals in other disciplines, including architects, mechanical engineers, fabricators, photographers, and others who may be unfamiliar with the requirements and ethics of conservation and preservation. In the same way, conservators who are responsible for the preservation of installation art, and in particular technology-based installations, must communicate effectively with audiovisual technicians, commercial video engineers,

equipment service personnel, and others whose ongoing services will be required to maintain electronic components and media and who are not in the habit of thinking in terms of long-range preservation mandates or conservation ethics. This will remain a key component of installation art preservation practice and should be addressed in graduate school curricula, unless or until conservation treatment of electronic media and components becomes a specialization within the field.

3.2.3 Participation of the Artist

As the example of the Coleman piece (see sec. 3.1.1) illustrates, it is critical to involve the artist in a re-created installation whenever possible. Installation artists, however, may resist the idea of spending significant time traveling from place to place to install older pieces—time better spent creating new work. Conservators and others representing institutions or collectors may be disturbed that the future viability of an installation should depend so heavily upon the presence of the artist: what, then, is to be done after the artist's death? On the one hand, the marketplace and the conventions of collecting do not easily allow for work that dies with the artist; on the other hand, from an ethical point of view, institutions or collectors should make some effort to allow for an artist's participation when it is so often clearly an important factor in faithfully creating the work. Conservators and curators of more conventional art forms, such as paintings, do in fact deal on a daily basis with decisions about how to present the work without the artist's direct input. However, they have the advantage of having a tangible object created by an artist at a particular moment in time and passed down through history, with major or minor interventions, directly to us. Like conceptual art, installation art often leaves only a paper trail or a memory; unlike most conceptual art, the "original" in technology-based installation art may quickly be swept away—made impossible, in a sense—by the rising tide of obsolescence.

The solution, if there is one, seems to be a combination of strategies, including involvement of the artist whenever possible, development of collective interdisciplinary experience and connoisseurship through repeat re-creations of a piece during the artist's life, careful documentation, and delegation of responsibility to trustworthy individuals or institutions. It is important to acknowledge that once a piece is acquired by a collector or institution and thus becomes a part of the historical record, the artist's own view regarding how the piece is to be preserved or how it might change, while important to know, is just one of many factors and not necessarily the predominant one.

As an example of the concept of delegation, the artist Suchan Kinoshita (b. 1960) has spoken of the idea of appointing "godmothers" responsible for the ongoing care of an installation when the artist is not available. The artist educates or trains the "godmothers," who in turn assume responsibility for appointing and training successive "godmothers," and so on into the future (Berndes 1999).

It is important to test future scenarios against the artist's stated intention, in conversation with the artist, to confirm what is essential, how it might change, to what extent the artist accepts or wishes for such change, or how the artist would envision adapting a piece to a future set of conditions. In this conversation, which might involve individuals of various disciplines (conservators, curators, technicians, etc.), it would be important to learn why the artist made certain choices of media or equipment and how he or she might choose differently in the future when the original choices are not an option. In the absence of a crystal ball, this information is very difficult to elicit from the artist and harder still to record in a meaningful way. In some cases the artist's choices will turn out to be based primarily on convenience, availability, familiarity, cost, and other apparently mundane factors that are unrelated to the aesthetic intention of a piece. However, once the piece is created, the artist may be able to perceive and articulate qualities produced by particular media and equipment that he or she would want to emulate in the future. In other cases the choice of media and equipment is consciously and directly related to the calculated effect of the image and sound the artist wishes to produce or to the equipment's sculptural or conceptual role in the piece.

3.2.4 Shared Resources

As experience and connoisseurship in the preservation of installation art continue to grow, it will become critical to find ways to share information among institutions, galleries, conservators, scholars, artists, exhibition designers, technical experts, and others. This imperative is not unique to installation art and has been suggested and implemented for other kinds of works of art. However, in the case of

installation art preservation, which depends so thoroughly upon the collective memory, connoisseurship, and record keeping of those involved with its creation, shared knowledge is essential. As living artists continue to create new work, it will be increasingly unlikely that they will have the time or inclination to answer the same kinds of questions about their work time and time again. Curators working on an exhibition will want to know which other curators and institutions have had significant experience working with a particular artist.

The World Wide Web seems a natural tool for networking this kind of information and making it accessible to the widest audience. Exhibition catalogs of installation work might include short essays addressing the artist's intent and aspects of long-term preservation (Stringari 1999).

Institutions, galleries, and artists might also consider sharing inventories of electronic components and even staff expertise in component repair, component installation, media treatment, and media formatting. For example, the Kunstmuseum Wolfsburg operates a rental company for technical equipment and repair serving a network of museums, similar in concept to the regional centers in the United States (Balch 1999).

Proper environmental storage of preservation masters and original media is another costly requirement that invites sharing of resources among institutions and collectors.

