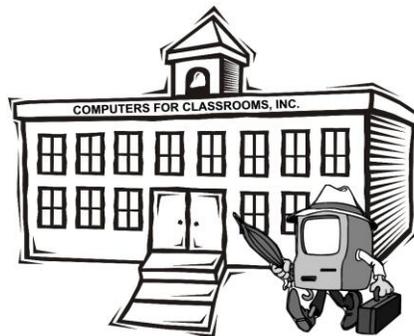# Creating a Successful Computer Reuse Program

This guide is presented by Computers for Classrooms, Inc.

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INTRODUCTION

Millions of tons of computers are sent to landfills every year. Many systems are still very serviceable. They can have many productive years yet ahead when restored to good working condition. By using volunteers to provide the restoration, the costs of refurbishing can be kept low so that the process is economically feasible.

It is estimated that it takes 1.8 metric tons of resources to build one computer. Environmentally, we are better served by extending the life of existing systems rather than using additional resources to build new ones. Through proper resource management we do not need to add ewaste to our landfills but rather reuse or recycle all of the components.

The reuse program can provide opportunities for training about computer repair, software installation and even some local networking. By earning a free computer after 50 hours of volunteer service, individuals can receive the computer with the satisfaction of having earned it and the knowledge of how to keep it running.

To close the digital divide, all need to have access to technology. By utilizing computers that would otherwise have been discarded, we can impact a large segment of the community that has not been served while protecting our environment.

Author's note:

This manual was originally created in 2005 and has been updated in this edition. During the past two years, I created a series of Power Point Presentations for Microsoft with the purpose of assisting refurbishers in other countries to form reuse programs. There are many photographs included as a photo can often clarify what words can't convey.

The Power Points can be downloaded from:
www.ComputersForClassrooms.org/tech_tools/ms_ppt.html

I will refer to certain presentations for further clarification.

FIND A NEED IN YOUR COMMUNITY

What is the pressing need for computers in your community? How will refurbishing used computers fill that need?

Do you want to provide good working computers to the individuals in your community without access? Do you want to provide job training that leads to a technical certification? Do you want to participate in mentoring young people or assisting older adults trying to learn computer skills to enhance employment opportunities? Do you prefer to work with persons with disabilities? Are you most interested in reducing landfill?

If your program wants to emphasize training, it will be a different program than one that attempts to turn out the most systems in a shorter period of time. Working with young people can be very challenging, but very rewarding as well.

Your program will have different needs depending upon your goals. By clarifying your thoughts and expectations in the beginning, you will be able to develop a program to fit your community. Start small. Don't try to take on too much in the beginning. You can always expand in other areas in the future.

While reuse programs and recycling programs are often confused, there is a difference. With a reuse program, you will be trying to reuse whatever you agree to accept.

Recyclers on the other hand are willing to accept everything. They "demanufacture" computers to the component level. There is a market for 1,000 lbs of power supplies or thousands of pounds of circuit boards. It can really enhance your program if you make friends with a recycler in your area. Just remember to have a place to take whatever you agree to accept.

Talk to your county director of waste management. Find out about the existing recycling programs in your area and the local laws and restrictions. What are your local regulations concerning CRTs (monitors)? How can you dispose of non-working monitors and what will be the cost? Are there local recyclers with whom you might be able to work?

Talk to the local metal scrap yard. What will they accept at no charge? Will they pay you for your scrap metal or wire?

You must know the current laws regarding ewaste as they are changing quickly. Don't accept donations of equipment you would have to pay to dispose of, unless you charge the donor a fee to offset your expenses. The laws vary state-to-state and county-to-county. Know what they are in your area.

There are often regulations defining how much equipment you can receive without needing to register as a "Collector" or "Handler" and then having to file notices of intent,

being open for inspections and being required to file annual reports. Learn about the requirements in your area before you go any further.

FIND A SUPPORTING ORGANIZATION

After you have found a need in your community, look for organizations that work with the same area of interest and start sharing ideas. Organizations can help you find donors, volunteers, recipients and a donated site. Reuse programs vary depending upon the strengths of your community. Garner that strength and support up front.

Schools or nonprofits make wonderful umbrella organizations. If you can work with them, the donor may be able to receive a tax-deductible donation receipt that is important to some donors.

How about senior centers, the Boys and Girls Clubs, Migrant Ed Programs, ESL (English as a Second Language) Adult Programs through the library or county schools or a community housing project? Start networking – the people kind of networking. Organizations will include you in their newsletters for free advertising once you are established.

DEFINE YOUR OBJECTIVES

After selecting a project, take time to define your objectives.

By clearly stating what you intend to accomplish, you will make better decisions when finding a site, configuring your workspace, determining what kind of donations you want to receive, deciding upon the product you will configure and your recipient qualifications.

At some point in time, you will want to create a simple brochure. Many donors would like a pamphlet to facilitate discussions with others in their organizations before deciding to donate to your program.

The brochure should state the need for your program, your objectives, who you will be serving and possibly the organizations giving you support. You will need to list contact information as well as the services you can provide.

DETERMINE YOUR FUNDING MODEL

As you think about starting your project also consider how you want to fund your program. Our program began as a volunteer project though a local school district. Over the years, we were funded to some extent by local organizations wishing to contribute to our goals.

As the program grew so did our need for a stable source of funding, especially when we no longer had free rent and needed to hire our first employee.

