Adaptive Institutional Change: Managing Digital Works at the Museum of Modern Art

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Abstract

From digital video to software-driven installations, digital art is now present in museums around the world. Museum systems designed for object-based collections like paintings and sculpture do not address the collections management and conservation requirements for these new technologies and their associated hardware. In this article the authors investigate processes through which digital art becomes embedded in museums. Based on original research conducted at The Museum of Modern Art in New York, we argue that the introduction of digital art to MoMA did not lead, as recent literature suggests, to disruptive or radical changes of existing institutional practices. Instead, the result has been organizational subunit proliferation and adjustments to established practices and procedures. Through our study of managing digital art at MoMA, we engage Science and Technology Studies and the institutional analysis tradition in the sociology of organizations to advance the understanding of processes of change in art museums.

Key words: collection management, digital art, institutional change.

Introduction

Since the advent of conceptual art practices in the 1960s, the art world has witnessed a radical re-imagination of the traditional art object. Responding to artists' challenges to the definition of art in general and museum art in particular, museums moved beyond the acquisition of physical objects to acquire the rights to fabricate, purchase, or enact the physical manifestation of an artist's idea. From early conceptual works to installation, media, and performance practices, collections staff at museums modified their practices to acquire and manage works that were not straightforwardly object-based. Ephemeral media gradually moved from the margins to the mainstream, and is now broadly represented in museums worldwide. Challenges to processing these works in museums are well documented in recent literature.[1] The aim of this article is to develop an understanding of how museums incorporate such new art forms into their general principles of operation and modes of organization. We focus on digital art, a type of art that is in the process of incorporation into contemporary art museums but is not yet fully settled, and on the Museum of Modern Art in New York (MoMA) as the context for our case study. Methods for this study include interviews, written institutional histories, and document review. In the following sections, we trace the process by which digital artworks became integrated into the museum via adjustments to 1) staffing and the creation of subunits, 2) conservation practices, and 3) information management systems. These three areas of practice emerged from our research as key to how adjustments occurred when staff members were faced with managing digital art.[2]

Disruptive Change?

The past two decades have seen an upsurge in the number of research projects, dedicated conferences and publications on the challenges of acquiring and managing media art in museums.[3] International research projects dedicated to collection management of media art include: Matters in Media, launched in 2005 by MoMA, SFMoMA and Tate; The Variable Media

Initiative, which emerged in 1999 out of a collaboration between the Guggenheim Museum NY and the Daniel Langlois Foundation for Art, Science, and Technology in Montreal, Canada; and DOCAM, initiated and managed from 2005 to 2010 by the Daniel Langlois Foundation. Our research builds on this work as it investigates the processes by which museums transform digital acquisitions into manageable museum holdings. In general, museum studies and conservation literature tend to stress the newness of digital art and describe the organizational changes required for managing digital collections as significantly different from existing practices (e.g. Graham 2014; Rinehart and Ippolito 2014; Noordegraaf et al. 2013; Laurenson 2013, 2014). These contributions often attempt to provide explanations of how digital art differs from more traditional art objects and why they have not been easily absorbed into existing conservation practices and organizational structures. A primary difference from traditional media is that digital works exist in binary, electronic formats that must be stored and managed on servers and computers rather than as physical objects that are kept in art storage vaults. Another difference is their dependence on software, operating systems and exhibition equipment such as computers and projectors that require regular maintenance and updating as commercial technologies advance.

Arguments about the introduction of digital art into museums tend to align strongly with the notion of disruptive or revolutionary change. Curator Graham, for example, sees new media art disrupting 'safe categories', including departmental territories, roles, boundaries, knowledge and skills (2007: 93). Laurenson, conservator and Head of Collection Care Research at Tate, describes how museums have responded to the advent of time-based media by focusing on changes in the social order that several organizations went through (2013).[4] Based on her research at large contemporary art museums and time-based media organizations, she identifies four museum staffing models that emerged in response to new conservation requirements of time-based art.[5] For Laurenson, the models demonstrate that the conservation of this relatively new art form cannot be simply absorbed into existing museum departments and professions (2013: 39).

Whereas Laurenson mainly focuses on new staffing models in response to these new art forms, sociologist Domínguez Rubio (2014) unpacks how the characteristics of the artworks necessitate change. He characterizes media art as 'unruly' in comparison with traditional museum objects such as paintings, which behave in a 'docile' manner. In the case of 'docile' objects, collections management processes such as storage, exhibition, and conservation are unproblematic, with labour clearly distributed among museum professionals. Such objects, then, stabilize and reproduce institutionalized boundaries within museums.[6] For Domínguez Rubio, unruly objects such as digital artworks are 'vectors of transformation and change' that challenge these boundaries and redistribute competencies and expertize (2014). He describes the museum as an 'objectification machine' (2014: 620), in reference to MoMA's endeavour to transform and stabilize variable and unstable media art into docile objects. While the distinction between artworks as 'unruly' or 'docile' is useful to explain how artworks produce different degrees of change and stability in a museum context, Domínguez Rubio only briefly touches on what changes actually occur and how they occur.

Rinehart and Ippolito (2014) are less optimistic about museums' ability to change in response to the advent of digital art. For them, museums are forced to choose between maintaining their past way of doing business and preserving new media collections (2014: 89). They critique traditional art preservation practices as closed and internal, and recommend open practices that engage non-professional actors they refer to as 'amateur preservationists' and 'unreliable archivists'. The authors lay out a multifaceted argument that attributes the future death of media art to failed technologies, poor institutional management, and restrictive copyright law. In their view, museums – closed and rigid – are too resistant to change, despite the fact that radical changes on multiple fronts are required to save digital collections in museums (223-224).

More closely aligned with our analysis, Hendrick (2015) suggests that the degree to which museums are 'agile' determines the effect of new media art on these institutions. She claims that museums whose organizational culture promotes experimentation, innovation and informal leadership by staff are agile and able to adapt to yield conditions suitable

for processing new media collections (33). In such institutions, subtle changes in formal organizational structures emerge in response to collecting new media art. These changes are enabled by interdisciplinary and cross-departmental collaborative practices inside and outside the organization that provide access to specific skill sets and technical know-how not typically covered by traditional staffing. Beyond these adaptations, the institution can persist in its usual formats and practices. Hendrick's research helpfully surfaces the notion of change in museums as occurring in subtle structural shifts that leave broader structures undisturbed, a theme we further develop in our case.