3.3 DOCUMENTATION: DESCRIBING BOTH THE TANGIBLE AND THE INTANGIBLE

Within the limits of time, money, and energy, any means possible to document both the physical and experiential qualities of the work should be used. This is no easy task; it is a little like trying to define and document the experience of eating an apple or creating a time capsule that would give the future a reasonably accurate idea of what it is like to live today. Although we can never know what future curators and conservators (if they even exist) will want to know about a piece created today, we must try to imagine and use the best means at our disposal to clearly record our thoughts and observations. Depending on the installation, documentation might include floor plans, schematics, wiring diagrams, lighting diagrams and reports, artists' preliminary notes and sketches, photographs, video, video interviews of artist, curator, and others (Mancusi-Ungaro 1994), written records of those involved with the installation, instrumental characterization of video and audio levels and quality, computer-assisted design (CAD) files, and virtual reality (VR). The way that sounds and images in multiple installations in an exhibition like *Seeing Time* inform—or compete with—each other might also be described and documented as a fundamental part of the historical record. The artist Gary Hill has commented that some documentation, such as a photograph, might sanctify and accentuate some minor detail that is actually irrelevant to the piece (Hill 2000), underscoring the need for multiple documentation formats and techniques incorporating multiple points of view. On the other hand, it sometimes happens that the documentation of a vanished work of art or performance eventually becomes its surrogate, such as the photographs of Joseph Beuys's (1921–1986) *Actions* by Ute Klophaus and Caroline Tisdall, which serve an interpretive as well as a documentary purpose (de Leeuw 1999).

Of course, any documentation created electronically will be subject to the very same preservation challenges as the original media itself. To the extent that future re-creation of the original depends upon this documentation, it should be cared for with the same collections management principles that apply to the original media, adding to the cost of ownership.

3.3.1 Recording the Decision-Making Process

Almost every installation involves making innumerable small decisions as the work evolves in the space. It may be that the artist has arrived at a site with only a sketchy idea of what the final product will be or that the artist is re-creating a previous work in a new location. In addition to aesthetic or artistic reasons, decisions are made because of more mundane concerns. For example, a particular DVD player or video projector is on back order; a safety code prohibits making the space as dark as the artist wishes or requires an illuminated emergency exit sign; an architectural feature of the building alters the effect of light or sound within a piece, requiring last-minute mitigation; the exhibition budget runs dry, preventing implementation of a finishing touch. It is important to capture as much of this process as possible, either during the installation process or in a sort of "post-mortem" meeting. Capturing the process is especially difficult because invariably there are impossible deadlines to meet, too few people to share in the

work of gathering information, and too much exhaustion after the installation is complete to have a clear-headed discussion.It is almost never practical to expect the artists to fulfill this role even though they alone may be party to every key decision along the way. Larger institutions might consider appointing a documentation coordinator during an installation process,as proposed by Stringari (1999).Galleries and artists might contract with one of a growing number of independent arts management firms specializing in technology-based installations (Balch 1999).

3.3.2 Standardized Technology

The world of media and installation art is full of technical terminology, jargon, and proprietary product names and model numbers. Just as the conservation field has worked hard to sort out conventions for the terms used to describe conventional works of art and their treatments, so too must there be standards in the technological area. For example, for conservators it is a given that a proprietary name alone (for example, Acryloid B-48) may not be too helpful in the future when the product of that name is no longer made or is not the same formulation as the one referred to. Similarly, for example, a description of a James Coleman installation that includes "one Audio Visual Laboratories Dove X2 control unit,one Sony CDP500 compact disc player, four JBL Control-5 loudspeakers, one Samson Servo-120 amplifier, and one Alesis M-EQ 230 stereo equalizer" (Ross et al.1999,177),though admirably rich in particulars, may not be enough for future scholars to adequately re-create the piece. Conservators should attempt to learn from artists and technical experts what characteristics of an electronic playback component are important to record. For example, it might be important to know of a DVD player its chip set (type, manufacturer, and specifications), whether the player is a progressive scan or standard interlaced model, whether the model is capable of passing below-black information, etc. It would also be important to know how these characteristics relate to the artist's desired result, how they might be measured,and how they might be altered when displayed in a different space composed of different materials.

The Variable Media Initiative of the Guggenheim Museum has recently proposed a set of terms to describe installations and the practices involved in their preservation.According to a set of "behaviors," an installation may be "installed," "performed," or "interactive," and its media components may be either "reproduced" (reformatted from analog originals with some loss in quality) or "duplicated" (copied from digital originals with no loss in quality). Similarly, a set of preservation "strategies"are defined, including "storage"(traditional preservation of original components),"emulation" (imitating the appearance of lost or obsolete original components with different means), "migration" (substituting lost or obsolete original components with newer materials), and "reinterpretation" (reformulating the piece according to an updated understanding of its conceptual and metaphorical aspects).The term "variable media" also embraces the idea that preservation of installations must accept the possibility of change or variation over time (Ippolito et al.2001).

