Electronic Waste (e-Waste) Terms and Definitions
General Terms

- **Advanced Recovery Fee (ARF)**: A fee paid by a customer when he or she buys an electronic product. Once the consumer has used up the product and/or no longer wants it, he or she will take the product back to the retailer or manufacturer who will then use the ARF in order to dispose of the electronic product. California is the only state that currently mandates ARF; other states use the extended manufacturer responsibility. (http://www.productstewardship.net/PDFs/productsElectronicsARFSystemChart.pdf)

- **Carcinogens:** Substances that are known to be capable of promoting or causing cancer in humans or animals. (More information at: http://scorecard.org/health-effects/explanation.tcl?short_hazard_name=cancer)

- **Cathode ray tube (CRT):** Devices used to create images in the form of light on a screen. Old televisions and monitors were made using this technology, which contains a vacuum tube, electron gun, and a fluorescent screen. CRTs are environmentally hazardous because they contain large amounts of lead, which is hazardous to the environment. (See http://electronics.howstuffworks.com/tv3.htm for more information)

- **Circuit Boards [Also known as Printed Wiring Boards (PWB)]:** Components which use conductive paths or copper traces and tracks to connect electronic components and make things like computers, cell phones, and all other electronic devices possible. (More information available at http://encyclopedia.farlex.com/Printed+wiring+board)

- **Closed loop manufacturing**: A manufacturing system that maximizes efficiency, uses recycled materials, reuses or recycles waste or scrap materials, utilizes reusable energy, and has very sustainable operations. The goal of closed loop manufacturing is to have the waste become the feedstock for new products therefore, eventually requiring no outside resources. (http://quakingaspenllc.com/toolkit/closed-loop-production/)

- **Conference of the Parties (COP):** This refers to the countries that have ratified the Basel Convention, whose goal is to stop the trans-boundary movements of hazardous waste, including electronic waste. A meeting of these countries is held every two years. (Additional information at: http://www.cbd.int/convention/cops.shtml)

- **Difference between regulatory and certification processes:** Regulatory processes can be used to regulate or manage environmental concerns, such as e-waste. Regulatory processes are required by legislative bodies, such as the US EPA, and it requires the participation of manufacturers, recyclers, etc. Several drawbacks are that the process can take 3 to 4 years, making it potentially irrelevent to current technology once it is in effect. Additionally, regulations require verification, which is often hard to obtain because there are not enough inspectors. Certification processes, however, work much faster and various stakeholders are involved in the process of creating a certification. Although certifications are optional, stakeholders have a greater incentive to meet desired certifications in order to make them more competitive and appeal

to environmentally-conscious consumers. For example, state laws (http://www.sustainelectronics.illinois.edu/policy/state.cfm) requiring the proper recycling of electronic waste is an example of a regulation; EPEAT (http://www.epeat.net/) is a voluntary certification process.

- **Dioxins:** Chemical contaminants that are created during combustion processes such as incineration, forest fires, backyard burning, and more. Dioxins can cause harm to humans and can be ingested or inhaled, then stored in fatty tissue. (More information at: http://www.niehs.nih.gov/health/topics/agents/dioxins/index.cfm)

- **Electronic Waste (ewaste, e-waste, e-scrap):** The definition of electronic waste vary depending on the country defining the term. In the United States, the term "e-waste" refers to electronics such as computers, televisions, video game consoles, monitors, VCR/DVD players, cell phones, printers and scanners, fax machines, and other electrical devices that operate using a program and PWB board. In Europe and Australia, "ewaste" is defined as anything that has a plug, which also includes the American definition of the term, as well as items such as refrigerators, washing machines.

- **End of Life (EOL):** When a product is at its EOL, it can no longer be used for any purpose and should go to materials recovery.

- **End of Use (EOU):** This is when a product is no longer being used for the purpose for which it was purchased, but is still useful in some way.

- **Eutrophication:** An excess of nutrients in a body of water, often caused by runoff. Eutrophication leads to algal blooms that lower the quantity of dissolved oxygen in the water, killing fish and other aquatic organisms. (More information: http://www.eoearth.org/article/Eutrophication and http://toxics.usgs.gov/definitions/eutrophication.html).

