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How the Guggenheim and NYU Are Conserving Computer-Based Art—Part 1

By Caitlin Dover

Since 2014, the Guggenheim Conservation Department has been partnering with the Department of Computer Science at NYU's Courant Institute of Mathematical Sciences to analyze, document, and preserve computer-based artworks from the Guggenheim collection. Now, the museum is taking a further step to enhance practice development within this new conservation area and launching a dedicated, two-year fellowship position. Here, Conserving Computer-Based Art (CCBA) initiator Joanna Phillips, Conservator of Time-Based Media at the Guggenheim, and her research partner Professor Deena Engel from NYU's Department of Computer Science, discuss their academic-museum collaboration and the CCBA initiative at the Guggenheim.

When—and why—did the Guggenheim begin collecting computer-based art?

Joanna Phillips: An important part of the museum's mission has always been to collect the art of our time and to foster its appreciation. In the late 1980s and early 1990s, when more artists started to become interested in software as an artistic medium, the Guggenheim was among the first museums worldwide to reflect that movement in its permanent collection. The oldest computer-based work in our collection was commissioned by the museum as early as 1989: Jenny Holzer's rotunda-spanning LED installation *Untitled (Selections from Truisms, Inflammatory Essays, The Living Series, The Survival Series, Under a Rock, Laments, and Child Text)*, which was coded in the very old, now rarely used programming language SP-Forth. A decade later, spearheaded by our former Curators of Film and Media Arts John Hanhardt and Jon Ippolito, we commissioned a number of net artworks: Shu Lea Cheang's *Brandon* (1998-99), Mark Napier's *net.flag* (2002) and John F. Simon Jr.'s *Unfolding Object* (2002). Today, these seminal net artworks are still online and hosted by the Guggenheim, but due to their use of early Java, their accessibility is now severely compromised in contemporary web browsers.

Over the years, the Guggenheim has collected more than twenty computer-based artworks that have artist's code at their core, and more works are added to this collection regularly. Looking at the increasing significance of software applications within our culture and within artists' creative production, I expect the near future to bring a steep increase in the acquisition of software-based art, not just at the Guggenheim, but also in private and public collections here and abroad.

This is why we want to enhance our ability to take appropriate care of these works, and this is why we have launched the CCBA at the Guggenheim. This initiative is based on two pillars: first, our ongoing research collaboration with Professor Deena Engel and her students from the Department of Computer Science at NYU's Courant Institute of Mathematical Sciences; second, the creation of a dedicated, two-year postgraduate CCBA fellowship position that we are currently filling.

What are a few of the museum's computer-based works that are in need of conservation?

Phillips: All of them are in need of conservation attention! Conservation doesn't just mean treatment in case of acute damage. By the time a piece has suffered acute damage, it is often too late for treatment. The conservation of cultural heritage, including computer-based art, starts much earlier in an artwork's collection life, with a thorough examination and documentation of the "original substance," an artwork's components and artist-intended behaviors. Before any conservation plan is developed, conservators identify the vulnerabilities of an artwork, e.g. its dependencies on a certain operating system, software, or customized hardware. We assess what effect a possible conservation treatment, such as migration or emulation, would have on the intended behaviors; and we determine, commonly in collaboration with the artist, which visible and invisible changes to the artwork would be acceptable without posing a compromise to the artwork's integrity.

Since most of the museum's computer-based works were acquired before we even had media conservation staff at the Guggenheim, our highest priority now is to conduct a comprehensive survey and back-up of all works, create disk images of the works that came with artist-provided hardware, and identify high-risk pieces that require immediate conservation treatment.

Once we have a better overview, we will continue our in-depth research of selected case studies with Deena and her computer-science students, who have been conducting source code analysis on our works since 2014.

The list of CCBA works is long. It includes installation works, such as Siebren Versteeg's *Untitled Film II* (2006), which gathers data from the web in real-time, Paul Chan's Flash animation *6th ~~Light~~* (2007), and Paul Ramirez Jonas's PBASIC programmed *Another Day* (2003), as well as sculptures and objects, such as Julieta Aranda's *Two shakes, a tick and a jiffy* (2009), Jason Rhoades's *Sepia Movie* (2000), and John F. Simon Jr.'s *Color Panel v1.0* (2000). The three net artworks I mentioned before, *Brandon*, *net.flag*, and *Unfolding Object* have already been analyzed and documented as part our Guggenheim-NYU collaboration, but now require urgent conservation treatment to restore public access to the works.

What are some of the unique challenges involved in preserving those works?

Deena Engel: The ever-present challenge is ongoing digital innovation and the resulting inherent instability of digital artworks. If you think back to a word-processing document that you wrote 10 or 15 years ago, is it easy to open that file now? Does the document still look the way it did in the old software? As hardware, operating systems, and software change over time, the works of art must be brought up to date for continued access. In addition, web-based artworks depend on the viewer's software as well as the hardware and software on the web server that is running the work.

We are concerned about obsolescence of the hardware as well as updates to the operating systems that can render the artworks incomplete—or worse, they no longer run at all. When an artwork runs but seems "weird," we check for specific functions of the given programming language that no longer work. This means that specific sections of an artwork no longer run correctly (even if the rest of the environment and source code are operational), because the current language version no longer recognizes those specific commands. This happened with John F. Simon Jr.'s *Unfolding Object* (2002), which recently introduced unintended black shapes into the image due to selected functions of Java which no longer run.