Two types of funding can be through writing grants or working on a cost/recovery basis (C/R). The C/R basis means that we sell our computers at a low cost to schools or low-income clients. We charge enough to cover our costs. Since we are a nonprofit organization we are not interested in making profits but we do need to have sufficient funding to stay in business.

This model can be used for small organizations as well. Determine your costs and the number you would have to sell in a given month to be able to cover those costs at a certain price. You can even take a survey in your area before you begin to see if there is a market for what you would have to offer. If there are other low-price sellers, you can find out what they have to offer to see if you can lower the price or offer better warranties and services.

MICROSOFT AUTHORIZED REFURBISHER (MAR)

Microsoft has developed the Microsoft Authorized Refurbisher (MAR) Program, which has been a real boon to refurbishers. CFC was part of the pilot program.

Everyone interested in reuse programs should check out https://www.techsoup.org/mar/default.asp

MAR allows refurbishers to purchase Windows operating systems and possible Microsoft Office products for a low fee. These are real bargain prices and make the reuse program feasible. Most students prefer using Microsoft programs that are often requirements for certain classes. Open Office is an excellent product and is offered free at www.OpenOffice.org as an alternative to MS Office.

The MAR licensing program is available for those programs refurbishing at least 20 computers per year.

The computers can only be placed with a "Qualifying School, Qualifying Charity or Qualifying Access Project". In general the qualifying school is a K-14 accredited educational institution. The qualifying charity is a 501(c)(3) nonprofit. A qualifying access project is a charity or school that provides refurbished PCs to its students, their families and /or other individuals solely for home use as a way to increase access to technology for those traditionally without access to technology.

Please check the web site for additional qualifying information. If your project fits with the MAR guidelines, then you can load licensed operating systems on the donated computers. If your organization is not a school or 501(c)(3) nonprofit, you may be able to work under their umbrella given the proper documentation.

Microsoft allows the refurbisher to create a folder on the donated computer hard drive that contains the information from the CD. This allows the end user to have the files for installing printers or other peripherals, although they do not get a copy of the CD.

Every computer refurbisher should become aware of the MAR program and the great benefits it offers in loading licensed operating systems for a nominal fee.

If you are a nonprofit, be sure to check out the additional licensed software, which is available at very low fees. Both the TechSoup and Compumentor sites have excellent support for reuse programs and nonprofits.

For information about the MAR program contact:

communitymar@techsoup.org
(800)659-3579 x 350

Mailing Address:
Community MAR Administrator
TechSoup Stock
435 Brannan St #100
San Francisco, CA 94107

QUALIFICATIONS OF YOUR RECIPIENTS

If you are getting operating system licenses through the MAR program, you want to be sure you are following their requirements for eligible recipients. You are not free to sell to the general public.

As an example, we have defined a "Computers for Families" program that places our family computer with lower income families by using the qualification for free or reduced price lunch program as one measure of eligibility.

Computer competencies require that students have excellent skills prior to graduation. Many teachers require that homework and papers be submitted through a web site. Those students without access to technology at home are at a severe disadvantage.

Local libraries have time limits for computer use, if the student can even get access to one. We use the slogan that we want students to spend their time "on line" and not "in line". Many students don't have transportation to libraries.

When placing computers with low-income families, we have asked the school to select the families that qualify for free or reduced priced lunches along with the teacher recommendation. We set up a computer in some of the low-income schools during back-to-school night so that parents can see that it is an excellent value. Junior high schools and high schools ask parents to attend a meeting if they do not have a computer at home.

Parents are given a demonstration and are encouraged to provide computers for home use.

Other programs select entire schools where the ratio of free or reduced price lunches is over 75%. Any child from the qualifying school would be eligible for the program.

Some programs require the recipients to attend classes – one or more training sessions in the use and upkeep of the computer. We partnered with a Healthy Start program with limited English speaking participants. They attended computer classes twice a week for three weeks, had health screenings and earned a computer at the end of the session.

Stick to the goals of your project. How can your recipients "earn" their computer? If they earn the computer by taking classes, paying fees or through volunteer work it will be of greater value to them.

We also serve families that qualify for government assistance such as those on: Medicaid, Food Stamps, Section 8 Housing, fire victims referred by the Red Cross, students on Financial Aid, etc.

PERSONNEL NEEDED

To have a smoothly running program there are four main categories that must be balanced.

1. You must have a coordinator to manage income and expenses and arrange for donations.

2. You must have the expertise to diagnose and refurbish the computer systems as well as the volunteers to do the work.

3. You must have sufficient space to accommodate your level of operations. Sometimes if you are getting a large shipment and don't have the space, local businesses will help you on a temporary basis rather than have you refuse the donation. Don't be afraid to ask – but vacate quickly if they ask you to do so.

4. You must have a market for your refurbished computers. Be careful when advertising your computers that the demand doesn't exceed what you can reasonably do. Start with a limited project before trying to expand to additional groups. Stick to your plans as there are many, many deserving causes and it is very easy to get sidetracked. Develop the reputation of being fair and up front in managing your program.

With all of these "musts", you need a coordinator to work with the public and a knowledgeable technician. When developing a volunteer reuse program, one needs the

ability to work with a very wide range of volunteers. Patience, a sense of humor and mediation skills are very important.

The coordinator needs good people skills. Having an established reputation in the community helps garner support but isn't a necessity. Being able to ask for assistance is a must.