Additionally relevant is more general research on change in museums, as well as technology-induced change in similar institutions. Similar to Hendrick, Peacock (2008) theorizes that the effect of technology on museums depends on the degree to which internal conversations are open to diverse ideas. LeMaistre et al. (2012) show how the advent of digital cataloguing systems in libraries caused reference librarians to shift their roles rather than rendering them obsolete. Other scholars focus on the ways in which museum staff interpret external pressures on their organizations. For example, Alexander (1996) finds that funder influence on museum exhibitions is mediated by curators, who attempt to retain their autonomy and legitimacy by shielding certain topics from influence (see also Lachmann et al. 2014). Other studies point to a confluence of change-causing forces in museums: internal factors, such as collections growth; economic factors, such as organizational finances; and field-wide factors, such as professionalization (Moreno 1997; Marsh 2014). These studies importantly point to the ways in which reactions to changes in museums' external and internal environments are, rather than uniform across institutions, customized and adapted in the daily work and interaction of staff.

Theoretical Apparatus

Two distinct traditions, Science and Technology Studies (STS) and institutional theory in organizational sociology, are useful for our case. First, the STS tradition explicitly addresses how social and technological dynamics combine to explain how change occurs. Scholars in this field assess the various ways scientific/technological 'know-how' conjoins in social action. We make use of two strands of STS theory in particular – *infrastructure analysis* and *sociomateriality.*

The infrastructure analysis tradition, (exemplified by Star 1999) attends to the intermeshing of people and technologies as infrastructure – the physical and technical media of everyday work and backstage elements of work practice (380). This tradition advocates analytical attention to infrastructure as the taken-for-granted and fundamentally relational backdrop of behaviour and practice. Writers in the sociomateriality tradition argue that organizations exist as a process enacted by assemblages of 'people, social structures, information technologies, and representational object[s]' (Mazmanian, Cohn and Dourish 2014). We follow Star's (1999) call to attend to infrastructural systems, and sociomateriality's focus on the production of these systems via assemblages of people and technologies and analytical concentration on processes and relations.

Collections management and conservation systems at MoMA are thus understood as social products that are enacted in organizational practices. They bespeak infrastructural systems whose elements cannot be studied in isolation, but as social processes and procedures as well as technical systems. Instead of focusing exclusively on interpersonal dynamics or how artworks' features force changes in practice, building on this literature we attend to how social relations and structures within MoMA combine with the characteristics of digital artworks and collections management systems to drive adaptation at the museum.

Moving to the second component of our theoretical framework, we leverage the institutional theory tradition in organizational sociology. Under the new institutionalist tradition, organizations structure themselves according to taken-for-granted ideas and structures that have been legitimated by society. This situation promotes isomorphism in highly institutionalized organizational fields, in which organizational structures assume a high degree of consistency (across museums and their departments, and from one museum to another, for instance) (DiMaggio and Powell 1991). Organizations may add additional subunits to conform to new environmental expectations while leaving their core fundamentally unchanged (Meyer and Rowan [1977] 1991: 41). This tradition helps us to understand why organizational change may

be adaptive in museums rather than disruptive or revolutionary. DiMaggio (1988) describes the work of institutional entrepreneurs as a mechanism through which such change occurs. These entrepreneurs, realizing that they will be unable to accomplish their aims within the confines of existing institutions, pursue the transformation of existing institutional structures or their replacement by new institutions.

This argument suggests that we identify institutional entrepreneurs and analyze their activity to help us understand how change takes place at organizations like MoMA. We combine theoretical perspectives from STS and organizational sociology to identify the type of change that occurred at MoMA around digital art and explain how and why it occurred. Using insights from organizational sociology, we argue that MoMA, as an organization located within a highly institutionalized field, responded to the advent of digital art via adaptive rather than revolutionary change. Accomplished via subunit proliferation and subtle changes to existing structures and protocols prompted and facilitated by institutional entrepreneurs, this change allowed digital art to be incorporated into existing MoMA infrastructures. We use STS to analyze the processes and relations by which these changes occurred.

Methods

We chose MoMA for our case study because of its size, scope and the importance of its media collections. Since its first digital acquisition in 1991, MoMA's digital collections have grown to approximately 3,000 works. Data for this study stem from a researcher-practitioner partnership with current and former MoMA staff. One of our authors, Glenn Wharton, worked at the museum from 2005 – 2013 to establish the conservation program for media and performance art. Given Wharton's long-term familiarity with MoMA practices and personnel, his participation in the research presented an important internal perspective on our case. This was balanced by co-authors Vivian van Saaze and Leah Reisman, who analyzed the museum's practices and processes from an external perspective. At the outset of the project, Wharton provided extensive written institutional histories of MoMA's adoption of digital art, along with his perceptions of the process and roles of various actors. Van Saaze and Reisman also interviewed him regarding his experiences, to contextualize and complement the written histories. Additionally, the authors conducted semi-structured interviews with thirteen MoMA staff members across departments and of varying tenure and seniority,[7] selected in partnership with Wharton due to their involvement in digital art at MoMA, both currently and historically. Wharton's status as a former staff member facilitated access and context for these interviews; he conducted interviews with senior museum leadership, and interviews with other museum staff were conducted by van Saaze and Reisman. One key staff member was interviewed twice. Interviews took place between 2015 and 2016, with the majority conducted in May 2016. They lasted between 45 minutes and 1.5 hours and were conducted and recorded either at MoMA or over the phone. Interview questions covered themes related to MoMA's current and historical approach to and perspective on digital art. Following sociomateriality's focus on backstage work and processes (Bowker 1994, Star 1999: 379-384), interviewees were specifically asked about current and former work practices and processes related to digital art, including decisions about encoding and standardizing, tinkering and tailoring activities, and decisions carried into infrastructural forms (Star 1999: 382). In alignment with infrastructural analysis and new institutionalism, respectively, the authors also requested that interviewees describe and show examples of infrastructural systems used in their work and identify key involved individuals. Finally, the authors reviewed archival materials documenting digital artworks acquired by MoMA. As is convention in qualitative research, these data were analyzed through a process of triangulation, in which claims or themes in one data source are corroborated, adjusted, or challenged in light of additional data sources. In our case, the internal perspective that Wharton's position as an institutional insider afforded was confirmed, revised, and contextualized through additional interviews and review of archival materials. With backgrounds in ethnographic research, and in alignment with Star, all three authors brought an 'ethnographic sensibility' (383) to the data collection and analysis.