- **Extended Producer Responsibility (EPR):** A form of end-of-life handling of electronic products. EPR requires electronics manufacturers to properly dispose of or recycle electronic products, once the electronics complete their life cycle. EPR legislation is in place in 20 different states, but Illinois states that refurbishment, and not only recycling, is a way to properly and responsibly dispose of electronic waste. (http://www.ilsr.org/recycling/epr/index.html)

- **Gold, Copper, Platinum, Palladium and Silver:** Five useful materials that can be recovered from used computers.

- **Incineration**: A disposal method that involves combustion of waste materials. Rather than sending trash to a landfill, some waste is sent to an incinerator, where the waste is burned by either low-tech means, such as backyard burning or in modern large-scale incinerators. Incinerators convert waste materials into heat, gas, steam, and ash. (http://www.pollutionissues.com/Ho-Li/Incineration.html)

- **Informal processing/Informal recycling:** Informal processing and recycling of electronics occurs when computers and other electronics are taken apart by individuals who do not use proper health and safety precautions and therefore place themselves as well as their surrounding environment in danger through exposure to unsafe materials and chemicals (acids, mercury, lead, toxic fumes, etc.). The toxicities of materials within an electronic product are not the only hazards with informal recycling. The acids used to extract materials, toxic or non-toxic, can often have the greatest environmental impact. This was the focal point of the *60 Minutes* video titled "Following the Trail of Toxic E-Waste". (Informal recycling videos at: http://www.cbsnews.com/stories/2008/11/06/60minutes/main4579229.shtml and http://www.pbs.org/frontlineworld/stories/ghana804/)

- **Intended Design:** The purpose for which a product or piece of equipment was originally devised. There is a common idea that equipment should be used for its intended purpose, and this can limit the perception of a product's useful life. By considering a broader definition of what an item is truly intended for, we can conceive of new uses for old equipment. For example, a laptop might be viewed as merely being intended for use as a laptop (narrow view) or it might be viewed as being intended for use as programmable hardware (broader view). The latter view offers more possibilities to consider, thus extending the perception of the item's usfulness.

- **Mutagens:** Substances that can cause genetic mutations or changes in DNA sequences in cells. Most carcinogens are also mutagenic. (See http://www.ilpi.com/msds/ref/mutagen.html for more information)

- **Neurotoxins:** Toxic substances which damage the nervous system. (http://www.ilpi.com/msds/ref/neurotoxin.html)

- **Original Equipment Manufacturer (OEM):** The initial company that manufactures products or components that are purchased by another company and retailed under that purchasing company's brand name. (http://www.investopedia.com/terms/o/oem.asp)

- **Perceived obsolescence:** Perceived obsolescence is when a product is still usable and functioning, but it has simply fallen out of style and fashion, and it is therefore considered to be obsolete by consumers. (i.e. continuous iPod generations and models) (More information at: http://www.greenlivingtips.com/articles/188/1/Perceived-obsolescence.html)

- **Planned obsolescence:** A decision made by a manufacturer to make a product last only a certain amount of time. By ensuring failure of a product, the consumer is encouraged to purchase an updated product, proving profits for the manufacturer. (Information at http://www.investopedia.com/terms/p/planned_obsolescence.asp)

- **Printed Wiring Boards (PWB):** see Circuit Boards

- **Radio frequency identification (RFID):** RFID tags can be incorporated into a product, animal or person for the purposes of identification or tracking. Examples include the I-Pass used for automatic payment on toll roads and the microchips used for identifying pets. RFID tags have been proposed to help gather data on computers and other electronics that are collected for recycling. However, the average age of items dropped

off at collection events is 10+ years, so you would have to wait a long time for your RFID tag on such equipment to be effective for supplying information. (http://www.aimglobal.org/technologies/rfid/what_is_rfid.asp)

- **Recycling:** In terms of electronics, recycling refers to the process of material recovery (metals, glass, plastics, etc.) and reducing the amount of virgin materials used in a product. (http://www.askoxford.com/concise_oed/orexxcycle?view=uk)

- **Refurbishing:** The process of extending the life of a product and re-using old electronics; some products may require a software, not a hardware, change in order to be refurbished. (http://www.askoxford.com/concise_oed/orexxfurbish?view=uk)

- **Refurbishment Date:** The date upon which the refurbishment of an electronic device was completed. It has been suggested that refurbishers should add this date to computers, where it would serve a similar purpose as the manufacturing date, which is recorded on computer hard drives.