The technician doesn't need to be certified. The technician will not be fixing broken components such as CD-drives, as a working one will replace it. The technician needs to know how to load software, configure hardware, update CPUs, set jumpers on the motherboard, replace power supplies, work with disk imaging software, test on-board batteries, create CDs, search for drivers on the Internet, etc. The technician should have a real interest in computers and physically be able to pick up computers and monitors. Knowledge about using a local network is a plus.

Computers for Classrooms, Inc.[1] may offer a two day intensive course in the full aspects of a reuse program including hands-on training and shadowing our staff. After 19 years we have developed an efficient system that can use volunteers with little experience. We don't ask volunteers to clean computers but give them tasks such as triaging and parting out computers where they can learn how computers are put together and perform simple repairs.

GETTING STARTED - LOCATION

You now have a goal in mind and others willing to help, so let's discuss what you will need to get started.

CFC was started in 1991 in a spare bedroom. It now occupies a 25,000 square foot warehouse facility with three tiered pallet racking, loading docks as well as 3,000 square feet of working areas.

Start small. Use donated space. You will only need about 400 sq. ft. (20 x 20) to start with but the location can be important.

As your program grows, you can then find something larger. If you are partnering with a school, see if they have suggestions or empty facilities. Your city leaders, local Realtors or builders can have suggestions. If you can show you will be helping fill a need and saving your local landfill, you will get support. Donated space is important when getting started.

If you will be using disabled or student volunteers, be sure you have access to public transportation. If you are within biking distance you can have many student volunteers. Older commercial buildings or strip malls with vacancies can make great starting

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[1] If interested contact Pat Furr at cfc@digitalpath.net for additional information

locations. Donors can drive up to your door and the walk-by traffic can lead to volunteers and donors.

Your location should be fairly easy to find. You want the public to bring computers to your facility.

A tile floor can be better than a carpeted one as there is less chance of static electricity. We have never supplied wrist straps for static electricity, nor have we had a problem. This may vary in different parts of the country or when working on carpeted floors. Do not select a locale that is very dusty or damp.

If your volunteers do not need public transportation, locations in a business park or warehouse location can be desirable. If your program grows over the years you may need to expand to a site with a loading dock and possibly using pallet racks for the storage of computers and monitors. This type of operation can become more streamlined and allow for a more efficient reuse program. This is not the way to start up but possibly a goal for future expansion.

Lifting computers and monitors improperly can cause back problems. By using hand carts, pallets and a pallet jack, it can be easier to keep volunteers and to minimize the risk of injury. When visiting a location that uses a pallet jack, tell them their jack is looking fairly old and suggest they donate it to your program when they replace it. It works.

Volunteers need to have training on the proper method of lifting and the use of pallet jacks or other equipment. They must wear proper shoes to protect their feet from dropped computers or errant pallet jacks. All forklift operators **must** be certified.

EQUIPMENT YOU WILL NEED TO START OPERATIONS[2]

- Tables
- Sufficient electrical outlets and lighting
- Internet connection
- At least one computer to access the Internet
- Tools – including screw divers - flat head – #1 & #2, Philips #1 & #2, torx drivers
- Scraper which holds single razor blade to remove labels
- Pocketknife
- A Sharpie Container (make one to hold old razor blades) – a coffee can with a slot in the lid
- CD/DVD burner
- At least one convertible hand truck
- White board cleaner to remove ink from cases

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[2] www.ComputersForClassrooms.org/tech_tools/ms_ppt.html

- Case cleaner such as Orange-Sol[3] biodegradable, non-toxic cleaner – Supervise volunteers carefully as we found a young person sniffing the cleaning cloths
- 3-M pads – to clean cases when used with white board cleaner
- Goo Gone– or Orange-Sol Citrus – to remove adhesive labels
- Paper towels or cleaning cloths
- Band-aids or first aid kit for cuts when new volunteers work with cases
- A can of compressed air or donated air compressor to clean the insides of the computer and laptops.
- Insurance
- A fire extinguisher
- A battery tester for on-board batteries
- Programs for disk imaging or a hard drive duplicator
- Programs for computer and monitor diagnostics
- Hard drive wiping software
- A USB flash drive
- A USB external hard drive

As your program expands these items may be desirable:

- A pallet jack (get one donated – ask when you visit warehouses)
- Pallets (you can get them donated)
- A power supply tester
- A KVM switch box for wiping hard drives or loading programs – the KVM switch allows us to access 8 computers at a time. It uses one keyboard, one monitor and one mouse thus saving space
- A local network setup with Internet access – we do not allow volunteers to have access to the Internet
- A forklift or pallet lifter (when your operation expands)

STACKING AND HANDLING DONATIONS

There is an extensive tutorial on stacking computers and monitors safely that can be found by downloading www.ComputersForClassrooms.org/tech_tips/ms_ppt.html and studying the section on warehouse operations. The proper handling of equipment is very important and will save both your donation and protect the safety of your crew.

ACCEPTABLE DONATIONS

Let's take a moment to talk about the computer you will furnish and the licensing of the operating systems. 92% of all computers are based on PC (Windows) operating systems

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[3] www.orange-sol.com computer hardware component cleaner

rather than MAC or Linux. Most technicians will be familiar with PCs and most computer classes use PC technology. Our discussions will be limited to PCs.