1. Adjustments to staffing and the creation of subunits

As Wharton recounted, MoMA's first digital acquisition (in 1991) was a TIFF image for Felix Gonzalez Torres' Untitled (Death by Gun). Arriving on a CD, the image was to be used for printing photolithographs to exhibit in the gallery. The CD was placed on a shelf with other artworks in fine arts storage. Over subsequent years, additional digital works were acquired by a small number of curators. Barbara London and Paola Antonelli, specializing respectively in media art and design, were the first institutional entrepreneurs to advocate for digital acquisitions. They championed the importance of media and digital collections at MoMA. According to London, convincing the museum that digital art was worth collecting was an important task.[8] Between 1993 and 1996 London organized Technology, a program in which artists, architects and theorists discussed new art forms powered by computers. As a result, work by several artists using digital technologies entered the collection. Later, Antonelli broached the subject via a series of symposia in 2006 exploring the future of MoMA's graphic design collection; the overwhelming response from the convened experts was the necessity of embracing the digital.[9]

By 2004 MoMA held approximately 100 digital works, grouped with approximately 1800 analogue audio and video works as 'media' collections. The museum was at this point also collecting highly complex software-driven installations and computational works. Digital artworks continued to be stored on CDs, DVDs, flash drives, portable hard drives, and computers in fine arts storage as they arrived from the artists. In addition to this insecure storage system, managing information about the digital works challenged traditional practices. The Collection Management System (CMS)[10] was not capable of storing all of the technical data about the scores or hundreds of files that comprised some of the more complex works, nor was it equipped to manage relationships and dependencies between the files, the software and the hardware needed to exhibit them.

MoMA staff members cite the growth of digital collections as engendering a 'tipping point' for the organization; the scale of the collection made the storage difficulties explained above impossible to ignore. As Wharton recalled, chief conservator Jim Coddington realized that something needed to be done and that it could not be dealt with via existing structures. In 2005 Coddington procured an internal grant for a contract conservator to survey the media collection and establish conservation priorities. At the time, conservators specializing in media art did not exist in the United States. In Coddington's view, he could find someone in the audiovisual or computer industries who would bring deep technical knowledge to the museum or he could contract with a conservator who could 'put a conservation mind' on the problem. The contract media conservation position would be added to existing positions for paintings, sculpture, paper, and photograph conservation at the museum. Thus, a new branch of conservation was to be built onto the existing departmental structure at MoMA.[11] In doing this, Coddington acted to recognize a need in MoMA's institutional structure and responded to it by creating a new subunit of conservation. Like London and Antonelli, he can be thought of as an institutional entrepreneur.

After serving on this two-year consulting contract, Glenn Wharton, who had a background in sculpture conservation, was hired by MoMA in 2007 as the country's first museum Media Conservator. Digital collections grew concurrently with this staffing growth. As Architecture and Design Collection Specialist Paul Galloway put it, 'the more works we get, [...] the more conservators and attention they need'.[12] By 2015 there were three full time media conservators at MoMA. Just as Wharton had come from sculpture conservation, these three media conservators also adapted their skills from prior professional practice: from photograph conservation, library and information science and moving image archiving and preservation. The hiring of new staff in response to the conservation and management needs of digital art occurred through a deliberate effort to maintain consistency with museum structures. At a moment when no one in the country was trained to perform this work, people were brought in from allied professions and transformed into media conservators. In leading this work, Wharton acted as an additional institutional entrepreneur. He tapped professionals with expertize in disciplines with related institutionalized skills and practices and facilitated their conversion into media conservators. When Wharton left in 2013 he was replaced with Kate Lewis, a media conservator from the Tate (2005-2013), who was originally trained as a paper conservator.

In this early history of digital art at MoMA, change was prompted via simultaneous forces – the increasing importance of digital art in the art world, the technical particularities of these works, and the new technical requirements their growing prevalence in the museum created (such as server storage and software maintenance) combined with the agency of several institutional entrepreneurs within MoMA to instigate a process of institutional reorientation. The shape this adaptation took is intelligible within the new institutionalist tradition in organizational analysis. As mentioned earlier, in highly institutionalized fields like that of the museum sector, organizational change often occurs via subunit proliferation, in which additional organizational segments are added to satisfy a change in the organizational environment, rather than wholesale organizational change. Coddington's choice to create a new branch of conservation at MoMA to respond to the technical demands of growing digital collections represents the addition of just such a subunit – a new conservation segment would allow MoMA to devote concerted attention (and resources) to this new art form without disturbing the greater organizational structure.

