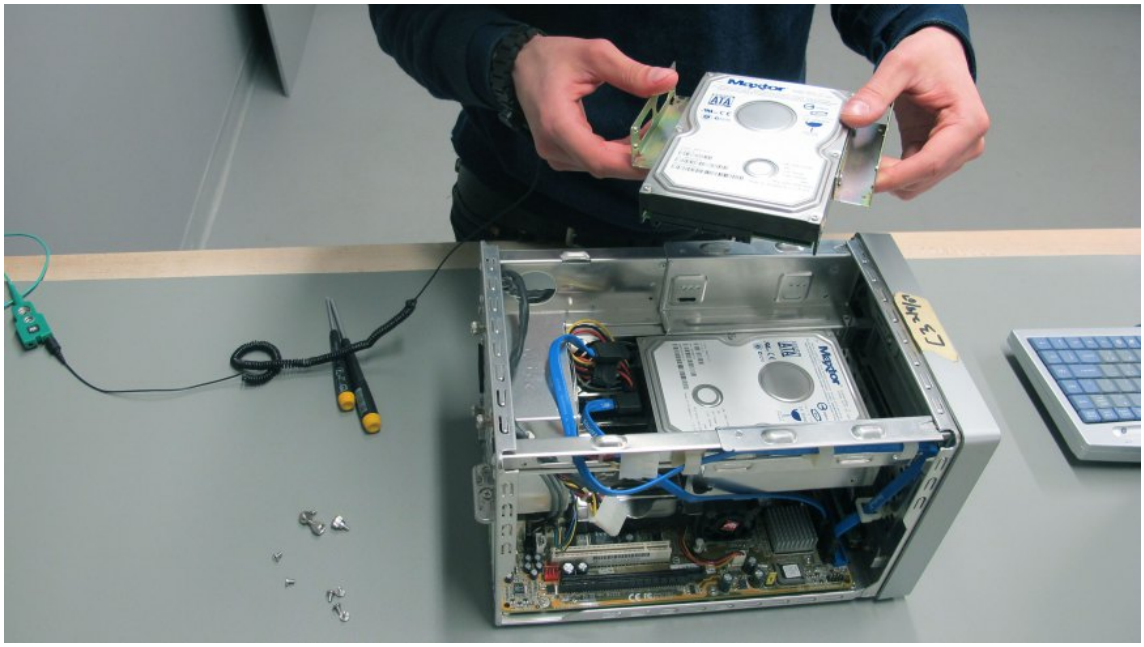

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How the Guggenheim and NYU Are Conserving Computer-Based Art—Part 2

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, continue their discussion about their academic-museum collaboration and the CCBA initiative at the Guggenheim.

How did the collaboration between the Department of Computer Science and the Guggenheim's Conservation department begin?

Phillips: Deena and I met in 2013 at the annual conference of the American Institute for Conservation of Historic and Artistic Works (AIC). Deena Engel and Glenn Wharton presented their joint talk "Technical Documentation of Source Code at The Museum of Modern Art" to the Electronic Media Group (EMG), and I immediately knew that I wanted to work with her. At that point, I had become aware of the unique conservation needs of the computer-based works in our collection, but I knew that I was missing critical expertise to fully understand their intended functions and behaviors and conduct effective conservation on them. Learning about Deena's source code analysis of artworks at MoMA was like a door that opened in my head: Conservation practice development for these works had to be interdisciplinary, and we are all in New York! A few months later, Deena and I started our preparatory viewing sessions in search of suitable case studies for our research collaboration.

Engel: My students and I have collaborated with art conservators to study aspects of software-based art since 2008, when we first collaborated with Glenn Wharton while he was the Media Conservator at MoMA. There are many benefits to be gained from academic-museum collaboration in research: The museum benefits as students and faculty

can devote time to study works in the collection to complement research done by museum staff; and the university benefits as students and faculty have an opportunity to do original research on important works of art. I believe that it is important to provide computer science students with real-world research opportunities that are appropriate to the students' skill levels and interests. Students meet with me weekly throughout the semester. They also receive academic credit upon successful completion of the academic requirements, including written reports, an oral presentation, and other assignments throughout the semester to support their research. Students are encouraged to include a title on their C.V. reflecting this experience. We are grateful to the Solomon R. Guggenheim Museum for welcoming our students to participate in this field of research. As an art lover myself, I have long admired and enjoyed the Guggenheim collection. After I met Joanna at the EMG meeting in Indianapolis, we agreed to get in touch and we did!




Artist interview with Mark Napier in the Guggenheim Media Conservation Lab. Guggenheim conservation staff, NYU's Deena Engel, and her compu
net flag (2002) with the artist, present the findings of their source code analysis, and explore future preservation and access scenarios.

In what way do the computer science students participate in this collaboration?