We use Linux operating systems on our low-end laptops that would run too slowly with Windows. Ubuntu is a version of Linux that is very similar to Windows in its graphical interface and may be a good solution for low end systems too good to recycle.
 There is no restriction on selling Linux based products but we prefer to sell Microsoft systems to those who can't afford to own a computer without our help.
Look at your plan and the scope of your program. When starting out and with limited facilities, you will need to be very careful what you are willing to accept. Remember that when you accept anything, you will need to find a home for it as well.

Keep informed on the current laws concerning hazardous waste. At the present time, CRTs (monitors), TVs and even laptop screens are deemed to be universal waste and cannot be disposed of in landfills. The cost of disposing of any non-working monitors or other e-waste can be very expensive. The laws vary greatly depending upon your location. Talk to your local Director of Waste Management and find out about your regulations. In California anyone collecting more than six monitors per year has to register with the DTSC (Department of Toxic Substance Control) before collecting monitors, TVs, or LCDs.   If a person or company receives over 200 pounds of e-waste, they must also register as a Collector or Handler, must submit annual reports and be prepared for physical inspections of their facility. The laws are very specific about handling, storing and shipping e-waste. Know the laws in your community before you accept anything.

If you are starting out, you can decide to accept only working systems that meet your standards. Alternatively, you can ask for a donation to offset the cost of handling the donations. You need to find a local recycler to advise you of the best way of handling e-waste in your area. If you have a large volume, recyclers will pick up for free or even pay for your e-waste. It is also your responsibility to know where your recycler is sending the parts once they are de-manufactured. You need to know if they are being sent overseas or handled within your country. You must be sure that your e-waste is not being dumped in a third world country.

CPU'S

The level of computer you will accept will vary over time and depend upon what you can get in your area. We triage donations and divide them into three classes.

   1. working computers that we will place in schools, nonprofits or low-income families
   2. working computers that are below our current level of low-income systems
   3. non-working computers to be parted out for usable components or scrap

MONITORS

Be very careful when accepting monitors. Be sure to plug them in and test the picture quality. The monitor can be plugged into a running computer without turning the computer off. Be sure the picture is not fuzzy or too dark. Have a good test image[4] so that you can see the colors, brightness, hue, and straightness of lines.

At the present time there are two common types of monitors, CRT (Cathode Ray Tube) and LCD (Liquid Crystal Display). Both types of monitors can come within hazardous waste laws in your community.

Each CRT monitor contains over 5 pounds of lead. Lead is used to coat the inside of the screen so that harmful rays do not reach the viewer. Please become informed as to the proper handling of monitors. Any broken glass must be carefully swept up and placed in a non-leaking vinyl bag. The bag must be placed in a box. Please check regulations before trying to transport it to a hazard waste disposal facility. Lead must not be allowed to leach into ground water.

DO NOT open the monitor cases or try to adjust the controls inside. The monitor has an electrical transformer and capacitor with stored electrical current that can be very dangerous if discharged improperly. Be very careful if the case is cracked.

The vacuum tube can implode if cracked and send broken shards of glass that can blind those without the proper eyewear. We do not allow our volunteers or employees to remove the housing of the CRTs. In case the housing is cracked or glass broken, the monitor is placed in a plastic bag, then boxed to be shipped to the recycler who is trained to handle monitors properly.

Do not accept monochrome, Apple, dumb terminals, BNC type connectors, VGA (9 pin instead of 15), broken cases, really yellowed cases or Sun monitors. The monitor must be able to be connected to a 15-pin adapter. Starting out you want to have the same number of monitors as systems. Many people will want to give you monitors. Be selective.

LCD monitors must also be tested and are considered Hazardous waste because of a backlight containing mercury. We do not repair LCDs but some companies may want to do so. Additional training and precautions need to be considered that are beyond the scope of this beginning manual.

Wrap the monitor cable around the base and secure it upon receipt of the monitor. Dangling cables can cause tripping or become easily damaged. Do not transport monitors on their bases, as the base can become detached from the monitor. They can be moved by placing them on their sides or backs.

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[4] Email cfc@ComputersForClassrooms.org and ask for monitor test program

Once the monitor has been tested, label it tested and store it properly in your storage area.

KEYBOARDS

We accept and triage all kinds of keyboards. Those that are discolored or have keys missing are given to our recycler as part of our universal waste. Be sure that you have worked out a mutual agreement with your recycler to take these items so that he will not charge you fees to dispose of them. We clean all keyboards before sending them out. Keyboards can be purchased at a low price but we are more concerned about reuse so we clean them, wrap the cords around the keyboard, and store them for future use.

MICE

Mice are cleaned, have the cables wrapped around them and are secured with a rubber band and are stored according to type of connector. Schools prefer optical mice as the students often remove the "ball". Track ball donations are kept for use with disabled recipients.

POWER CORDS AND CABLES

We accept all power cords and cables. Cables are sorted and secured by rubber bands. Boxes or containers are used to store them until they are ready to go out with a completed system. There is a market for all cables and cords. Check with your local scrap metal dealer as this can be an additional source of income. Even ribbon cables and audio cables can have a scrap value in quantity.

PRINTERS

Printers can be a time consuming item to check out. Due to the volume of computers we place we do not refurbish printers directly.

LASER PRINTERS

Our warehouse crew gives a preliminary checkout of laser printers. They plug them in and run a test page giving information such as the numbers of pages run, % left of drum life, cartridge life, etc. The printer is stored along with the sample of print output so that schools can have them for free without further processing. Schools often prefer to replace the same model of printer since they have toner on hand already. The older models often have toner cartridges that will print more pages that newer ones. The

printers may have hard drives. Be sure to remove and wipe the drives. Jet direct cards used for network printing can also be salvaged to use in other printers.