Concurrently to the addition of an organizational subunit, efforts took place in other departments affected by the introduction of digital art at MoMA to undergo a similar process – adjust practice while leaving core duties intact, with institutional entrepreneurs acting to smooth change processes. As Wharton retold, MoMA's Information Technology (IT) staff gradually took on new responsibilities in digital artwork storage, as distinct from their primary role of providing technical support for the museum. At first, they assumed that digital artworks would be stored on the same servers as other data at the museum. As described later in this article, IT gradually embraced a more collaborative approach by working with media conservation to develop a secure, preservation-quality art storage system. Similarly, the curatorial departments did not initially have internal expertize to properly acquire and catalogue digital collections. In the Architecture and Design curatorial department, the Study Center Supervisor took a personal interest in digital acquisitions. He took it upon himself to gain expertize and became the department's digital collection specialist as he worked with the media conservators to acquire, document, and catalogue digital works. The Media & Performance Art curatorial department took another approach by creating a Media Working Group with the media conservators and a registrar to develop policies and make collaborative decisions regarding media acquisitions. As Wharton elucidates, there was some initial pushback in other departments against expanding existing roles and responsibilities to accommodate digital collections:

> The imposition of new art forms that required new tasks, skills and knowledge on the part of the existing staff was at times quite stressful. Initially people had it in their minds what their job descriptions were, what it is that a registrar does, what it is that a cataloguer does, and what they should know. There was some rejection, or saying 'no, that's not what we do'. They were grateful that someone else [the media conservator] had come along to handle the new workload so they could continue doing what their conception of their work was.[13]

Cohering with expectations about highly institutionalized organizations, some of the existing roles and domains of expertise at MoMA were initially resistant to change. This context necessitated careful smoothing work by institutional entrepreneurs. In 2012, Wharton expanded the Media Working Group, which was originally established for the Media and Performance Art curatorial department, to encompass all seven curatorial departments with representation from IT, Registrar, Collections Exhibitions Managements System, Audio Visual, and Exhibition Design. This new group met regularly for seven months and included stakeholders from additional departments, such as the Collections and Exhibition Technologies staff and MoMA Counsel. The primary task of the group was to adapt MoMA's cross-departmental Collections Management Policy for the needs of media art.[14] According to Wharton, this was a 'watershed moment'. Between the formal monthly meetings, smaller interdepartmental groups of staff members met to revise each aspect of collections care in the document, including acquisition, documentation, storage, exhibition, loans, and de-acquisition. The revised *Collections Manual for Time-Based Works* redistributed responsibilities to conform with departmental roles for the traditional collections. The group, while fostering interdepartmental collaboration on digital art at MoMA, left core responsibilities of its members undisturbed. As Wharton put it, the group was 'peripheral to their conception for what their work responsibility was. They were very happy that this was

going on, they could understand the logic of having a cross-departmental group that would meet regularly to discuss digital collections management'.[15]

In interviews, staff pointed out that in addition to this group, media conservators initially took on certain roles normally routed to different departments — namely, the Registrar Department initially asked the media conservators to perform work registrars and preparators normally conducted on object based collections, such as removing artworks from incoming storage containers (in this case hard drives) and performing condition assessments. These adjustments smoothed digital art's entry into MoMA and facilitated its normalization into existing systems. Beyond the addition of a new branch of conservation practice at MoMA, these subtle adjustments to practice were gradually accomplished in other departments. Although these changes were not simultaneous across the museum and did not always occur smoothly, the smoothing work performed by institutional entrepreneurs ensured that these adjustments facilitated the incorporation of digital art into departmental practices while leaving staff members' core duties undisturbed.

Notably, given that the institutional entrepreneurs we name in this case are also organizational leaders in MoMA's staff hierarchy, the smoothing work discussed above aligns interestingly with formal leadership structures at the museum. While organizational leaders used their authority to gain employee attention to the process of digital art integration at MoMA, they went beyond standard authority structures and enacted more informal leadership to accomplish smooth integration — for example taking on duties normally outside of their departments' purview. While some of these tasks such as "unpacking" digital files eventually reverted back to their original departments with the hiring of a registrar specializing in media art in 2016, other responsibilities like performing condition assessments remained with media conservation permanently.

In sum, the adjustments to staffing that occurred at MoMA in response to digital art occurred in accordance to predictions from new institutional theory – the museum first added a subunit devoted to media conservation, leaving the core organizational structure intact. Over time, institutional entrepreneurs additionally accomplished adjustments to existing departments – Conservation, IT, Registrar, and the two primary collecting curatorial departments all modified their workload and added staff to accommodate digital collections. The process by which this took place was prompted simultaneously by technical needs of the collection and the work of institutional entrepreneurs.

2. Adaption in Conservation Practices

According to Coddington, it was clear in 2004 that changes needed to be made in MoMA's conservation practices to address the material and technical needs of its digital collections.[16] As in the case of staffing at the museum, these practices changed in subsequent years through a process of adaptation, such that the conservation of digital artworks could be largely incorporated into codified principles of art conservation. Existing practices within the Conservation Department at MoMA were developed for object-based collections such as paintings and sculpture and did not address works that exist on hard drives and are dependent on commercial playback and exhibition equipment. They mirrored practices in other museums in the western world that are codified through professional literature, codes of ethics, and guidelines for practice developed by national and international professional organizations. Conservators are bound by accepted principles of practice such as 'minimal intervention' and future 'reversibility' of their actions whenever possible (Clavir 2002; Muñoz Viñas 2004).

Traditional conservation interventions include cleaning, repair, and replacing areas of loss on art objects. Standard methodology for these interventions involve research, negotiated decision-making between conservators and curators, and extensive documentation of all actions with photographs and reports (Appelbaum 2007). Conservation research includes assessing the material condition of art objects, determining original appearance, and identifying 'artist intentions' for display (Wharton 2016). Over time, the media conservators at MoMA and other museums adapted these research and intervention strategies to accommodate the needs of digital collections. As MoMA's media conservators recounted in interviews, they expanded

traditional material identification such as paint media or varnish to include identification of digital video formats. Rather than analyzing how a painting was constructed, they investigate source code written by artists and programmers. Instead of documenting corrosion and breakage, they adapt documentation methods from the software industry such as annotating source code for future programmers who would recompile it to function on new operating systems (Wharton and Engel 2015). Whereas conservators of traditional art perform art historical research to learn about artist materials and techniques, the media conservators at MoMA also interview artists to ask them directly how they produced the work, including image capture, editing, audio and color rendition, source code compilation, etc. They also ask the artists how they would like their work to be displayed – on monitors, screens, and the use of interactive technologies.