3.3.4.The Cost of Ownership

One way for a conservator to ensure the future preservation of a work of installation art is to develop the cost of ownership of the piece, over its projected life, as part of a preservation plan (Laurenson 1999a). Such a plan might include, for example (Rothenberg 1999):

- the cost of producing archival masters of audiovisual components
- the cost of future periodic migrations of the masters to newer formats
- the cost of producing successive generations of presentation media formats
- the cost for acquisition of successive generations of presentation playback equipment
- storage costs (for example, cold storage) for the archival master, possibly off-site
- the cost for acquisition of redundant equipment for later use as spare parts or replacements
- the cost of in-house or outside expertise for diagnosis and repair of electronic components
- re-installation costs (design, construction, electrical,etc.)
- the cost of bringing in the artist or artist's representative to participate in future re-installations
- the cost of in-house expertise to maintain the piece while it is on view, for example, to periodically recalibrate CRT displays and replace nonfunctional presentation media
- other in-house staff costs, such as attendants required for certain interactive pieces
- the cost of special documentation required to

present the piece accurately in the future (video, production and recording of artist interview, CAD, VR, radiospectrometry, decibel levels, etc.) and the cost of maintaining the resulting information (storage, migration, etc.)
- maintenance costs for any software (such as proprietary monitor-switching software or frame buffers), including re-programming or program emulation in the future if necessary

If an owner fully understands and accepts, at the time of acquisition, the economic requirements for shepherding a piece intact into the future, the chances for that piece's survival are much enhanced. Collecting institutions, led by The Tate Collection, have begun to allocate acquisitions funds for the ongoing costs of preserving these kinds of works (Laurenson 2000). Some institutions, such as the San Francisco Museum of Modern Art, have embraced the need for permanent staff technical expertise in the installation and maintenance of electronic components (Roosa 1998; Graham and Sterrett 1997). In the *Carnegie International 99/00* exhibition at the Carnegie Museum of Art, the activation and maintenance of the many technology-based works in the show required the assistance of two full-time technicians. Museums that are building media-intensive collections should plan for adding appropriate technical staff and should look to one another for the sharing of knowledge and the development of ongoing professional development and training in this highly specialized area.

3.4 THE PROBLEM OF WHO RETAINS CONTROL OVER PRESERVATION OF KEY COMPONENTS

There is no consistent standard so far for determining who will retain control over the ongoing preservation and reformatting of the image- and sound-bearing media components of an installation. Some installation acquisitions come with acquisition agreements or contracts that permit the purchaser to produce preservation masters, from which current "presentation" formats can be made to keep pace with equipment obsolescence. In other cases, the artist wishes to retain control of any future copying or reformatting. For example, the artist James Coleman makes multiple camera originals of the color slides he uses in his installations and stores them in multiple locations in archival conditions (Vitale 2001). A museum owning a piece by Coleman is contractually obligated to purchase a new set of slides from the artist once the original set has faded. This purchase may not be a problem during the artist's life, especially if the artist, like Coleman, takes his responsibility for preservation seriously. But a collector or institution will want to take a longer view. Under prevailing art world custom, in practice ownership of this kind of work of art is more akin to a licensing arrangement, and the owner has no real control over the destiny, or preservation, of the piece. In the dance world, the case of the modernist master Martha Graham illustrates the point: less than 10 years after her death, her dance school and company have been dissolved and her works are rarely performed; some suspect that the artist wished—indeed, planned—for her work to die with her (Acocella 2001a). This outcome points to a crisis in the preservation of dance (BAVC et al. 1997) that could apply equally to visual arts said to exist primarily as "performances" or events.

On the other hand, an artist or artist's estate has a legitimate interest in how ephemeral components are handled by an owner. Aside from the obvious copyright issues, which grow more complex as more artists turn to digital media in their work, consider, for example, an institution that either fails to make replacement presentation media (such as slides in a Coleman piece) or fails to use adequate quality control, resulting in copies that poorly reflect the artist's intentions. It should be possible for artists, dealers, and the owners of installations to negotiate agreements that give the owners sufficient control to guarantee the survival of the piece, while at the same time reassuring artists that the quality of ephemeral media will be adequately monitored and that any copying or reformatting will meet mutually satisfactory and measurable standards of quality, in addition to adhering to copyright restrictions. For example, an institution could monitor and limit the total amount of time a color slide is projected and employ standard densitometric monitoring to determine when the slide has unacceptably faded (Wilhelm 1993). Allowable measurable densitometric variation limits could also be established for the production of duplicates from the masters. Similarly, standard measurable quality control parameters could be determined for video signals reproduced from masters (Feeley 1999). Once the criteria for a particular piece are agreed to by both owner and artist, both could submit to the conclusions of a third-party testing service to determine whether the standards have been maintained.

3.5 CONSERVATION TREATMENT

Any intervention—such as replaced components, parts, or media—will change the piece in some fundamental way, a concept that applies equally to works of art in more conventional media. For this reason, an intervention should not be undertaken lightly and should take into account the views of the artist and scholar as well as those of the conservator.