A local printer repair dealer may want to work with you. They may want to take some of the parts for reuse. Do not take printers unless you have a program to get rid of them.

INK JET PRINTERS

Ink jet printers have often been sitting in storage so that the heads are clogged with dry ink. They are generally not worth having repaired, as the cost of newer units is low. We advise schools to use laser printers as they are more economical to support.

With so many calls for printers to accompany our home computers, CFC has purchased new Hewlett Packard entry level color ink jet printers which we sell at cost. We also include the USB printer cable and the sales tax. We receive many printer cables that are expensive for the recipient to buy. We hand them out for free.

We have a retired teacher from a school district near by who works on ink jet printers so he can give a complete computer/printer setup to every student in the 5th grade at his elementary school. We are very happy to help support his program by donating printers to him.

The ink cartridges can be removed and sold to a local company that buys cartridges for refilling. Your recycler may accept the printers with or without cartridges. This is another decision to make before adding to limited storage.

PHOTO COPIERS, FAX MACHINES

Stay away from photocopiers or fax machines unless you have a need for your office and you test it thoroughly first. They have generally been surplused for a reason and are not worth fixing. Do not accept large photocopiers – even color ones. The schools won't want them because the cost of using them is $.25 per page. Schools are trying to give them away. The maintenance contracts on the older copiers make it more attractive to buy a new one.

GETTING DONATIONS

Why would the donor want to give to your program?

- Is it for a good cause? Have information available about the need you are serving. Many businesses are willing to donate to a good cause rather than see their equipment sent to a recycler or even resold. Individuals want to know that the equipment they spent a lot of money to purchase can still be used and not thrown

away. Make a case for your project. Facts and figures can help in a simple brochure.

- Can the donor get a charitable donation receipt? If the donation is coming through a school or 501(c)(3) nonprofit, a charitable tax donation form can be given. We do not assign a value to the donation but encourage the donor to check with their accountant or check the prices for similar equipment offered on E-bay.

- How can the donor be certain the information on the donated hard drive cannot be retrieved? This is an important issue for refurbishers. We don't want any information on donated hard drives to be seen by anyone.

Hard drives cannot be erased by deleting files or by partitioning and reformatting hard drives. To the untrained eye, the hard drives look blank, while in reality only the fat or file allocation table is missing. Using fairly simple programs, the important information from the hard drive can be recovered.

A Real-life example: "Remembrance of Data Passed: A Study of Disk Sanitization Practices".

Two Massachusetts Institute of Technology graduate students have exposed a treasure trove of personal and corporate information on used disk drives:

They bought 158 disk drives for $1,000 on the Web and at swap meets. Scavenging through the drives, they found more than 5,000 credit card numbers, medical reports, and detailed personal and corporate financial information. The information was either freely readable or could be read with data recovery software that is commercially available for about $150. To properly sanitize the hard drive, you need to overwrite every block.

The government concluded, "It is imperative that data and programs be removed by special software."

Source: Massachusetts Institute of Technology:
"Remembrance of Data Passed: A Study of Disk Sanitization Practices".
(http://www.computer.org/security/garfinkel.pdf)

The best solution is to run a program that wipes the hard drive to the US Department of Defense (DOD) standards. Donations from hospitals or medical centers must have their hard drives securely wiped or be destroyed. To prevent good hard drives from being physically destroyed, solutions need to be found to protect the donor.

There are products available such as DBAN[5], a free product, that wipes the hard drive to United States DOD standards. By overwriting the hard drive three times using sophisticated algorithms, the hard drives have been wiped or an error message alerts the

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[5] www.dban.org/ Darik's Boot and Nuke

user to take further measures. If we cannot be certain the entire drive has been wiped, we destroy the drives. In earlier years we drilled holes through the drives. Currently, we use a DeGausser to destroy the drives but it does make them inoperable as well. The DeGausser sends a burst of magnetic energy through the drive that erases all data but also magnetizes the drive so that it cannot be used.

Care must be taken that volunteers don't start up the donated computers and take a look around the programs installed. At Computers for Classrooms all hard drives are removed before the computers are tested so that no possible information can be gleaned before the disk is wiped completely.

This will be an even greater issue in the future as the public becomes more concerned over the security of the information contained in their computers.

Would you want to give your computer to a reuse program that doesn't wipe the disks properly? Wouldn't a business owner or government agency prefer to donate where the hard drives are wiped?

By assuring donors of the security of the handling of the hard drives, those programs that provide disk wiping procedures will be in demand. Local computer stores are charging $40.00 to wipe a hard drive. We are providing the service at no charge.

The refurbishing program runs much smoother if you have many computers of the same model. The donations can most easily come from banks, insurance companies, law firms and government agencies. Computers can be obtained from schools that are upgrading their classrooms systems. Some of these older systems can be adapted for home use.

Develop a one-page flyer to give to computer stores that sell new systems or have a repair facility. They will refer purchasers of new equipment to you to take their older systems. Talk to your local Chamber of Commerce. Businesses would rather give systems to you, than have to pay to dispose of them at your local waste facility. Get a small notice in your local paper that you are now accepting donations. Be careful. Don't publicize too much at first and find yourself swamped with more computers than you can handle.