Similar adaptions were made to traditional conservation interventions. At times conservators still repair damaged objects, but the objects are often video monitors and playback equipment rather than paintings and sculpture. As the media conservators pointed out in interviews, instead of consulting with bronze founders, stonemasons, and other technicians with specialized areas of expertize, they work with audio and video engineers, computer scientists, and programmers to identify artwork technologies, hardware and software dependencies, and artist concerns for display of their work. These adaptions to standard conservation practice at MoMA by borrowing from audiovisual, electronics, software, and other industries took place in the context of a changing professional field for art conservation. An increasing number of conferences, research projects, and publications began to focus on conservation interventions for time-based media and installation art. An early example was the Variable Media Initiative, a research project launched by the Solomon R. Guggenheim Museum and the Daniel Langlois Foundation for Art, Science and Technology in 1999.[17] New methods of intervention were imported from adjacent industries such as digital archiving and software engineering. These interventions include migration to new software and emulation to allow old software to function on new operating systems.[18]

As Wharton put it, through all of this, media conservators struggled to adapt these new research and intervention strategies from the software industry into the ethical practice governed by deep-seated values within their profession. Just as adaptions in practice were made at MoMA, a parallel expansion took place in the American Institute for Conservation with the introduction of a new 'specialty group' called the Electronic Media Group (EMG)[19] to codify the professional requirements of this area of the field. The EMG joined the ranks of other specialty groups, including Paintings, Book & Paper, Photographic Materials, and Textiles.

To illustrate how these adaptions entered practice and presented ethical challenges at MoMA, we examine the 2013 conservation intervention on Nam June Paik's *Untitled* (Piano), an artwork referred to by Domínguez Rubio (2014) as 'unruly'[20] (Figure 1). The video sculpture consists of an upright piano modified with an electronic player piano unit that plays jazz show tunes. The piano is covered with fifteen monitors. Some play bright psychedelic videos in tribute to John Cage, while others capture live video feed from the moving piano keys and hammers. The condition report documented damage to the piano, the monitors, and other technical equipment (Figure 2). The report also drew attention to obsolete technologies that the work relied on, including the cathode-ray tube monitors, the live feed video cameras, the laserdisc playback equipment, and the player piano unit. According to the museum's conservation treatment report[21], the conservators contracted repairs on the piano and purchased two sets of backup monitors and video cameras for future replacement when the current equipment fails. They also migrated the video to preservation quality digital files so they could be played on new playback equipment in the future and replaced the 5¼-inch floppy disc piano player with a new unit made by the original company that runs on wireless MP3 technology.

Just as adaptions in staff workload did not come easily for the museum, the conservators struggled with the ethics of adapting and changing original technologies used by the artist in order to keep the audio and video functioning. Since the artist wasn't alive, they consulted colleagues, including the director and curator of the Nam June Paik Studios. Decisions were difficult. For instance, as Wharton explains, the team decided to replace the floppy disc piano player with a new MP3 unit since the original unit could no longer be maintained with commercially available technology. The new player was of 2013 vintage and did not look like the 1990s technology employed by the artist. A compromise was made to leave the old unit

(Figure 3) in place and visible to the public. The new, smaller unit (Figure 4) was placed behind the original and is only visible from underneath the piano. This was a troubling compromise for the conservators, because while it visually honours the original technology by leaving it in place, visitors may not know that it is a non-functioning relic of original technology. Although new to the museum in their specificity, such conservation interventions were perceived by the conservators to be adaptations to traditional conservation decision-making. They followed traditional conservation methodology that includes research, decision-making, documentation, and intervention. They struggled with the traditional principal of minimal intervention as they migrated new technologies such as replacing the player piano unit, but they honoured the standard principle of reversibility by keeping the old unit in place. A future conservator could, in theory, bring back the old technology by repairing the original unit.

Figure 1. Paik, Nam June (1932-2006): Untitled, 1993. Player piano, fifteen televisions, two cameras, two laser disc players, one electric light and light bulb, and wires. Overall approximately 8' 4" x 8' 9" x 48" (254 x 266.7 x 121.9 cm), including laser disc player and lamp. Bernhill Fund, Gerald S. Elliot Fund, gift of Margot Paul Ernst, and purchase. Acc. no.: 211.1993. New York, Museum of Modern Art (MoMA). © 2018. Digital image, The Museum of Modern Art, New York/Scala, Florence

To summarize, in order to maintain consistency with museum structures, a new subdivision of conservation intervention was introduced that aligned with existing professional ethics and values and was modelled after existing conservation practices at MoMA. Over time, MoMA media conservators conducted a number of conservation interventions such as the work performed on Nam June Paik's *Untitled* (Piano) that subtly altered original technologies. They followed standard conservation methods of research, collaborative decision-making, and intervention, while documenting their actions and their rationale in their reports. The procedures developed for digital art thus fitted within ethical codes and standards for practice developed for traditional art forms. Responding to the conservation needs of new technologies, conservators adapted processes from audiovisual, electronics, software, and other industries. Digital art came to the museum with seemingly insurmountable challenges but became embedded in museum conservation practices through adaption, rather than wholesale and disruptive change. This happened as conservation practice itself adapted to the new medium, further facilitating the incorporation of digital art's technical needs into existing museum structures.

Figure 2. Assistant Media Conservator Peter Oleksik and Conservation Fellow Emily Hamilton assessing the condition and calibrating a cathode-ray tube monitor. Photo: Glenn Wharton

3. Adaptations to information management and storage systems

Analyzing the development of the information management and digital storage systems at MoMA reveals another museum effort to model new practices according to existing structures. Instead of creating a new information management system for digital art from the start, efforts were first made to modify two existing systems: The Collection Management System (CMS) and the Digital Asset Management System (DAM). The CMS is the museum's collection management database in which all information about its collection is housed. The primary function of the DAM is to house the definitive images of the collection. In the CMS, staff worked to adapt fields designed for object-based collections for information about digital collections. The DAM was adapted to accommodate audio and video documentation of collections required by digital art, as well as viewing copies of the museum's digital collections.