- **Secure E (Secure Erase):** A system that is internal to most computer hard drives and uses all heads of a hard drive in order to erase data stored on the computer. This was developed as hardware size increased. Prior to this system, data was erased bit by bit. Prior to Secure E, data clearing of a 20 GB hard drive took approximately 4 hours and 20 minutes. With Secure E, deleting data from an 80 GB hard drive takes only 30 minutes. (More information online at: http://cmrr.ucsd.edu/people/Hughes/DataSanitizationTutorial.pdf)

- **Stakeholder Process:** Meeting purposefully designed to bring together all the vested interests on a particular topic for negotiation. In the Partnership on Action for Computing Equipment (PACE) workgroup, for example, non-government organizations, governmental bodies, industry and industry associations are all brought together as stakeholders.

- **Sustainability/Sustainable Development:** Meeting the needs of the present without compromising the ability of future generations to meet their own needs.

- **Total Cost of Ownership (TCO):** A financial estimate of the direct and indirect costs of a product or system while it is owned by a company or individual. For a computer, for instance, the direct costs would be the cost of the hardware and software itself, while indirect costs would include energy to operate the computer, maintenance, installation, training to use the system, upgrades, and end-of-life disposal costs. (See http://www.solutionmatrix.com/total-cost-of-ownership.html for additional information)

- **Toxicity Characteristic Leaching Procedure (TCLP) Test:** U.S. Environmental Protection Agency (U.S. EPA) test method used for characterizing waste as either hazardous or non-hazardous for the purpose of disposal. This laboratory test is designed to predict whether a particular waste is likely to leach chemicals into ground water at dangerous levels. This procedure is used in determining if a waste exhibits the toxicity characteristic of a hazardous waste. Tested materials are ground up, treated with an acidic solution, and then filtered. The resulting solution is analyzed for the concentration of the chemical in question. The concentration detected will be used to characterize the test material as hazardous or non-hazardous. It is important to note that the toxicity within the product being tested is not the only toxic material in informal

recycling. The acids used to extract materials in informal recycling, toxic or not toxic, often have the great environmental impacts. (See http://www.epa.gov/waste/hazard/testmethods/faq/faq_tclp.htm#Total for more information)

- **Toxicity vs. Climate:** When considering the environmental impact of electronic products, you can focus on the toxicity of materials used in their production and the discard of the product, or on the contribution to global warming that comes from the energy used in their production, recycling, etc. If you focus exclusively on toxicity, you neglect to address the carbon footprint of making the electronic equipment. Conversely, if you focus exclusively on climate affects, you do not deal with the possible toxicity concerns. Both issues actually need to be address simultaneously when examining the e-waste problem. One argument is to say that it is better to err on the side of climate because it is a global issue; toxicity is local in scale and can be cleaned up (although clean up is expensive).

- **W. Edwards Deming:** Statistician credited with improving auto manufacturing production in the U.S. during the Cold War. He championed the use of statistical testing to improve product quality. He went to Japan with his ideas, where his techniques were embraced, and had great influence on Japanese manufacturing and business. See http://en.wikipedia.org/wiki/W._Edwards_Deming for more information.

- **Zero Waste:** the concept of recycling all products and using 100% efficient systems to manufacture and use a product. Rather than throwing materials away at the end of their life, the waste is converted as feedstock into another production stream. (http://www.zerowaste.org/case.htm)

Additional Terms and Definitions

SEI TN - 002 Electronic Waste (e-Waste) Terms and Definitions: Legislation and Directives -- Champaign, IL: Illinois Sustainable Technology Center - Sustainable Electronics Initiative, 2010.

SEI TN - 003 Electronic Waste (e-Waste) Terms and Definitions: Organizations and Certifying Bodies -- Champaign, IL: Illinois Sustainable Technology Center - Sustainable Electronics Initiative, 2010.

SEI TN - 004 Electronic Waste (e-Waste) Terms and Definitions: Certifications and Standards -- Champaign, IL: Illinois Sustainable Technology Center - Sustainable Electronics Initiative, 2010.