University and community colleges can be a good source of systems. You won't be able to pick and choose the donations, so be sure that you have sufficient room and the ability to handle a large truckload of equipment. Ask about the quantity of the donation before you agree to accept it. You probably won't receive matching systems, i.e. monitors and PCs, so only solicit what you can handle. Donations from state agencies and university warehouses are measured by pallets that are generally 4'x4'x4' high.

Large donors may ask you to pick up their donations that may be on pallets. At CFC, we used to rent trucks (with no wheel wells) so that the pallets could be loaded directly into the truck. In our early years we rented trucks and loaded the donations by hand. It was a lot of work, and we slowed the operations of the warehouse giving us the equipment. It

was very difficult physical work. Loading pallets directly into the truck is a much better solution.

We now have our own 25 foot box van with a power ramp. It also works as a moving billboard advertising our program.

When picking up equipment from a warehouse – DON'T PICK AND CHOOSE – take it all. Put yourself in the shoes of the warehouse manager. If you take all of the good equipment, he will be left with items that are even harder to dispose of, since all of the good items are gone. You won't be invited back.

Check with businesses you use in your community. Ask your support personnel or organizations to look as well. People will be thrilled that a good use will be made of their old computer so that it doesn't have to be thrown away.

Don't be afraid to politely say no. It is better to decline than to become too crowded.

FINDING VOLUNTEERS

Seniors can be the backbone of your program. It can be a very rewarding experience for seniors to know they are still of value to the community. After retirement people often want to continue going to the office each day. Sometimes their spouses want them to go even more. "I married him for better or for worse, but not for lunch".

Talk to your local Sirs (Sons in Retirement) or similar organizations. Do you have a senior center? Many senior centers have computer labs with people with lots of time and the desire to help.

Placing a notice in the paper or through a local school will generate lots of interest if you offer a free computer for 50 hours of volunteer service. Again, be careful of generating more volunteers than you can handle – go slowly at first. We have never had to advertise, as word of mouth has been very successful for 19 years!

One program that has been very beneficial for the past four years is a partnership between California State University, Chico and Computers for Classrooms. The senior level class in Management Information Systems has been required to volunteer for 10 hours as a course requirement. Many of the graduating seniors have never seen inside of a computer. This is a natural partnership in that we get an educated, computer savvy volunteers and they get the experience of working with hardware to better understand how computers work.

We have found the minimum age we will accept is 13. Volunteers should be of sufficient strength to be able to lift a computer and place it on the table. Safety is very important when working around all equipment. Volunteers must wear good shoes and not flip/flops so they have protection in case a computer falls on their feet.

We allow volunteers to combine their hours to obtain a computer. Several non-English speaking families have volunteered. The young children interpret for us and the parents can provide the physical strength to do the work.

One of our favorite volunteers is Lauren who is legally blind. Lauren's guide dog, Major, curls up under the table where Lauren is working. Lauren has become proficient in scrapping out computers. It's amazing to watch her figure out if a screw is a torx, or Phillips and to take the cases apart.

Often new graduates of the A+ Certification classes can't get jobs without experience. Your refurbishing program can help them get that experience.

We teach the volunteers about hardware, software and some networking. After the volunteers earn their computer they are also more knowledgeable about keeping it running. We only use volunteers for cleaning computers if they are unable to work on other parts of the process. We want them to learn and enjoy doing it.

By breaking the refurbishing process into separate procedures and giving volunteers the skills and information to do one part of the job, the seemingly difficult process can be managed with novice trainees. Volunteers can then advance to the next stage, if and when they are ready to do so.

A sign-in book is kept – with no time limit on the accumulation of hours. Volunteers are allowed to come in and work at their convenience. Some volunteers no longer sign in as they have been with our program for over ten years.

Volunteers are the backbone of our program.

ORGANIZING YOUR WORK PLACE

You will need at least three separate working spaces.

- Receiving area for new donations; new donations should be tested to see if they are worth keeping. Monitors can also be tested to determine if they stay or are returned to the donor.

- Storage area for computers waiting refurbishing and those completed units ready to be picked up

- Production area for loading, testing and cleaning the computers

As your program expands you may want to set up areas dedicated to:

- Wiping hard drives – a secure room with no public access

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- Setting up laptops
- Testing monitors
- Business office – licensing and checking out completed systems

RECEIVING AREA (TRIAGE)

If you are a start-up program, you will want to accept the computer, insert the diagnostics disk and boot it up. If the system does not meet your minimum standards, you can return it to the donor.

At CFC, we accept all computers regardless of age. We reuse what we can, use parts when we need them and send the remainder to the recycler. We don't question the donations. Our first step is to remove the hard drive, then send it to our hard drive wiping station. The computer is then plugged in, a floppy disk or CD is inserted and then it is turned on. It is important to use a program to diagnose the system speed and the amount of the Ram.

- If the computer boots up, reads the disk and gives you the needed information, check to see if the system meets your minimum standards. If it does, attach a label on the front of the system stating the CPU speed and the amount of Ram. Place it in the Ready to Load area. If the computer is below your standards with no useful parts, send it to the recycler. The computers are recycled rather than going to landfill. If the floppy drive is faulty or the boot sequence is set to do so, the computer may boot to the hard drive so that donor's files can be viewed. We do not want volunteers looking around the hard drives so we remove the hard drive before the computer is turned on.

- Clean the inside of the computers to be kept using canned air or an air compressor. Be sure to blow the air through the fan as well as the rest of the case. Don't forget to blow out laptops as the fans can become clogged and cause them to overheat. In our new facility we created a blow-out room with a continuous ceiling venting system and an air compressor build into an adjacent room to limit the noise during use.

