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Media in the dump

Jennifer Gabrys reports on the residues from our digital devices

If you dig down beneath the thin surface crust of Silicon Valley, you will find there are deep strata of earth and water percolating with errant chemicals. Xylene, trichloroethylene, Freon 113, and sulfuric acid saturate these subterranean landscapes undergirding Silicon Valley. Since the 1980s, 29 of these sites have registered sufficient levels of contamination to be marked by the United States Environmental Protection Agency as Superfund priority locations, placing them amongst the worst hazardous waste sites in the country. In fact, Silicon Valley has the highest concentration of Superfund sites in the US. What is perhaps so unexpected about these sites is that the pollution is not a product of heavy industry, but rather of those seemingly immaterial technologies that facilitate the processing of information. Of the 29 Superfund sites, 20 are related to the microchip industry. Computers and mobile devices, microwaves and digital cameras: the manufacture of components for these technologies contributes to the accumulation of chemicals underground. Mutating and migrating in the air and earth, these barbed and toxic compounds will linger for decades to come. Silicon Valley is a landscape that registers the terminal, but not yet terminated, life of digital technologies—a space where the leftover residue of electronics manufacturing accumulates. Yet this waste is not found only where electronics are produced; it moves and settles in circuits that run from manufacturing sites to recycling villages, landfills, and beyond. While we often overlook the elaborate infrastructures required for the manufacture and disposal of electronics, these spaces reveal the unexpected debris that is a byproduct of the digital. Electronics, or digital technologies, often register only as “media,” or as interfaces, apparently lacking in physical substance. Yet the waste from digital devices reorders our understanding of these media and their ecologies, revealing spaces where the residue of electronics congeals and disperses. When digital devices turn up in the dump, we can begin to re-map their reach through their remainders.

Electronic waste

“Waste is now electronic,” writes Gopal Krishna, describing the escalating number of obsolete electronic devices headed for the dump. Here is the other side of electronic waste—not a byproduct of the manufacturing process, but the dead product headed for disposal. E-waste—trashed electronic hardware, from personal computers and monitors to mobile phones, DVD players, and television sets— is, like the electronics industry, growing at an astronomical rate. In the US, it is expected that by 2010, 3 billion units of consumer electronics will have been scrapped at a rate of 400 million per year. The volume of obsolete electronics is so great that in the near future the number of outmoded computers is projected to surpass the number produced or consumed (IAER; Kuehr and Williams). Of the hundreds of millions of computers declared useless, at least 75 percent are stockpiled, according to the US Environmental Protection Agency. Computer owners store the outmoded model as though there might be some way to recuperate its vanishing value, but the PC is one item that does not acquire value over time. At some point, stockpiled computers enter the waste flow, and are either landfilled, recycled for reuse, or shipped for salvage to countries with cheap labor and lax environmental laws. The Digital Revolution, as it turns out, is littered with rubbish.

Contrary to popular perception, digital technology is hardly light or dematerialized; rather, as Silicon Valley makes evident, it involves elaborate systems of abundance. Worldwide, discarded electronics account for as much as 20 to 50 million metric tons of trash per year. Such a volume of discards is equivalent to the disposal of 1,000 elephants every hour (Nair). A colossal parade of elephants— silicon elephants— marches to the dump and beyond; suddenly the immaterial abundance of digital technology appears deeply material. For example, the manufacture of semiconductors requires tremendous material inputs; as much as 99 percent of the material used in making semiconductors is discarded. Raw materials, chemicals, and water are disposed of in order to arrive at the impossibly pure and miniature microchip (Mazurek 48). Bits and shards, gallons and tubs, are dumped down the drain or stored as waste matter in underground tanks. The waste and contamination particular to electronics is, for this reason, often initially invisible, only to return later in material form: obdurate, shapeless, toxic. Today's proliferating digital technologies necessarily produce an equally gargantuan and diverse plume of pollution. Abundant chemicals, abundant materials, abundant devices, and abundant pollution and trash; the attempt to dispose of all this waste simply transforms one type of abundance into another. Yet the elephantine scale of production ensures that at some point and in some corner of the world, the discards will resurface.

Ephemeral screens

Before it becomes trash, however, digital technology drives another type of abundance, this time in the dematerialized space of electronic trading. The National Association of Securities Dealers Automated Quotation System (Nasdaq) is the electronic trading system that specializes in technology companies, and it is also the world's first electronic stock market. Established in 1971, the Nasdaq is now the world's largest "electronic screen-based equity securities market." The Nasdaq, an index of the volume and value of digital technology, is itself a digital technology. As a system of automation programmed to deliver financial data across a scattering of sites, its telecommunication networks enable market activity to take place among "thousands of geographically dispersed market participants" (Smith et al. 98–101). In this sense, the Nasdaq network is located in a million micro-locations, from individual screens to stories-high display screens in Times Square, to the massive server farms that collect and disperse data.

This market, an electronic trading space, hovers in a virtual space of instant exchange. But, like Silicon Valley, this seemingly immaterial space is rooted in matter, and in waste. The Nasdaq is the economic and technological engine that contributes both to the increasing volume of shares in digital technologies, and to their rapid rise and fall in value. The virtual ticker tape of financial data displays information that is obsolete at the moment of its appearance. This is the speed of trading: instant refresh, enhanced execution time, all traveling through sophisticated and constantly updated computer and telecommunication networks. This system generates automated remainders both in the program of instant information, and in the form of proliferating electronic technologies that support the monitoring and exchange of technology shares. The seemingly dematerialized marketplace, in the end, is an instant refuse generator, both in terms of its own erratic valuations, and in terms of the material fallout from obsolete technologies.