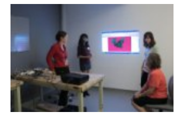
Ideally, the museum obtains the uncompiled source code from the artist upon acquisition of a work, but this is not always possible. In some cases, if we do not have the artist-provided source code available, we have to “decompile” the program. This is not ideal because the result doesn’t include the artist’s annotations within the code and it is much harder to discern the artist’s programming style from decompiled code, if at all.

When attempting to run an older work on contemporary hardware, we need to be mindful that new hardware might run much more quickly, so the artwork no longer displays at the intended pace. This happened to us with Paul Chan’s *6th Light*, for example. Another issue is shifts of color and resolution, which can occur when viewing older works on newer display technology with different color spaces and higher resolutions. The discontinuation of external data sources may also compromise the work, e.g. when links are broken. This happened to Siebren Versteeg’s *Untitled Film II* (2006), as the birth announcement and obituary websites the piece connects to no longer provide the data that the artist intended. Think about an ATM: one doesn’t worry about how an old ATM worked or what it looked like as long as the data are correctly migrated to the newer system; but with works of art, every aspect that impacts the aesthetic experience—colors, shapes, speed, line and so much more—must be considered, according to the principles of art conservation.

Phillips: On a higher level, conserving computer-based art presents conservators with a three-fold dilemma: First, the examination of these works requires the ability to read and understand code, a skill that is currently not taught in traditional conservation education; second, conservation practices first have to be developed before they can be applied (which turns every treatment into a labor-intense research project); third, the number of computer-based works within contemporary art collections is often believed to be too small to justify sufficient dedicated and specialized staff time. As a result, computer-based artworks in contemporary art collections often fall through the cracks—especially if they haven’t been checklisted for exhibition or loan in a few years. Unlike paintings and sculptures, these works don’t have a shelf life per se, so they can quietly break or die without anyone noticing until it’s too late.

This is why one of the aims of the CCBA is to explore possible characterization models that allow targeted monitoring of our works based on their programming languages, software versions, hardware dependencies and other technical parameters. With such a system, we could batch-address all pieces that employ a certain technology once it faces discontinuation; one example would be Java applets, which the contemporary browser Google Chrome stopped supporting as of December 2015.






The Guggenheim's Time-Based Media Conservator Joanna Phillips (left) with research partner Professor Deena Engel of the Department of Comput
University's Courant Institute for Mathematical Sciences.

Are there any established practices that guide how you go about this very specialized branch of art conservation?

Phillips: Of course we are not the first conservators to reflect on the ownership and preservation of computer-based art. Over the last decade, there have been multiple research projects and case study initiatives internationally, some of which resulted in useful publications and online resources. Apart from this valuable research, however, practice development has been scarce and there are still no best practices in place that would guide collection caretakers on how to acquire, document and preserve computer-based works. Within the conservation community, and the larger museum world, there is no consensus on what components and information to request when acquiring a computer-based work into a collection; how to create complete copies of artworks while considering their software and hardware dependencies; how to identify and describe these dependencies; what metadata to create and save, how to document the functions and behaviors of a work; and what those workflows should ideally look like.

It doesn't come as a surprise that practice development shows most progress in collections that have dedicated time-based media conservation staff, such as MoMA, SFMOMA, the Tate, and the Guggenheim. As a networked professional field, we are at the very beginning of developing terminology, methods and methodologies, and we all learn from each other's research and treatments. At the Guggenheim, we hope that our CCBA initiative will deliver a substantial contribution to this movement, especially with the cross-disciplinary layout of our project. We don't want to reinvent the wheel if we can learn from other professional fields such as computer science and import relevant tools and procedures into conservation. This is why we are so grateful to be working with Deena: her unique perspective has changed the way that we look at our collection works and their needs, and thinking outside the box opens the door to innovation.

Engel: Computer scientists and IT professionals have been thinking about software maintenance for many years. That's our bread and butter! Computer professionals have developed standards and methodologies for software maintenance and documentation, backing up, and other strategies towards the goal of maintaining and managing large and small computer systems in many different applications so that the software runs well and produces valid results for our many users.

In addition, in mathematics and the sciences, there is a field known as computational reproducibility that studies how to document and conserve software used for scientific inquiry and related research. It is a basic premise of the sciences that experimental results must be reproducible to be accepted. Today, a great deal of scientific research relies heavily on computational techniques; therefore, the software and hardware environment used to obtain scientific results must be fully documented and preserved in such a way that the same scientific results can be achieved in perpetuity. This is analogous in many ways to the goal of art conservation, as museums will wish to re-exhibit contemporary works of time-based media and software-based art well into the future.

Why did you establish the CCBA initiative?

Phillips: Finding sufficient time for collection care research in a busy museum schedule is not easy, especially in a fast-paced, exhibition-focused environment like the Guggenheim. Generally, our conservation staff's engagement with artworks is driven by exhibitions, loans and new acquisitions, and these always take priority over artworks that are not check-listed. When we understood that some of our under-studied computer-based works might not even survive until their next appearance on a checklist, we decided to take action: We created an official project around the entirety of this group of 22 works, named it the CCBA initiative, and set out to raise awareness and funds in order to staff the project with a dedicated, two-year fellowship position, which will start this fall.

The primary goals of the CCBA initiative are to save and document all computer-based works in our collection and to enhance best practice development for future acquisitions at the Guggenheim and beyond.

Check back next week for the second part of this conversation. For more information about the Guggenheim's conservation department, visit guggenheim.org/conservation.

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