- We have developed a system of checking computers that are not booting up properly. There is a step-by-step process to follow in determining if the computer should be kept or scrapped. Many computers have model codes that explain what is probably inside. Make sure there is compatible Ram installed, that all components and cables are firmly seated, that you have a good floppy, video card, power supply, etc.

- A more experienced computer tech can supervise several volunteers during the triage process. Many times difficulties are encountered in removing the case or finding Ram to assist in booting the computer. Inexperienced volunteers can quickly get the idea with supervision nearby.

- When scrapping computers, save enough parts to keep on hand to repair other computers. We set a manufacturing date as a base line such as those manufactured after 2002 for saving CD drives. We save some video cards and AGP graphics cards. Some parts are proprietary so we keep a sufficient supply on hand for replacements. Sound cards and network adapters are often saved as well as audio cables. The parts are stored in boxes on shelves for ready access when putting the computers back together. The front slot covers are sometimes missing on donated computers so we keep a supply for replacements. Our smaller hard drives and older CD drives are given to our recycler.

Most volunteers can part out computers. It is interesting to know how much force it takes to add or remove memory or adapter cards. Volunteers learn how to take care of their own computer by practicing on ours.

STORAGE AREA

After the computers have been triaged and have their labels attached, they should be placed in an area designated "to be loaded". At this stage, we separate the computers by speed of processor and size. We also try to store the same models together in one area.

When we get orders from schools setting up labs, they want the same make and model to make technical support easier. The techs may want to load the software onsite using their network.

When loading the operating systems and software on the computers, it may be much faster when working with the same models.

A separate part of the storage area will be set aside for completed systems. The systems must be labeled clearly on the front. We mark the family computers with the CPU speed and the amount of memory. The school computers are marked with the CPU speed, Ram and Hard Drive size. This helps us to place the right computer with the appropriate grade level or need for power, etc.

Monitors should be stored with labels showing that they have been tested.
It is best not to store monitors on their bases as the bases can break off. Since monitors are considered hazardous materials they must be handled and stored with care. Please refer to the Tech Tips slides to see the methods of warehouse operations.

Computers for Classrooms has been working with a state certified recycler, WTP. At WTP, the employees "demanufacture" the monitors. The leaded glass is shipped to a smelter where it is crushed and melted. The circuit boards, wiring and plastic shells are separated, processed, baled and sold for reuse. Nothing goes to landfill.

THE PRODUCTION AREA

Two important tools in saving time loading operating systems and programs are a disk-imaging software program or a hard drive duplicator. We have been using Clonezilla Live – a free hard drive imaging program. You can use it to transfer the image from one computer to another of the same make and model.

We also use a program called Sysprep provided by Microsoft to transfer images of computers of other makes and models. Sysprep when used with the server edition of Clonezilla can be used to install programs of 30 or more computers of different makes and models at the same time using multi-casting. These programs are free and do not need special license fees such as Ghost or Acronis. Ghost and Acronis are excellent programs but they do charge for each computer you image. Sysprep and Clonezilla SE are not for novice computer users but tutorials can be found by visiting www.ComputersForClassrooms.org.

We also use a hard drive duplicator that we purchased from Logicube. We are able to duplicate five hard drives from one master drive within 20 minutes. By working with one model of computer at a time loading all of the programs and updates and then duplicating the drive, a lot of time will be saved when installing ready to go hard drives. After the hard drive is installed in the new computer we need to activate Windows XP and install the anti-virus program.

Other programs and patches you will want to install are also saved on a flash drive that works with the USB port. For instance we have folders for Open Office, Adobe Acrobat, Anti-Virus, Internet Explorer and various patches. We used CD disks in the past but the cost of flash drives has dropped to the point that they work very well for most uses.

CFC created a drivers CD that is very necessary. Once we have downloaded drivers for video, sound and network adapters, we save them in directories on our drivers' CDs.

If you decide to use a disk-imaging program, be sure to run "scandisk" to determine if the hard drive has bad sectors. If a few bad sectors are found, run scandisk again or use a program such as Spinrite. If more bad sectors are discovered, send the hard drive to the recycler. If the drive is stable it can be loaded, but it must be loaded by hand and not imaged. Imaging the hard drive will overwrite the bad sectors so that problems will show up when the programs are run. Hand loading will avoid the bad sectors but it is very time consuming.

In the production area, memory is added to the computer specifications as well as the sound card, cd /dvd drive, network adapter or modem, and slot covers. The volunteer checks to see that everything is working correctly.

All computers are checked once again, cleaned and labeled. They are sent to the storage area and are ready to go.

STACKING AND STORING COMPUTERS AND MONITORS[6]

As your reuse program expands, you will want to use pallets for storing and transporting computers.

We have developed a great system of stacking monitors. We use cardboard between the layers and on the bottom to prevent the screens from becoming damaged and to add stability. 15" monitors are stacked 9 to a layer, three layers high. 17" monitors are 9 to a layer, 2 layers high. 21" monitors are 4 to a layer, 2 layers high. All palletized monitors are shrink-wrapped. If you are transporting monitors on pallets be sure to catch the pallet with the shrink-wrap or the monitors will slide off. Be sure the pallet is labeled.

