

DIGITAL IMAGING: REVELATION AND REVOLUTION

In September 2004, about a hundred and fifty imaging practitioners and specialists, representatives from camera manufacturers and others from museums, libraries, archives and universities convened at the Rochester Institute of Technology to discuss the state of the art of digital imaging in Museums, define a set of best practices and establish leadership. The event, sponsored by the A.W.Mellon Foundation, was the “American Museums Digital Imaging Survey Benchmarking Conference. Direct Digital Image Capture of Cultural Heritage in American Institutions “. I was invited to describe the concerns of conservators and conservation scientists that are not-necessarily digital imaging specialists. The following will provide a summary of “the good, the bad and the ugly” of digital imaging in conservation and science and hopefully provide some inspiration for discussion that might continue in the months leading to the 33rd AIC annual meeting, pertinently focused on documentation issues.

Within the conservation community, the topic of digital versus conventional photography is frequently cause for heated debate. In recent years we have witnessed a revolution in the way visual information is recorded, stored, displayed and accessed, and although this process brings impressive advantages, it also has inherent risks. Although the quality of digital images is governed by the laws of physics and electronic engineering, users such as the conservation community should be proactive about finding appropriate solutions to emerging issues, ensuring that a fundamental turning point in the history of image-making does not turn into a catastrophe.

For scientists, an array of digital image types are frequently utilized; the simplest consisting of “working images” used to explain research, i.e. providing context and localization for analytical data, or serving as visual aids to explain an experimental setup. The visual interest and flexibility offered by digital images in combination with tools such as PowerPoint have been embraced as a welcome improvement by the whole scientific community, untouched by the drama of having to abandon slides for the new technology (a dilemma currently faced by many Art Historians and conservators) because these tools offer an alternative to the “dry” presentation of hard data to the unaccustomed ear. Digital microscopy represents the next level: now a reality in many labs, it allows rapid workflows, high-resolution color fidelity images and sensitivity for fluorescence images that are then immediately available to be digitally incorporated into reports, presentation materials etc. Digital image analysis can be easily applied to micrographs, allowing the quantitative assessment of areas for analytical purposes (for example for cell-counting in biological samples as well as porosity and binder/aggregate determination in plaster). Moreover, specific scientific imaging techniques open up a third dimension in bi-dimensional images, by providing analytical information in addition to a reproduction of the object under study (this is the case of backscattered electron images –BSE- obtained by Scanning Electron Microscopes, Energy Dispersive X-

Ray Fluorescence maps , Fourier Transform Infrared – FTIR- molecular 3D-mapping, X-ray tomography etc.).

Digital technology can also benefit conservators, offering new enhanced research presentation tools in the field of technical studies of works of art. It is now possible to simulate and preview the effect of conservation treatments or to evaluate framing options. In the case of X-ray radiographs, Adobe Photoshop can be used to manipulate digitized x-rays of paintings to render images more legible by eliminating distracting interferences from stretcher bars and other structural elements. Software can also be used to generate overlays, highlight changes with colored outlines, perform fading in of images etc. in order to facilitate interpretations (the same applies to Infrared reflectography). Exciting new opportunities for the museum community at large have been brought about by digital imaging, as demonstrated by the recent groundbreaking project of color reconstruction or “digital rejuvenation” of G. Seurat’s *La Grande Jatte*, a collaboration of the Art Institute of Chicago and the Rochester Institute of Technology. This project allowed visitors of the exhibition *Seurat and the Making of La Grande Jatte* to view a simulated, digital image of what *La Grande Jatte* looked like during the late 1880s before the darkening of the brushstrokes containing zinc yellow. On a larger scale, the Vasari Project (Visual Art System for Archiving and Retrieval of Images), funded by the European Commission's ESPRIT program, uses a calibrated colorimetric imaging system to acquire high resolution images that allow users to monitor changes in colors of paintings (due to fading and deterioration).

Notwithstanding this long list of innovations and advantages, there are still a number of open questions, problems and concerns. There is widespread concern in the conservation community that digital imaging is a poor choice for treatment photographs because of a perception that they do not have the required resolution and color fidelity. When seen through a magnifying lens, prints of digital images produce an array of pixels and not the fine details that the conservators rely on for detailed documentation and work. Importantly, the impact of image processing – visual editing, retouching, sharpening (sometimes applied rather intuitively with Photoshop) can create huge variability (impairing comparison of images over the years), as confirmed by a comparison of reproduced images from the same mock-up paintings that were produced by different Museums’ Imaging labs and presented at the Rochester Conference. Differences in color sensitivity of monitors, of computer systems (macs vs Pcs), of printers, inks and papers also play a role.

Of significant concern is the code of ethics that the conservation profession has embraced; the preservation of our records as a cultural legacy of future generations. Further complicating the issue is the question of image validation: how can we guarantee that the photograph found in the archives, supposedly showing the object before treatment, was not manipulated after fact? Will Metadata ensure that the imaging chain is not broken? Furthermore, there are complexities and staggering costs associated with archiving

and preserving digital files for the future. As Franziska Frey, Assistant Professor at the School of Print and Media at RIT very clearly pointed out during the Rochester meeting, the cost of storing digital images is much higher than that required for conventional photography (84:1). This is due to the fact that, although traditional archives are passive, digital archives require more technologically active strategies for upkeep and retrieval.

To state the obvious, as conservation professionals worry about image preservation issues, they must prepare for the process by having a solid plan for image archiving or digital asset management at large. Scientists in different laboratories use filemakerpro databases or excel spreadsheets to build up relational databases that help link scientific data to images and the artwork they are related to, but there are limitations to the file-size that these systems can handle. Conservation departments, on the other hand, are still struggling to determine the best way to store and preserve the digital images collected today. Realistically, this struggle can result in the risk of permanently lost images (print or digital file), or more significantly, the loss of a digital master. There are several levels at which information loss can occur, including where and how the images were stored, loss of the metadata that were appended to the image, risk of software and hardware obsolescence. Such odds strongly suggest the retention of archival quality prints of digital files to be stored in paper record files. In the conservation studio of the future, thanks to new generation computers and a solid network infrastructure, conservators will be able to access image-databases, visualize images on large wireless monitors and magnify the tiniest detail of an object in treatment. This, I am afraid, still sounds like science fiction, but eventually, these types of solutions will become economically feasible and accessible.

In conclusion, conservation and imaging professionals need to work towards the creation of a comprehensive agenda including clear parameters and standards for color, resolution and file format which will allow for image comparison, as well as a certified image validation procedures. **It is also important to think strategically about digital asset management, including plans for entering and saving metadata, centralizing image storage and backup with guaranteed long term image retrieval in order to ensure transmission to future generations.** In short, what we need is organization, leadership, institutional support and, most importantly funding. After all, as someone said, “a vision without appropriate funding is hallucination”.

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