Kate Lewis, Media Conservator, asserted that a main goal for conservation staff in integrating digital works into collection management systems was to equalize the treatment of digital and non-digital works. As she put it in an interview,

> To me that was really important... people say, 'this doesn't fit in a collection management system, we should have our own system' but I've always been of the mind that: sure but we don't want people to forget this is part of the collection. How digital art is stored, and how we retrieve it is different than object-based collections. That's the edge where it is getting pioneered, but to the museum at large it shouldn't look different, it should feel like the same collection.[22]

Key to avoiding the alienation of digital art from the rest of MoMA's collection was fitting it into existing systems in a manner consistent with other artworks and recognizable to the various users of the CMS across the museum. This was accomplished via a complex negotiation

between various users of the CMS and constraints and affordances of both digital works and the CMS itself. Wharton described the process of selecting and adapting fields in the CMS to specify digital works:

> The CMS was designed for what I might call contained, or object-based works of art like paintings, works on paper, photographs, sculptures and so on. It wasn't designed for variable works that have their technology change over time. The curators, registrars, the education department, legal staff, conservators — all put their information into different sections in the CMS. But there were very clear problems. For example, there was a field for dimensions but not for duration. We decided to put duration, like '20 minutes', in the 'dimensions' field. To do this we needed buy-in across the museum.[23]

> There was also a problem of controlled vocabulary. [...] I wanted to do searches for video works at MoMA and learned that I couldn't because various curators, cataloguers, and registrars had entered video under many different descriptors, such as 'video', 'VHS', 'CD', and 'DVD'. [...] I had many meeting with Collections & Exhibition Technologies staff, the registrars and the curators to develop controlled, searchable vocabularies.[24]
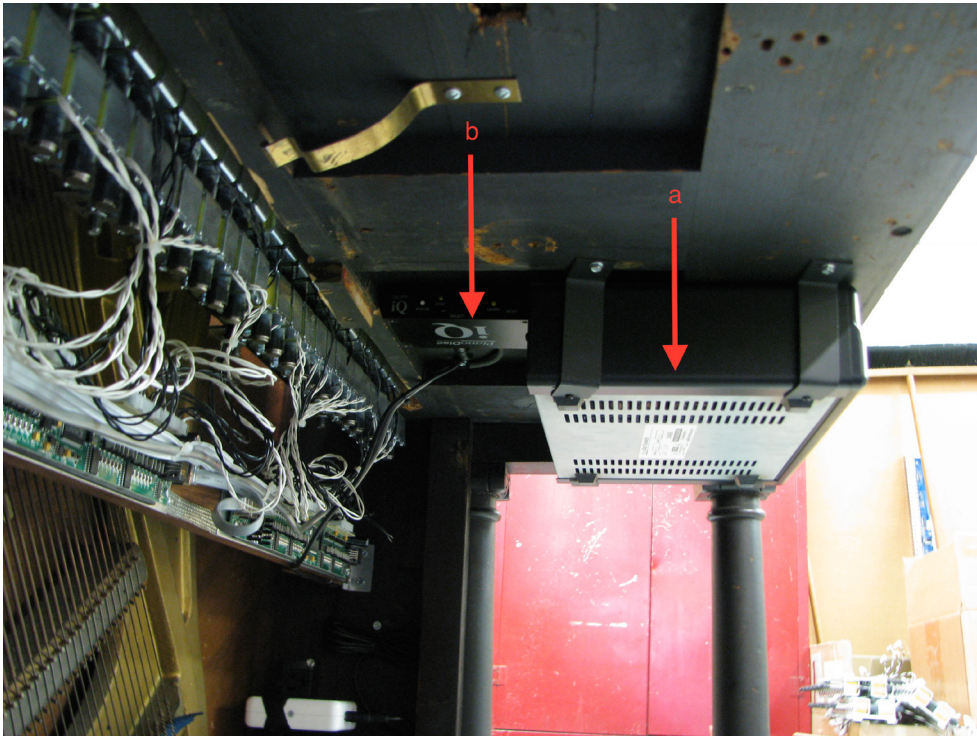
Figure 3. View of the underside of the piano keyboard. The old player piano unit ("a") is on the right and remains visible to the viewer. The new unit ("b") is on the left and is only visible from the underside of the keyboard. Photo: Glenn Wharton.

The lack of fields designed for digital and media works in the CMS necessitated creativity to fit them into the system. At first this resulted in ad-hoc classifications. Over time, staff created a controlled list of values that facilitated information searches within the database. Developing standard protocols for cataloguing digital works in the CMS required, however, delicate interpersonal work on the part of key conservation staff members. Lewis explained this process, indicating that they worked

...primarily with the Registrars and Collection & Exhibition Technologies departments to enhance cataloguing at the component level. In 2014 we did not want to redo all the cataloguing for works entered since 2007 but add clearer technical descriptions for digital files akin to the descriptions being entered for objects. As part of this process we talked with stakeholders including our curators to make sure everyone was on board and that, critically it was useful across users. In addition to now using '.mov H.264', (a file suffix and codec) as a component name, in brackets at the end we also added '[digital file]'. So for people who are not familiar with the different file formats but are users, this flags that the component is digital.[25]
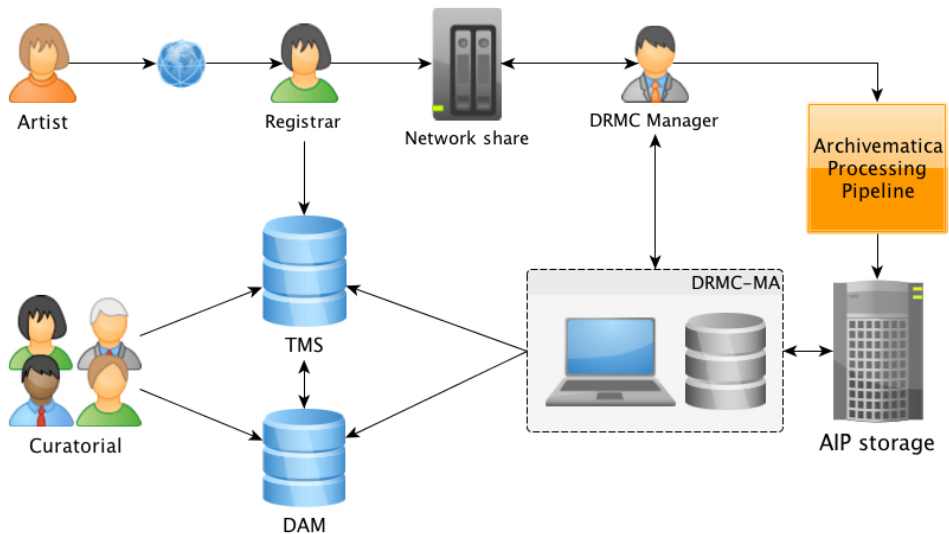
Figure 4. Diagram depicting the socio-material processing of digital art through MoMA's DRMC, TMS, and DAM (2013). Credit: Ben Fino-Radin, DRMC Manager.

