BLACKBOX / WHITEBOX

by Kyle Bickoff

Over the course of Day 2 we took a close look at game cartridges—rather, we dissected cartridges. After opening up the NES cartridge we then removed the chips on the card that store the contents of the game. We then extracted the contents off the chips, transferred them via a universal controller device via USB to a laptop, merged the files, edited them, rewrote them to writeable chips and then ran our modified game on an NES.

I summarize our work today because it describes a methodology that very much resists a term I've written on previously—that term is the *black box*. The black box typically refers to a system in which the data is input into the black box, an (unknown) change occurs to the content, and a different data is subsequently output. When I've written on the blackbox previously, I've talked about other systems such as the Apple IIe (which attracted DIY hobbyists, modifications, and third party hardware additions) in comparison to the Apple Macintosh, which sealed the computer and drive within a plastic cage, which would void the warranty if it were opened or modified in any way and implemented a bias against opening the system.

I've built multiple computers myself, so building systems and understanding individual components is not new to me—what was new to me was working so directly today with a system which is *intended* to remain a closed system (a black box), opening it up, and then breaking into that black box by means of codebending the software (a nod to circuitbending hardware). Another concept I've been talking about recently is the *whitebox* (of course the opposite of the blackbox) and describes a system that *can* in fact be known. Norbert Wiener uses this term in his Cybernetics—he situates them as knowable

sets of rules (Whitebox) vs unknowable sets of rules (Blackbox).

While I've both read and written on the *blackboxing* trend in computing, one that began decades ago and has slowed in no way, I'm finding yet another reason to resist the blanket use of the term blackbox. Rather, it seems that it takes ever more effort to tinker on these systems, work with the help of the DIY community, and better understand both the software and hardware abilities and limitations. These systems may be difficult to tinker with, although the intentionally restrictive technologies appear, at least from our work on Day 2, to comprise knowable systems. It may take a large amount of codebending/circuit bending to reach this point, but I don't believe it is outside any realm of possibility.

My other work with preservation has largely been with software such as Bitcurator and work with controllers such as the FC5025 and KryoFlux—both considered digital forensic tools, which are designed for the needs of cybercrime law enforcement, but also serve the purposes of many digital archives across the United States (and abroad). One significant difference that I've noted between the aforementioned digital forensic tools and the methods we used with the NES cartridges is much less a technological difference—rather there are both social and political differences. I mean to say that, while Hard Drives, 3.5" Floppy Disks, and 5.25" Floppy Disks were intended to be read and reread, written and rewritten, the devices we dissected today were quite differently intentioned. The NES games were sealed plastic cartridges, which could be opened only with specialty screwdrivers (screwdrivers much easier to come across in 2016 in comparison to 1997). The contents on the chips were not intended to be desoldered, content removed and edited, and later resoldered with new content on a writable media. While we did nothing illegal through our DIY dissection, we did use the media in a completely unintended

manner that its designers could not have foreseen; for that matter, Nintendo (wanting to sell as many copies as possible) I imagine would not have liked these techniques. While I've certainly tinkered my fair share with old computers and game consoles, I've certainly never gone this far in breaking open a video game console and desoldering the very chips that house the content we interact with.

While I feel I have a better understanding of much of the ROM / RAM issues I mean to discuss, I in fact am left with more ways I might answer the questions I presented yesterday, and with even more questions than I began with. This, of course, is an excellent place to be. I have quite a lot to say, I see now, on blackboxed and 'whiteboxed' technology. In addition, I'm planning to attend to codebending/circuitbending now, making vs. playing, and perhaps I can even address the role of cultural memory institutions in my final paper.