Engel: They participate by analyzing and documenting source code for these works of art. The students typically begin by writing up notes, spreadsheets, and charts to track all of the software elements in a given work of art as well as the hardware components. In this way, students clearly document the native environment for each work of art that they study, such as the operating system, hardware details and other aspects of the computer and software needed to run the works. Many works of art use more than one programming language, for example, so the students seek to understand and clarify which role each language plays in a work of art. There are also works of art that either retrieve

data from other sources (such as from the web) or track the viewers' input and then store and manipulate the data in a database or in data files. The students also examine the works of art with respect to media: for example, if there are sound files used, which file type is used? Are the sounds created or composed as the program runs, or is there a "soundtrack" running separately from an audio file? Still images, too, are sometimes stored as GIF or other standard image file types; but other programs actually "draw" the images programmatically as directed by the software.

The students meet with Joanna and her colleagues at the museum to learn about the concerns of art conservators for these important works. Based on what they learn, the students seek to identify conservation risks and to propose conservation interventions for the works under study. In some cases, students write software to prototype their proposed interventions after consultation with the Guggenheim's IT staff. Computer science students assist in preparation for artist interviews by writing questions for Joanna and her colleagues to review, and they also participate in those interviews. At the end of each semester, the students do a formal presentation on their findings for Guggenheim staff and their guests. The students work hard to prepare for these presentations—it is often their first formal public speaking experience.

Phillips: Over the last four semesters, we have actively developed the way in which Guggenheim conservators interface with the computer science students: In the beginning, Conservation was more or less on the receiving end of an outpouring of CS information the students created. We would receive diagrams of software elements, giant excel spreadsheets that might detail the color palette Mark Napier used for *net.flag*, or list all Java classes and their functions of a given work. Lists of broken links, PowerPoint presentations, extracted media and screenshots of production environments would all be transferred to us at the end of the semester. But in reviewing these materials, we noticed that some important conservation questions would go unanswered, while other highly detailed analysis would be meaningful to a programmer or computer scientist, but not comprehensible by a traditionally trained curator or conservator without a layer of higher level interpretation.

This was the moment when we returned to traditional conservation documentation and experimented with adapting and applying its long-established information structure to the examination and documentation of computer-based art. We came up with a template that would prompt the CS students to filter their information into channels that correspond with information categories conservators capture for other works of art. With every artwork under investigation, this template is getting further developed, based on the exchange and mutual feedback between conservators and the computer science team. We are basically building a bridge between conservation and computer science by learning about each other's perspectives and approaches, and by translating these into our own professional thought categories and terminologies.

The end-of-semester presentations that Deena mentioned take place in the Guggenheim's time-based media conservation lab, and they have become a kind of "salon" for our New York City community of colleagues. In the beginning, we only invited Guggenheim staff and NYU faculty, but for the last few presentations, colleagues from other museums and NYU programs have joined the discussions, which have now attracted conservators with different specialties; curators; archivists; IT staff; computer scientists; multimedia specialists; and scholars from different fields.

How do the computer science students respond when they are learning old computer languages? How does it inform the way they view their work and their field?

Engel: The students have been very interested to learn old computer languages, as it gives them an opportunity to see how a specific programming language evolved over time, as well as insights into why a now-defunct language was a language of choice in its day. Professional computer scientists often know how to work in several programming languages. Learning an older language helps the students to understand first-hand why clear documentation of both programming languages and computer applications is so valuable to future programmers. Students at the Guggenheim have learned to interpret Lingo (a scripting language for Director, a media environment that predates Flash) for *Untitled Film II*, as well as early Java coding for applets such as for *Unfolding Object*. They have also been introduced to Perl, a web-scripting language that is still in use but rarely taught in current web development curricula.

Are the students familiar with or interested in art before they become involved? How does their participation affect their relationship with art?

Engel: All of the computer science students come to these projects with an academic background or interest in the arts. We have had students participate who also study art history, studio art, set design, media theory, and game design, to name a few. The students who work on these projects are carefully selected from a number of applicants based on their CS skills and interest in the arts.

For many CS students this collaboration further opens the art world for them. We find that they all follow the Guggenheim exhibitions, and this research exposes them to art and the art world in New York in exciting ways that we had not anticipated.

In September 2015, the Guggenheim co-organized and hosted the conference TechFocus III: Caring for Software-based Art. Engel and her students also played a major role in this conference. How did the conference come about, and how did this collaboration between institutions make it possible?

Phillips: The TechFocus conference series is organized by the Electronic Media Group (EMG) of the American Institute for Conservation (AIC); I am co-founder of this series, and we hosted two of the conferences here at the Guggenheim—one on video art in 2010, and last year TechFocus III: Caring for Software-based Art. TFIII was definitely the most ambitious of all programs: our goal for this conference was to reach collectors and collection caretakers alike and to reduce their fear and hesitation towards engaging with computer-based art. We had our great and interdisciplinary team of contributors work closely together to coordinate content across talks and to provide the 170 attendees with actual guidelines and useful takeaways. One of the highlights was a three-hour workshop on the second day, in which Deena, together with MoMA's Ben Fino-Radin and SFMOMA's Mark Hellar, taught participants how to create an artwork in Processing, how to create disk images working from the command line, and how to use the version control tool GitHub on participants' own, previously prepared laptops.