Shipping and receiving

These obsolete electronics linger in warehouses, in attics, and on curbsides, awaiting disposal. Here is a rapidly growing industry with equally rapid waste streams. The Basel Action Network, or BAN, an organization that tracks the movement of e-waste, writes, “the electronics industry is the world’s largest and fastest growing manufacturing industry, and as a consequence of this growth, combined with rapid product obsolescence, discarded electronics or e-waste, is now the fastest growing waste stream in the industrialized world” (5). In the end, transportable electronic waste follows the path of the most undesirable forms of trash—from economically privileged country to poorer one. The primary exporter of electronic waste is the US, a country that does not consider the export of waste to be illegal. But electronics from the United Kingdom to Singapore turn up in places as far-flung as China, India, and Nigeria.

Because of investigative research done by BAN, much attention has been directed to one particular region in China, Guiyu, in the Guangdong province, where cheap labor makes the stripping of machines for salvageable parts profitable. Here, thousands of workers break down the discarded electronics for raw materials, including gold, steel, and copper. Electronic components are burned and dipped in acid baths to remove metals, while materials not worth salvaging are incinerated or dumped in the surrounding region (Shabi). These recycling methods are toxic for both workers and the environment. Soon, however, this garbage may circulate indefinitely, searching for a final resting spot, as countries such as China are currently regulating against accepting shipments of electronic waste. We can imagine barges of dead electronics trolling the oceans, unable to land to unload their toxic shipments, caught in a peripheral and restless space of remainder.

Failure in the archive

For every ton of electronic material cast out, a select portion ends up preserved in the halls of history. Alongside the dumpster are those spaces where artifacts are preserved as markers of significant cultural moments. Significance derives from the sheer everydayness—and pervasiveness—of materials like electronics. The archive, in this sense, is a dustbin, a collection and stockpiling of “representative technologies” that flooded and continue to flood the market. Much of the technology in the electronic archive is inaccessible: ancient computers do not function; software manuals are unreadable to all but a few; spools of punch tape separate from decoding devices; keyboards and printers and peripherals have no point of attachment; and training films cannot be viewed. Artifacts meant to connect to systems now exist as hollow forms covered with dust. In this sense, the archive can be seen as what Will Straw calls a “museum of failure”: it is a record of failed and outdated technologies. If it collects anything, it collects a record of obsolescence.

The idleness of these electronic artifacts raises other questions about how technology demarcates duration. The archive attempts to fix time, and in so doing reveals the rapid rate of change that is endemic to digital technology. Bound as it is to systems of continual reinvention, digital technology cannot slow down to fit into the archivist’s slow time. The dilemma of preservation collides with the dilemma of electronic waste. How does one preserve media that have a built-in tendency toward their own termination? When we insert these failed objects into the archive, we encounter their impermanence in high relief. So while collections and lists of “dead media” proliferate (see Sterling), the archive suggests that electronic technology is not so much dead as always dying; that expiration, even more than innovation, is the ceaseless activity that electronics perform.

The Dump

Most electronics are not chosen for preservation, however. Instead, idle machines, at end of life and end of utility, stack up in landfills, are burned or buried. More formally known in the Western world as the “sanitary landfill,” the dump is the penultimate site of decay, where electronics of all shapes and sizes commingle with banana peels and phone books. Plastic and lead, mercury and cadmium break down and begin their terrestrial migrations. Electronics—media in the dump—require geological time spans to decompose. The dump is a site where objects typically devoid of utility or value collect. Except through the work of invisible salvagers, from mice to treasure-seekers, the material here is unrecoverable. The “garbologist” William Rathje suggests the best way to investigate contemporary material culture is through this apparently useless garbage (see Rathje and Murphy). Much as archaeologists study the relics of the distant past, Rathje unearths the refuse of the “nonhistorical” past to measure human consumption. This garbology examines cultural phenomena by linking discarded artifacts with consumption patterns. Garbage Project crew members set out to landfills to draw core samples, tabulate and catalog discrete waste objects, and thereby chart significant patterns of consumption. In this sense, a dump is not just about waste, it is also about understanding our cultural and material metabolism. A dump registers the speed and voracity of consumption; the transience of objects and our relation with them; and the enduring materiality of those objects.

Digital technologies linger in the dump, where they stack up as a concrete register of consumption. The garbology of electronic waste may have an obvious reference point in landfills, but from Silicon Valley Superfund sites to recycling villages in China, we find an even more expansive global network of waste sites where electronic debris expands, sifts, and settles. Electronics, media, landscapes, and waste are all linked and in constant transformation. From the virtual to the chemical, and from the ephemeral to the disposable, the accumulation of these electronic wastes creates new residual ecologies, and requires expanded practices of garbology. With electronic waste, we can begin to look beyond the thin surface of digital interfaces to find that the movement, transformation, and accumulation of this debris belie the myth of immateriality. In the dump, our digital media and technologies turn out to be deeply material.

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