The following examples of intervention—actual or potential—illustrate how difficult these decisions can be and how dependent they are on a consideration of multiple points of view:

A series of acetate-based 16 mm films by Marcel Broodthaers (1924–1976) in the exhibition *Seeing Time* (Ross et al. 1999) performed poorly as a presentation medium. The film began to break down along the sprockets after only 50 hours of projection (Biederman 2000). A polyester-base version would be more practical for presentation purposes, but connoisseurs of film might reasonably object that the particular tonal qualities of a black-and-white acetate film are unsatisfactorily rendered on polyester-based film.

Nam Jun Paik's (b. 1932) piece, *Moon Is the Oldest TV* (1963–65) was produced by magnetically disrupting the image on 12 cathode ray tube monitors to mimic the appearance of the phases of the moon. When CRT monitors are no longer reparable or replaceable, the only way to present this piece might be with a laser disc containing digitized still images of the moonlike magnetic effects, presented on modern LCD monitors. However, such a presentation might be so remote from the original material and concept that it would lose its meaning. In a case like this the only viable intervention might be to re-create working CRT monitors (Herzogenrath 1997).

Vito Acconci's (b. 1940) 1975 piece in the exhibition *Seeing Time* (Ross et al. 1999), *Pornography in the Classroom*, originally contained a Super 8 film, which was later remastered to Beta SP and then to DVD for the exhibition. The evocation of a "classroom" created by the original Super 8 projector and imagery, along with the scratches and skips typical of the medium, was lost in the remastered media, to the possible detriment of the piece, even though Acconci himself had expressed no concerns whatever regarding the reformatting of his audiovisual materials (Vitale 2001). On a philosophical level, given that Acconci's work is primarily conceptual in nature, the remastering could be considered irrelevant (Vitale 2001); on an experiential level, the piece could be said in a sense to have been "overrestored," much like a painting whose original rubbed canvas texture has been inpainted by a well-meaning restorer.

Dara Birnbaum's (b. 1946) installation *Tiananmen Square: Break-In Transmission* (1989–90) will present future curators and custodians with a similar dilemma. Some of its video imagery contains "snow" and other visible technical "defects"—typical of the broadcast signal on which it is based—that should not be corrected in any future reformatting, since they are important to the experience and meaning of the piece (Messier 2001).

Keith Tyson's (b. 1969) piece, *AMCHII-XLII Angelmaker Part II (the quadruped)* (1995, Collection of Pamela and Richard Kramlich) (Ross et al. 1999), includes a vacuum cleaner motor that periodically turns on, creating a distinctive sound and air turbulence, though the motor itself is not visible to the viewer. When the motors burn out and replacements are unavailable, they could theoretically be replaced with components that mimic or emulate the sound and air turbulence produced by the original equipment. As long as such an intervention is documented and theoretically reversible (at the extreme, someone could construct a new motor from scratch, for example), it is probably appropriate since the viewer's essential experience of sound and air movement is entirely preserved. In many ways this approach is analogous to using an inpainting medium other than that used by the artist. The material may differ, but this fact is transparent to the viewer, whose experience, if the intervention has been well executed, remains unchanged.

3.6 EVOLVING GUIDELINES AND STANDARDS OF CARE

Valuable work has been done recently on basic standards for the care of technology-based installation art and video installation (Roosa 1998; Laurenson 1999a), installation art (Stringari 1999); and single-channel video (Stauderman 2000). Institutional guidelines should include, for example, at least the following elements for video-based installation work:

For the signal-bearing media (Laurenson 1999a):

- accurately labeled media, including media's generational relationship to the original or master media (e.g., edition, exhibition copy, clone, duplicate, etc.)
- maintenance of at least an archival master,

exhibition copy, and access copy, in appropriate media
- if known, the location of other versions or masters in the possession of artist, gallery, or other institution
- determination of the obsolescence rating of the media (Stauderman and Messier 2000).
- strict playback guidelines regarding what each format is to be used for, under what circumstances, and by whom (for example, an archival master would never be lent, while an exhibition copy could be)
- record-keeping requirements for each version including standard metadata sets such as Dublin Core (Dublin Core Metadata Initiative 1999).A model for cataloging independently produced media has recently been proposed by Independent Media Art Preservation (2001).
- storage criteria including maintenance of acceptable levels of temperature, relative humidity, and particulates
- guidelines for pre-acquisition requirements; for example, viewing the tape to determine the presence of absence of color bars (important for future calibration), technical faults or damages, chrominance and luminance levels (important for selection of display format), and so on
- identification of any copyright issues posed by the imagery or sound
- documentation of the correct appearance of video imagery by agreement of artist. For example, documentation could be done by monitoring the tape with the artist on a calibrated monitor or measuring the luminance and chroma with appropriate devices such as light meters and colorimeters (ISO 1997a, 1997b, 1997c;1999).
- cost of ownership and long-range strategy for migration or reformatting of original and exhibition media, avoiding "lossy" compression algorithms such as MPEG or MPEG-II for digital media.