I still can't believe we actually pulled this off, and we were so happy (and proud!) to receive the many grateful and enthusiastic reviews from participants. I really do believe that this conference was a seminal event for the conservation of computer-based art, and without Deena's input and her students' support, we couldn't have done a large workshop like that, and the event would have never been as successful.

Engel: The TechFocus conference was very meaningful for our students. Three of our students spoke at the conference. They worked hard to prepare their materials and as recent college graduates, this was their first public speaking event outside of their coursework. These three students also had the opportunity to be on a panel with the artist whose work they had spoken about, and to have lunch with him; they were so excited to spend time with Siebren Versteeg! Four other students ran the Help Desk for the conference participants. They set up a table in the back of the auditorium and took turns assisting participants to install the required software on their laptops and to troubleshoot Wi-Fi issues and other questions from participants. We invited an additional group of four students to join the Help Desk team to serve as Teaching Assistants during the practical workshop Joanna just mentioned. All of the students greatly enjoyed working with the participants as curators, conservators, and registrars learned how to use software to build art projects. In turn, it was exciting for us to watch the students engage as teachers in this creative work.

In what other ways has the CCBA initiative been supported within the Guggenheim and through the Guggenheim-NYU collaboration?

Phillips: Our interns and fellows have been contributing significantly to the CCBA initiative over the last two years. Our former Samuel H. Kress Fellow for Time-based Media Conservation, Brian Castriota, and our former Andrew H. Mellon Graduate Intern for Time-based Media Conservation, Amy Brost, have both been assisting in reviewing Deena's students' documentation, preparing artist interviews and putting together the case study presentations in the lab. Brian also co-presented our Guggenheim case study at the TechFocus conference. In addition, we have started to place targeted summer internships in order to tackle specific projects within the CCBA. Last summer, for example, we took on one of Deena's former CS students, Jiwon Shin, to examine and document Julieta Aranda's *Two*

shakes, a tick and a jiffy (2009), which was installed in our Storylines exhibition at the time. Internship training in the Conservation Department is usually reserved for conservation students or conservation pre-program interns, so the decision to take on a computer science student was unprecedented. But the experiment was really rewarding! Having Jiwon in the Department catalyzed much R&D on the job and was a great learning experience for both sides.

This summer, we hosted one of NYU's Polonsky Digital Humanities Interns. NYU conservation student Lia Kramer came to work with us to review computer-science documentation of John F. Simon Jr.'s *Unfolding Object* (2002) and to organize and refine its documentation from a conservation perspective.

While we plan to continue these short internships, we are extremely excited that we finally reached our fundraising goal to fill the two-year CCBA fellowship position.

Engel: It was a pleasure to watch Jiwon Shin, a computer science major, grow and thrive in the Conservation Lab during the summer of 2015 after completing two semesters on our project during the previous academic year. In the summer of 2016, I had the pleasure to co-mentor Polonsky Digital Humanities Scholar Lia Kramer. I usually work with computer science students who learn about the principles and ethics of conservation in order to apply their programming skills; this summer, I advised a conservation student as she learned how to apply her conservation training to a new medium: software. So I am happy to add that an additional benefit of these wonderful and fruitful teaching collaborations is that Joanna and I have had some exciting discussions about how to best train computer science students about the principles of art conservation and how to best train conservation students to work with software.

What outcome do you hope to see resulting from CCBA?

Engel: I believe our ongoing collaboration between the Guggenheim Museum and the Computer Science department at NYU will continue to provide opportunities and accomplishment for both the museum and the CS Department and that the results of our work will serve the conservation community now and in the future. I look forward to giving talks and writing papers with Joanna as our research progresses. I also look forward to encouraging the next generation of conservators and scholars who bring skills in both computer science and conservation towards this emerging field.

Phillips: In two years' time, when the CCBA fellowship nears its completion, we want to have a clear understanding of the condition of all computer-based works in our collection. We want to see them backed up and documented, and we want to have clear strategies and roadmaps in place for immediate or future conservation interventions. Our ongoing case-study research with Deena and her students will be integral to all steps of this work.

In the course, and as a side effect of these practical goals and activities, we expect to increase our institutional competence in the caretaking of computer-based art, and to identify further research and development areas together with Deena. Eventually, we aim to propose some new practices and workflows to the conservation community, which we hope will serve to advance the development of best practices.

You can read the first part of the conversation between Phillips and Engel here on Guggenheim Blogs. For more information about the Guggenheim's conservation department, visit our guggenheim.org/conservation.

CCBA is supported by the Carl & Marilynn Thoma Art Foundation; the New York State Council on the Arts with the support of Governor Andrew Cuomo and the New York State Legislature; Christie's; and Josh Elkes.

CONSERVATION, GUGGENHEIM COLLECTION, TECHNOLOGY

CHECKLIST

FROM THE COLLECTION

Josef Albers
Pachacamac (Peru)
1953

SEE ANOTHER

NEW YORK
Solomon R. Guggenheim Museum

VENICE
Peggy Guggenheim Collection

BILBAO
Guggenheim Museum Bilbao

ABU DHABI
Guggenheim Abu Dhabi