Adjustments were described in our interviews as minor changes and augmentations to existing systems. Compromises were struck between various groups to satisfy concerns and ensure buy-in to procedural changes. To bridge differing levels of technical knowledge between different CMS user groups, staff resorted to adjusting component names such as adding '.mov H.264' to indicate its video format. This allowed codes intelligible to different groups to coexist to ensure maximum legibility across the museum. Again, this process was shaped in important ways by the peculiarities of the CMS system as well as the digital works being inputted. Adaptations needed to achieve the tripartite goal of compatibility with existing systems, legibility to traditional MoMA departments, and adequacy in representing new digital works. Via this process, digital works were incorporated into existing information management structures and practices, rather than disrupting them. Despite these adaptions, the CMS and the DAM had their limits. For instance, the CMS could not easily track the hundreds of individual files that made up some of the complex software-based works. Nor could it accommodate the volume of technical metadata associated with these files. The DAM could archive audio and video files and associated documentation, but it was not designed to support the high level of security and file integrity need to preserve digital artworks in perpetuity. Once it became clear that the existing information management and digital storage systems could not entirely manage the needs of the digital art collection, a third system (now known as the Digital Repository for Museum Collections (DRMC)) was designed.

The development and rolling out of the DRMC can be understood as a process of subunit proliferation and adaptation that mirrors aforementioned staffing changes. Like adjustments to staffing and conservation practice at MoMA, it was prompted and facilitated by both the technical needs of artworks and social action of MoMA staff. Indeed, according to Wharton, the dual social-technical constitution of the DRMC was explicitly recognized during the development process:

> We had discussions early on about whether the DRMC was a person or a thing, and we decided that it was both – that it includes the workflow of multiple people as well as the digital assets and the hardware and software.

Additionally, the DRMC's development process was made explicitly responsive to the needs of both human users and digital artworks. Lewis explained the 'agile development' process:

> You write out scenarios about how you want to put different works into a system [...] how am I going to use this system, how do I put this work, this work, this work, this work in [...]. So you still have milestones, achievable goals.[26]

> Development was iterative, based on the emerging needs of developers and future system users, as well as the specific needs of the digital works themselves.

As depicted in Figure 4, a protocol for information sharing was developed that was in part automated as it pushed and pulled information between the CMS, the DRMC, and the DAM, and in part controlled by staff input from multiple departments. A unique numerical identifier for each artwork is created by the CMS when it is initially entered into the database. This unique identifier is automatically 'pushed' from the CMS to the DRMC and the DAM to avoid human error in linking the artworks between the three systems. Similarly, descriptive metadata such as 'title', 'artist', and 'date' are pushed from TMS to the other systems. This integration was accomplished via the use of dedicated software to serve as, in Lewis's words, 'a bridge between the systems'. Importantly, the adaptive work to align the three systems is invisible to the majority of museum staff – the infrastructural changes made to facilitate the incorporation of digital art into MoMA systems exist under the surface, allowing the day-to-day practices of staff to remain unaffected.

{Figure 4 about here}

The adaptation of MoMA's information infrastructural systems and protocols to accommodate digital artworks was prompted and shaped by a number of institutional entrepreneurs who imported and integrated new institutional systems into the museum context to support the project. They worked to generate institutional buy-in and resource support for the work. As Wharton explained, in exploring options for the DRMC system once the need for it was established,

> I started looking around and talking to various colleagues. No one at any museum that I spoke with had a secure repository system for their digital collections. This led me to libraries and archives and I quickly learned that these institutions had developed what they called 'trusted digital repositories'. There was a very lively world of discussion and literature within the library and archive industries that didn't exist in the museum industry.[27]

Wharton and a team of internal and external advisors and collaborators imported an established tradition from the corollary field of library science, which itself was then adapted to use in the museum context, including the bridging process described above. This process was shepherded by Ben Fino-Radin, Associate Media Conservator and DRMC Manager at MoMA who was equipped with a dual degree in digital art and library science. He provided entry into the field of digital preservation tools for MoMA staff, and imported concepts and standards from the software development field.

Despite its novelty at MoMA and in the broader museum field, rhetoric around the DRMC facilitated its accommodation within existing museum concepts and systems. For example, the name for the system was changed from 'Digital Conservation Repository' to 'Digital Repository for Museum Collections', highlighting the DRMC as a storage system for collections, much

like a physical warehouse – a new subunit for the museum modelled on existing structures. Staff members now think of physical artworks being stored in art storage, and digital artworks being stored in the DRMC.

Crucially, Wharton and his team worked to generate internal support and resources for the project, through years of research, proposals, and internal meetings with IT staff, curators, registrars, and financial staff, bolstered by the support of Chief Conservator Jim Coddington. Fixes emerged as staff adapted extant systems to the technical requirements of digital artworks. What resulted was a set of infrastructural adjustments aimed at normalizing and rendering consistent the treatment of digital works with traditional works in MoMA's collections, and a new system modelled on existing structures. Digital works became legible within existing systems without compromising or misrepresenting their nature or character. Enlisting relevant staff and appropriate technologies, institutional entrepreneurs were able to gain allies and facilitate integration of new kinds of work in prior modes of practice.