For the installation as a whole (Stringari 1999):
- identification of required components and whether they are provided with the sale or acquired after the sale by the owner
- precise numbering and registration of all material components
- drawings or blueprints of the installation's layout
- description and documentation of lighting and sound aspects
- description and documentation of mechanical devices (motors, etc.), any service or replacement records, preventive maintenance requirements, and sources for replacement parts and service expertise
- transcription or videotape of interview with artist,or written questionnaire
- installation manual, developed in partnership with the artist or by the artist alone, detailing requirements and limitations for future installations of the piece
- storage requirements (space, environment, etc.) for each type of material
- cost of ownership: storage, maintenance, replacement,etc.
- consolidation of documentation from various sources into a single archive

Direct intervention on the signal-bearing media requires its own set of standards for practice. With videotape, for example, typically the work of cleaning,baking,scraping, remastering,and other forms of treatment are performed by professionals outside the conservation community who may not be familiar with the ethics of conservation and the requirements for careful documentation.The library preservation community has begun to evolve protocols for recording metadata associated with digital objects and their reformatting or migration, an approach that will prove useful to the museum community for management of similar materials present in technology-based collections (Dublin Core Metadata Initiative 1999; Furrie et al.2000;Russell and Sergeant 2000).Some magnetic media restoration practitioners have started to provide documentation of restoration treatments as well (Lindner 1998), while Sterrett and Christopherson (1998) and Laurenson (1999a) have described institutional procedures for managing interventions on media collections.

4. CONCLUSIONS

The practice of conservation of installation art is an emerging field with many unanswered questions. While there are parallels in the practice of conservation of other contemporary art forms and in the conservation of materials outside the fine arts area such as architecture, library and archival materials,and science and technology collections,installations present some unfamiliar challenges such as the notion of per-

formance and the experiential elements of sound, moving image, time, and space.

It is unlikely that conservation of installation art will emerge as a distinct field anytime in the foreseeable future; consequently, conservators confronted with the challenges of preserving installation art will have to become familiar enough with fields such as video technology and production,acoustics,and even appliance repair, so that they can communicate effectively with other professionals in these and other disciplines, in the same way that conservators of more traditional art forms might be conversant with architects, mechanical engineers, photographers, lighting designers,and the like.

Finally, because of the performance aspect of many installations, conservators working with this medium will need to look beyond the material and consider that the "heart"of a work might lie primarily in its less-tangible qualities. Preserving for the future something that is above all an experience might require conservators to take a more fluid view of what may or may not be changed about a work, challenging conventional notions of accuracy and authenticity.

NOTE

1. The term "installation art" commonly describes site-specific works, generally within interior spaces, that may also include sound,moving images,or other media components, as well as architecture, performance, and other forms of technology. "Media art" often describes work whose primary component is recorded or live sound and moving images or projected still images,whether or not within an installation context.The work considered in this article is located at the intersection of installation art and media art and appears to have no satisfactory label. Since many of the article's conclusions may apply equally well to installation art in general, that term will be used, along with "technology-based installation," when a narrower descriptor is needed.

REFERENCES

Acocella, J. 2001a.The flame:The fight over Martha Graham. *New Yorker*, February 19,26,180–95.

Acocella, J. 2001b. The lost Nijinsky:Is it possible to reconstruct a forgotten ballet? *New Yorker*, May 7, 94–97.

Albano, A. 1996. Art in transition. In *Historical and philosophical issues in the conservation of cultural heritage*, ed. N. S. Price et al. Los Angeles: J. Paul Getty Trust. 176–84.

ANSI. 1996.American National Standard for imaging materials: polyester base magnetic tape storage, IT9.23–1996. New York: American National Standards Institute.

Asahi Shinbunsha, K. Tange, and N. Kawazoe. 1965. *Ise, Prototype of Japanese architecture*. Cambridge, Mass.: MIT Press.

Balch, P. 1999. Electronic media: Rethinking the conservator's role—Proceedings. in *modern art:Who cares? An interdisciplinary research project and an international symposium on the conservation of modern and contemporary art*, ed. I. Hummelen and D. Sillé. Amsterdam: Foundation for the Conservation of Modern Art and Netherlands Institute for Cultural Heritage. 304–7.

BAVC, SFPALM, and WAW. 1997. Report on the findings of the learning applications to document dance (LADD) project at www.danceheritage.org/LADD.html (accessed 11/9/01).

Berndes, C. 1999.New registration models suited to modern and contemporary art. In *Modern art: who cares? an interdisciplinary research project and an international symposium on the conservation of modern and contemporary art*, ed. I. Hummelen and D. Sillé. Amsterdam: Foundation for the Conservation of Modern Art and Netherlands Institute for Cultural Heritage. 173–77.

Berry, M. 1999. Technological challenges in the museum: Installation and maintenance of the multimedia work of Tony Oursler at the Williams College Museum of Art. Paper presented at the AIC 27th Annual Meeting,St.Louis,Mo.