The monitors are set in a checkerboard pattern so when numbering the rows from left to right, the odd numbered monitors are face down on the pallet, while the even numbers are face up. This allows the monitors to be squeezed together and to give each other support. It looks like a game of "Tic-Tac-Toe" where the face-downs are the "X"s and the face-ups are the "O"s.

When we transport monitors over long distances, we have a banding tool to assure the pallets don't come loose in transit.

Computers are also stacked in a special manner. Visualize a plus centered in the middle of a 4'x 4' pallet. Computers are stacked vertically to form the cross and then laid horizontally to fill the corners of the pallet. This adds greatly to the stability of the load.

DISTRIBUTING THE FINISHED SYSTEMS

At CFC the completed computers are picked up from our storage area. The systems are loaded onto a handcart, the paperwork is taken care of in the office and the computers are loaded into the owner's vehicle. For individual systems, we store the mouse, power cords (2) and possibly a modem cord or printer cord in a plastic zip-lock bag.

It is good for the volunteers to see how much their work is appreciated. Many families and teachers are very grateful for our work and even bring snacks on occasion.

Larger orders are assembled, boxed and palletized prior to pick up. We also like to set up appointments to make sure we have enough help on hand. We offer free delivery with our larger orders within driving distance.

When the clients pick up their systems we demonstrate how to assemble the monitors, keyboards, mice, modem cables, printers, power cords, etc. Then, we give a

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[6] See Warehouse Operations: www.ComputersForClassrooms.org/tech-tips/ms_ppt.html

demonstration on a running system so that the new user will know how to turn the computer on and off, be able to access the programs and be able to run the "Learn Free"[7] program that explains all levels of computer use.

Recipients are encouraged to call for free assistance or to return any of the components for repair or replacement. We offer a one year warranty for hardware and software. Recently, we have found some illegal music sharing programs causing viruses to be installed. We have the user sign a pledge that if they install the illegal programs they will pay $15 to have us reload their computers. We also allow our clients to upgrade after a year for $30 to get a newer computer. We want low-income families to have access to technology so we try to provide continuing support.

INTERNET SERVICE PROVIDERS (ISP)

Try to find local Internet Providers willing to offer special rates for low-income families. We try to inform our clients about the best rates possible for all kinds of connections.

WARRANTY

We offer a full one year warranty. To date we have been able to handle any problems and have even serviced customers for years later. It has really helped to have the final check out before handing them out. Our rate of return has been very low. We also allow individuals to upgrade for a small fee. They get a newer computer and it is often more cost effective to recycle the older unit rather than spending time working on it.

FORMING A NONPROFIT CORPORATION

CFC was formed as a volunteer committee through the local unified school district. It operated in an informal style for many years. After the program was recognized in the community, a local education foundation picked up the expenses such as the utilities and the costs of renting trucks to pick up state surplus.

Partnerships are important especially as your program grows. You will need some funding either through grants, donations or by charging a setup fee for the computers you are placing.

While you cannot sell computers to the general public under the Microsoft Authorized Refurbisher program you are allowed to set a reasonable setup fee.

You can set up your own nonprofit as we did at CFC. The total fees in California ran around $600 in 2001. Instructions for forming a nonprofit corporation are detailed in a publication by Nolo Press at www.nolo.com. The web site has wonderful articles about nonprofits in general. They also offer a publication "How to Form a Nonprofit Corporation" (National Edition) which contains sample forms of Articles of

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[7] www.learnfree.org   This is provided in English and Spanish.

Incorporation, By-Laws and even board minutes. It is a step-by-step manual that is easy to follow. It is an excellent publication and web site. We also filed and obtained our 501(c)(3) status. The incorporation process took six weeks and the federal nonprofit determination another 60 days.

By incorporating it may help to limit personal liability, enable applying for public or private grant money, encourage tax-deductible contributions and to shelter profits that the corporation may make. Check out Nolo's web site or see if a local attorney can give you assistance.

THE FUTURE FOR COMPUTER RECYCLING AND REUSE PROGRAMS

There are always changes going on in the business community particularly with the impacts of recent legislation regarding ewaste.

Many businesses are opting to lease their equipment rather than having to deal with its end-of-life cycle.

The regulations pertaining to CRTs, TVs and now LCD screens will expand in the next few years to include cell phones, computers and all ewaste.

While the rules and regulations have not been finalized as of yet, those interested in reuse rather than recycling need to be vigilant as to proposed legislation. The larger recyclers want to insure that future legislation requires refurbishers to become certified to a standard such as E-Steward. Presently, it will cost in the neighborhood of $35,000 to obtain the certification plus requiring annual fees and reporting. This would effectively close out the small, non-profit organizations.

There is a lot of proposed legislation to protect against ewaste dumping in third world countries. Ewaste does need to be handled properly so that we are not poisoning our environment. Let's hope that in our enthusiasm to pass laws that we don't hamper the ability of good, responsible reuse programs to survive.

Many manufacturers don't want reuse – they prefer to furnish new products. Hmmmm. The greatest environmental use of power, air and water comes during the production of new computers. Reusing computers is 25 times better for the environment than just recycling.

Being involved in a reuse program is one of the best jobs in the world. One gets to be Santa Claus every day by helping people to learn and to obtain computers they never thought they could afford. By giving our communities access to technology, we give people the opportunity to have better jobs, succeed in school, stay in touch with families, set up home businesses and have access to the world through the Internet.

Creating a computer reuse program has wonderful benefits. We get lots of hugs and words of encouragement while helping to protect the environment. It's a real win-win!