Conclusion: A trajectory of adaptation and normalization

Utilizing insights from the new institutionalism tradition of organizational sociology, we analyzed MoMA's adoption of and adaptation to digital art. Rather than leading to disruptive and radical changes, acquisition led to add-ons and adaptations. Consistent with expectations from new institutionalism, existing structures and processes were subtly modified to fit digital art into MoMA's infrastructural systems. New subunits were created, modelled on existing museum structures, and a new repository was integrated into existing information management systems. Additionally, existing systems and departmental responsibilities were adjusted to incorporate digital art while leaving core roles and responsibilities undisturbed. STS arguments about the need to attend to infrastructure and consider humans and objects as fundamentally intertwined to produce action helped illuminate how this adaptive change occurred and what it looked like.

Focusing on assemblages of objects and humans helped reveal the processes by which these adaptations were accomplished to normalize digital art at MoMA. In this context, digital art was incorporated into MoMA systems via adjustments to 1) staffing and the creation of subunits, 2) conservation practices, and 3) information management systems. In all of these contexts, institutional entrepreneurs facilitated adaptation to the technical specificities of digital art works.

This analysis makes several contributions to the study of museums. We propose the combination of organizational sociology and STS as useful tools in understanding how change takes place in art museums, given that these organizations operate within highly institutionalized organizational fields and simultaneously highly dynamic artistic fields. The organizational sociology perspective helps us understand how and why change is difficult for museums, while STS shows us the subtle ways change actually occurs through adaptation driven by both museum staff and the specificity of artworks.

While our findings are relevant to other museums as they may follow similar pathways when acquiring digital artworks, the MoMA case no doubt has its own distinctive attributes. It has financial and organizational resources to deal with challenges of art and of organization. Further, MoMA has its own commitment, as repeatedly stressed by our informants (and the institution's many pronouncements) to innovate. This is consciously addressed not only in the art it shows, but also in how it can establish standards for the larger art museum field. As a prominent institution in this field, MoMA takes itself seriously as a change agent; it has, as one staff member put it, a 'loud megaphone...'.[28] The processes and types of change we observed at MoMA could, therefore, diffuse across the art museum field, albeit with varied degrees of success and modes of adaptation. Future work could investigate whether and how such diffusion occurs and the ways local circumstance might alter outcomes.

Acknowledgments

Notes

1   See for example: Altshuler (ed) 2005; Chiantore, Rava, Poli, and Dell'Aquila 2013; Corzo (ed) 1999; Hermens & Robertson (eds) 2016; Heuman (ed) 1995; Hummelen & Sillé (eds) 2005.

2   We believe that examination of how staff altered other collections management practices such as acquisition, loan, and exhibition to accommodate digital art would produce similar results but it was beyond the scope of our investigation.

3   See for example: Dietz 2005; Graham and Cook 2010; Graham 2014; Hölling 2017; Noordegraaf, Saba, Le Maître and Hediger (eds) 2013; Paul 2008.

4   Different terminology is used to characterize analogue audio, analogue video, and digital art. MoMA uses the term 'media art', as does Domínguez Rubio (2014), Laurenson (2013) uses 'time-based media art', and Dietz (2005) uses 'new-media art'. We chose the term 'digital art' in our research to focus on the particular challenges of this medium, although we use 'media art' when referring to MoMA's management of its entire audio, video, and digital collections.

5   The four staffing models being: 1) a time-based media specialization within the conservation department, 2) a specialist time-based media curatorial department, 3) an interdisciplinary team across the museum with expertize from multiple professions, and 4) outsourcing work to external consultants.

6   Existing boundaries and systems are, of course, also socially produced and derived from historical antecedents (See Duncan 1995; Paul 2012).

7   All MoMA staff members gave consent to participate in audio-recorded interviews for the project, before the interview commenced. Further, all participating staff members reviewed, verified, and approved the submitted paper.

8   Email communications with Barbara London, former Associate Curator of Media and Performance Art, 23 May 2017.

9   Paul Galloway, Collection Specialist, Architecture and Design Curatorial Department, interview by authors, digital recording, 17 May 2016, New York.

10   The proprietary name of the Collection Management System (CMS) at MoMA is The Museum System (TMS). In our interviews, staff uses these names and their acronyms interchangeably. To avoid confusion we refer to the system as the CMS in this article.

11 Jim Coddington, Chief Conservator at MoMA, interview by Glenn Wharton, digital recording, 26 May 2015, New York.

12 Paul Galloway, interview, 17 May 2016.

13 Glenn Wharton, interview by Vivian van Saaze and Leah Reisman, digital recording, 20 May 2017, New York.

14 The Media Working Group was based on the model of San Francisco Museum of Modern Art's Team Media.

15 Glenn Wharton, interview, 20 May 2017.

16 Jim Coddington, interview, 26 May 2015.

17 For The Variable Media Initiative, see: www.variablemedia.net/ and the publication Permanence Through Change: The Variable Media Approach (Guggenheim Museum 2003).

18 For references on conservation strategies for digital artworks, see B. Serexhe (ed.) (2013) Preservation of Digital Art: Theory and Practice: The Project Digital Art Conservation.

19 The Electronic Media Group within the American Institute for Conservation was created in 1997, and regularly holds conference sessions and publishes research on adapting theory and practice in the field.

20 See also two blogs on the treatment: https://www.moma.org/explore/inside_out/2013/04/15/conserving-a-nam-june-_paik-altered-piano/, https://www.moma.org/explore/inside_out/2013/05/08/conserving-a-nam-june-paik-altered-piano-part-2/; and Wharton, G. (2013) 'Disrupted Circuits: Managing a Nam June Paik Video Sculpture at the Museum of Modern Art', in *Nam June Paik Art Center Interviews, 150-169, Seoul: Nam June Paik Art Center.*

21 Unpublished "Media Conservation Treatment Report" for Nam June Paik, *Untitled*, 1993. Dated May 20, 2013.

22 Kate Lewis, Media Conservator, interview by authors, digital recording, 19 May 2016, MoMA, New York.

23 Glenn Wharton, interview, 20 May 2017.

24 Glenn Wharton, interview, 20 May 2017.

25 Kate Lewis, interview, 19 May 2016.

26 Kate Lewis, interview, 19 May 2016.

27 Glenn Wharton, interview, 20 May 2017.

28 Paul Galloway, interview, 17 May 2016.

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