Besser, H. 2000. What's so special about electronic art? Issues in conservation of digital works. Paper presented at the AIC 28th Annual Meeting,Philadelphia, Pa..2000.

Biederman, M. 2000. Personal communication. TechArchaeology symposium, San Francisco Museum of Modern Art.

Coddington, J. 1999. The case against amnesia. In

Mortality/Immortality? The legacy of 20th-century art, ed. M. A. Corzo. Los Angeles: Getty Conservation Institute. 19–26.

Corzo, M. A., ed. 1999. *Mortality/Immortality? The legacy of 20th-century art*. Los Angeles: Getty Conservation Institute.

Danto, A. 1999. Looking at the future: Looking at the present as past. In *Mortality/Immortality? The legacy of 20th-century art*, ed. M. A. Corzo. Los Angeles: Getty Conservation Institute. 3–12.

de Leeuw, R. 1999. The precarious reconstruction of installations. In *Modern art: Who cares? An interdisciplinary research project and an international symposium on the conservation of modern and contemporary art*, ed. I. Hummelen and D. Sillé. Amsterdam: Foundation for the Conservation of Modern Art and Netherlands Institute for Cultural Heritage. 212–21.

Dublin Core Metadata Initiative. 1999. Dublin core metadata element set, version 1.1: reference description, at http://dublincore.org/documents/1999/07/02/dces/ (accessed 11/9/01).

Eamon, C. 2000. Video installation: Problems in documentation. Paper presented at the AIC 28th Annual Meeting, Philadelphia, Pa.

Feeley, J. 1999. How to test video quality. *DV* (May): 7(4):29–34.

Fifer, S. J., T. Gould, L. Hones, D. H. Norris, P. Ramey, and K. Weiner 1998. *Playback: A preservation primer for video*. San Francisco: Bay Area Video Coalition.

Futurist Productions 1995–2001. Fluxus Home Page, at www.nutscape.com/fluxus/homepage/ (accessed 11/9/01).

Gantzert-Castrillo, E. 1997. On the gradual disappearance of the original. In *Wie haltbar ist Videokunst? How durable is video art?* Eindhoven: Lecturis. 49–60.

Graham, J., and J. Sterrett 1997. An institutional approach to collections care of electronic art. *WAAC Newsletter* 19(3), also at http://palimpsest.stanford.edu/waac/wn/wn19/wn19-3/wn19-310.html (accessed 11/9/01).

Groenenboom, R. 1999. Registration and reinstallation of installations: Installations and interpretations. in *modern art: who cares? an interdisciplinary research project and an international symposium on the conservation of modern and contemporary art*, ed. I. Hummelen and D. Sillé. Amsterdam: Foundation for the Conservation of Modern Art and Netherlands Institute for Cultural Heritage. 342–46.

Gromov, D. 2000. Software DV codecs: Compression Quality Evaluation. http://members.home.net/dgcom/MiniDV/DVcompressors.htm (accessed 11/9/01).

Hanhardt, J. G. 1999. The media arts and the museum: reflections on a history, 1963–1973. In *Mortality/Immortality? The legacy of 20th-century art*, ed. M. A. Corzo, Los Angeles: Getty Conservation Institute. 95–100.

Herzogenrath, W. 1997. Video art: what is the original in video art? In *Wie haltbar ist Videokunst?/How durable is video art?* Eindhoven: Lecturis. 27–38.

Hill, G. 2000. Personal communication. TechArchaeology symposium, San Francisco Museum of Modern Art, San Francisco, Calif.

Howard, S., and W. Murray 2000. Accelerated life expectancy estimation of data storage media: How long will it last, and how do you know? Paper presented at the AIC 28th Annual Meeting, Philadelphia, Pa.

Hummelen, I. 1996. Concept of fetish: The theoretical decision process in the conservation of modern art. In *Project "Conservation of Modern Art": Proceedings of the presentation of the project on 12 May 1996*. Amsterdam: Foundation for the Conservation of Modern Art. 41–45.

Hummelen, I., and D. Sillé, eds. 1999. *Modern art: who cares? an interdisciplinary research project and an international symposium on the conservation of modern and contemporary art*. Amsterdam: Foundation for the Conservation of Modern Art and Netherlands Institute for Cultural Heritage.

Independent Media Art Preservation. 2001. Independent media cataloguing project, at www.imappreserve.org (accessed 11/9/01).

TOWARD GUIDELINES FOR PRACTICE IN THE PRESERVATION AND DOCUMENTATION OF TECHNOLOGY-BASED INSTALLATION ART

Ippolito, J.,and Staff of Guggenheim Museum.2001. Variable media initiative, at www.three.org/z/varia_root/variable_media_initiative.html (accessed 11/9/01).

ISO. 1997a. Photography—projection in indoor rooms, part 1: Screen illumination test for still projectors, ISO 11315–1:1997. Geneva, Switzerland: International Standards Organization.

ISO 1997b. Photography—projection in indoor rooms, part 2: Screen luminance test for still and video projection (ISO 11315–2:1997). Geneva, Switzerland:International Standards Organization.

ISO 1997c. Photography—projection in indoor rooms, part 2: Classification of transmitting projection screens and measurement of their transmitted luminance levels, ISO 11315–3:1997. Geneva, Switzerland:International Standards Organization.

ISO 1999.Photography—projection of still pictures: measuring methods for the evaluation of imaging properties, ISO 11316:1999. Geneva, Switzerland: International Standards Organization.

Keens,W.,L.H. Kopp, and M. N. Levine 1998.Images of American dance: documenting and preserving a cultural heritage. Report on a study sponsored by the National Endowment for the Arts and the Andrew W. Mellon Foundation, at www.preserve-inc.org/decade/introduction.html (accessed 11/9/01).

Kuene, P. 1996.The conservation of modern art: A question of interdisciplinary cooperation. In *Project "Conservation of Modern Art":Proceedings of the presentation of the project on 12 May 1996*. Amsterdam: Foundation for the Conservation of Modern Art. 29–32.

Kunstmuseum Wolfsburg, 1997. *Wie haltbar ist Videokunst? How Durable is Video Art?* Eindhoven: Lecturis.

Laurenson, P. 1999a.The conservation and documentation of video art.In *Modern art: Who cares? An interdisciplinary research project and an international symposium on the conservation of modern and contemporary art*, ed. I. Hummelen and D. Stillé. Amsterdam: Foundation for the Conservation of Modern Art and Netherlands Institute for Cultural Heritage. 263–71.

Laurenson, P. 1999b. 'The mortal image':The conservation of video installations. In *Material matters: The conservation of modern sculpture*. London: Tate Gallery. 108–115.

Laurenson, P. 2000. *Between Cinema and a Hard Place*: The conservation and documentation of a video installation by Gary Hill. Paper presented at the AIC 28th Annual Meeting,Philadelphia, Pa.

Laurenson, P. 2001.The conservation of Gary Hill's *Between Cinema and a Hard Place*. *Journal of the American Institute for Conservation* xx:xx–xx.<EQ>

Lawrence, G., W. Kehoe, A. Kenney, O. Rieger, and W. Walters 2000. Risk management of digital information:A file format investigation. *RLG DigiNews* 4:3, also at www.rlg.org/preserv/diginews/diginews4–3.html#technical1 (accessed 11/9/01).

Furrie, B. and Data Base Development Department of The Follett Software Company. Understanding MARC bibliographic: Machine-readable cataloging, 5th ed., eds. Network Development and MARC Standards Office, Library of Congress. Washington, D.C.: Cataloging Distribution Service, Library of Congress in collaboration with The Follett Software Company, at www.loc.gov/marc/umb (accessed 11/9/01).

Lindner, J. 1998. Documenting magnetic media restoration. Paper presented at the 26th AIC Annual Meeting,Arlington,Va.

MacLean,M.,and B. H.Davis,eds.1998. *Time & bits: Managing digital continuity*. Los Angeles: J. Paul Getty Trust.

Mancusi-Ungaro, C. 1994. The artist's voice. In Abstracts of the 22nd Annual Meeting of the American Institute for Conservation,Nashville,Tenn. Washington, D.C.:AIC. 33.

Messier, P. 2001.Dara Birnbaum's *Tiananmen Square: Break-in Transmission*: A case study in the examination, documentation, and preservation of a video-based installation. *Journal of the American Institute for Conservation* 40:191–205.

Michalski, S. 1999. Conservation lessons from other types of museums and a universal database for collec-

tion preservation.In *Modern art:who cares? An interdisciplinary research project and an international symposium on the conservation of modern and contemporary art*, ed.I. Hummelen and D. Sillé.Amsterdam: Foundation for the Conservation of Modern Art and Netherlands Institute for Cultural Heritage. 290–95.

Norris, D. H.1999.The survival of contemporary art: The role of the conservation professional in this delicate ecosystem.In *Mortality/Immortality? The legacy of 20th-century art*, ed. M.A.Corzo, Los Angeles: Getty Conservation Institute. 131–34.

Pullen, D. 1999. Electronic media: Rethinking the conservator's role—The challenges of a dual role. In *Modern art: Who cares? An interdisciplinary research project and an international symposium on the conservation of modern and contemporary art*, ed. I. Hummelen and D. Sillé.Amsterdam: Foundation for the Conservation of Modern Art and Netherlands Institute for Cultural Heritage. 300–304.

Reck,H. U. 1997.Authenticity in the fine arts (to the present day).In *Wie haltbar ist Videokunst? How durable is video art?* Eindhoven:Lecturis.81–102.

Riley, R., M. Sturken, and C. Iles. 1999. *Seeing time*: *Selections from the Pamela and Richard Kramlich collection of media art*. San Francisco:San Francisco Museum of Modern Art.

Roosa, M. 1998. Maintaining technology-based installation art. In *Playback: A preservation primer for video*, ed. S. J. Fifer et al.San Francisco:Bay AreaVideo Coalition.39–47.

Rothenberg, J. 1999. Avoiding technological quicksand: Finding a viable technical foundation for digital preservation. council on library and information resources, at www.clir.org/pubs/reports/rothenberg/contents.html (accessed 11/9/01).

Russell, K., and D. Sergeant 2000. The Cedars Project:Implementing a model for distributed digital archives. *RLG DigiNews* 3:3, also at www.rlg.org/preserv/diginews/diginews3-3.html (accessed 11/9/01).

Stauderman, S. 2000. Collecting video art:What are the minimum accession requirements? Paper presented at the AIC 28th Annual Meeting,Philadelphia, Pa.

Stauderman, S. and P. Messier. 2000 and current. Video format identification guide, atwww.video-id.com (accessed 11/9/01).

Sterrett, J. 2000. TechArchaeology:A symposium on installation art preservation. Paper presented at the AIC 28th Annual Meeting,Philadelphia, Pa.

Sterrett, J., and C. Christopherson. 1998. Toward an institutional policy for remastering and conservation of art on videotape at the San Francisco Museum of Modern Art.In *Playback:A preservation primer for video*, ed. S. J. Fifer et al. San Francisco: Bay Area Video Coalition.55–59.

Stringari, C. 1999. Installations and problems of preservation.In *Modern art: Who cares? An interdisciplinary research project and an international symposium on the conservation of modern and contemporary art*, ed. I. Hummelen and D. Stillé.Amsterdam: Foundation for the Conservation of Modern Art and Netherlands Institute for Cultural Heritage. 272–81.

van Wegen, D. H.1999.Between fetish and score:The position of the curator of contemporary art. In *Modern art: Who cares? An interdisciplinary research project and an international symposium on the conservation of modern and contemporary art*, ed. I. Hummelen and D. Stillé.Amsterdam: Foundation for the Conservation of Modern Art and Netherlands Institute for Cultural Heritage. 201–09.

Viola, B. 1998. Art at the end of the optical age: Interview by V. Rutledge. *Art in America* (March) 86(3):70–77.

Viola, B. 1999. Permanent impermanence. In *Mortality/Immortality? The legacy of 20th-century art*, ed. M. A. Corzo, Los Angeles: Getty Conservation Institute. 85–94.

Vitale, T. 2001. TechArchaeology: Works by James Coleman and Vito Acconci. *Journal of the Institute for Conservation* 40(3):227–250.

Wilhelm,H.1993.The permanence and care of color photographs:Traditional and digital color prints,negatives, slides, and motion pictures. Grinnell, Iowa: Preservation Publishing Company, 1993. 211–38, 633–39.

Wirths, A. 1997. Media art between reproducibility and progressive interactivity. In *Wie haltbar ist Videokunst? How durable is video art?* Eindhoven: Lecturis. 61–72.

FURTHER READING

Cummings, L. Nd. It is not a trend; It is an inevitability: Interviews with nine contemporary artists. Unpublished bound mimeographed manuscript

Frieling, R. 1997. The conservator's struggle with the volatile medium of video. In *Wie haltbar ist Videokunst? How durable is video art?* Eindhoven: Lecturis. 21–26.

Gantzert-Castillo, E. 1999. The archive of techniques and working materials used by contemporary artists. In *Mortality/Immortality? The legacy of 20th-century art*, ed. M. A. Corzo, Los Angeles: Getty Conservation Institute. 127–30.

Gesmer, D. 2000. Still grasping for Nijinsky's elusive legacy. *New York Times*, August 27. Arts and Leisure, 7–15.

Hall, D., and S. J. Fifer, eds. 1990. Illuminating video: An essential guide to video art. New York: Aperture/Bay Area Video Coalition.

Hubbard, J. 1996. Meeting the challenges of video preservation: A progress report on initiatives within the media arts field. New York: The Media Alliance.

Language of Dance Center. 2001. http://ds.dial.pipex.com/town/drive/sn26/index.html (accessed 11/9/01).

National Initiative to Preserve America's Dance. 2001. http://save-as-dance.org/ (accessed 11/9/01).

Ross, D. 1988. Postmodern station break: A provisional (historic) Overview of Video Installation. In *American landscape video: The electronic grove*. Pittsburgh: Carnegie Museum of Art. 47–60.

WILLIAM REAL is currently director of technology initiatives at the Carnegie Museum of Art in Pittsburgh, where he also served as chief conservator from 1985 to 2001. He has recently directed a conservation survey grant for the magnetic media in the collection of the Andy Warhol Museum and has served on the AIC Electronic Media Group board and the AIC board. Address: Carnegie Museum of Art, 4400 Forbes Ave., Pittsburgh, Pa. 15213–4080.

Received for review on November 1, 2000. Revised manuscript received April 27, 2001. Accepted for publication May 15, 2001.