

6 chapter

Space, Hardware, and Security

We need to sit people down before PCs but remember that the people come first then the technology and ICT applications -- the primacy of human agency, using ICT to add value to the ideas of people and what they wish to achieve, is the determining characteristic of a successful project/initiative/program of activity.

*Andrew McDonald
Manager - CCIS Teleport
Craigmilller Community Information Service*

Introduction

With the focus of the CTC determined and a plan decided on for software acquisition, the next issues facing the Steering Committee and the Center Director/Coordinator are space and general ambiance; hardware selection and acquisition; and risk management.

Physical Space and Furnishings

General Ambiance

Equally important as the available software will be the center environment. A successful center is one that people want to come to, want to be in, and want to return to. Some of the features that can contribute include:

An open, friendly reception area: Flyers about the center, membership applications (if appropriate), center schedules, and class registration information should be available and current. A person (paid or volunteer) should be there to welcome people and dispense information. Walls can be used to display photos of center staff and volunteers (with names and relevant information), lists of sponsors and donors, newspaper articles about the center and its participants. A community bulletin board where participants can post notices of meetings,

services, or opportunities can further heighten the impression that this place is of, and for, the community.

Some comfortable, non-computer social and/or work space: Not everyone will want to spend every minute at a computer. Some may have to wait for a machine, others may have to wait to pick up children. Users may want to take time for a break, to relax, to exchange information with others, to read a magazine, or to do pencil & paper work in connection with their computer projects. If possible, situate this social space within eye-shot of the center itself so that people who may feel shy (e.g., parents) can get a sense of what goes on and may be intrigued enough to participate themselves.

Computer placement to encourage sharing: Frequently, a participant may see someone else doing something interesting. “Hey, I’d like to learn to do that” is a response that you want to promote. Arrange computer stations so that users of one can see the screens of as many others as possible.

Space for collaborative work: Working together with a partner or small group facilitates learning and lessens the load on the center supervisor. Space the computers so that two or three chairs can be located around each.

Toddler area: Parents often have to bring babies or toddlers: If space permits, set up a play area for youngsters and engage a volunteer to supervise. If space is not available, try to make an arrangement with a nearby daycare facility so parents can drop kids off for the hours that they will be in the CTC.

Safety and accessibility: Everyone needs to feel that the center is a safe place to be and a safe place to come to and leave. This may mean exterior and interior lighting, it may mean handicap accessibility, it may even mean that a youth escort service needs to be part of center planning.

Temperature and air quality: Less a necessity for the equipment than for the participants, temperature can rise when lots of people and lots of heat-generating equipment are concentrated in a small space. Make sure that ventilation is adequate and install air conditioning in locations where daytime temperatures exceed 80 degrees.

Wall space: Fill the walls with participant work, or jackets from new software offerings, or “Club News” , or anything that relates to, honors, or informs the participants. Encourage participants to create special holiday or project displays. Organize a committee to take on this responsibility and make sure that displays are updated or changed periodically.

Staff space: It is important that center staff (paid and volunteer) have space to call their own. This can be a desk, or a room. But there must be some space.

Amenities: Think about where participants will hang coats or lodge bookbags and other personal paraphernalia. Provide recycle bins for paper (centers generate lots of paper waste). Don't allow food or drink at computer stations. Post this and other center rules prominently.

Personal files: Provide filing space for participants who may wish to maintain an individual data disk or printed (hard copy) versions of work in progress.

Suggestion box: Consider creating an opportunity for center staff, participants and visitors to informally offer comments and suggestions.

In summary, do everything you can to make the space serve the participants' needs. An advisory committee that includes participant representatives from various age groups will be invaluable in identifying ways to improve center ambiance, service, and software library.

Where Should the CTC be Located?

Much will depend on the sponsoring organization. If the CTC is an expansion of existing services within an agency such as a Y or community center, that organization may already have space in mind. A housing complex may have common space or a vacant apartment that can be allocated; a library, religious, or educational organization may be able to rearrange space usage to accommodate a CTC.

These same entities may be able to provide space to an independent group wishing to start a CTC. Storefronts and trailers are other possibilities. One CTCNet affiliate in Los Angeles heard that a gas station was closing down and persuaded the fuel company not only to give them a long term lease, but to fund the needed renovations.

Accessibility is the key. People need to be able to find the place easily, and they need to feel that they can come and go without expense, without anxiety, and without physical obstacles. This means ramps as well as steps, elevators in addition to stair wells. It means a well lit exterior. It means a location central to the intended participants; it may mean easy access by public transportation.

Another key feature is cost. Free space with no strings is great, but rare. More likely is a case where an existing agency provides space and in return the CTC agrees on a certain amount of use by participants at that agency and perhaps a certain amount of training for agency staff.

How Much Space is Needed?

There must be room for computer stations (20 square feet per station), a reception area, office, relaxation/work areas, and general traffic. Restrooms must be included or conveniently available and there must be a way to accommodate strollers, coats, and other personal belongings.

In addition, it makes sense to think about possible expansion. Look for space that is large enough to allow additional computer stations together with the necessary additional staff.

To get a rough idea of how many computer stations it will take to serve the number of participants you anticipate, divide the intended number of participants by the anticipated number of hours per week that the CTC will be open. For example, based on serving 200 people each week during 40 hours of open time, 5 computer stations will give each attendee one hour per week but if the same number of people are expected to come every day for an hour, you'll need 25 stations.

Consider your staffing plan as well: a single teacher/supervisor can handle up to 10 stations assuming one or two people using each. And, of course, your budget: for new hardware, about \$1500 per system (see Hardware, below).

What About Electrical Connections?

The advice and assistance of a technical expert will be needed to determine and plan the CTC's exact wiring configuration. The following should be part of the plan:

- Floor and wall outlets for computers (maximum: 6 systems per outlet) and for printers, scanners, and copiers.
- Telephone connections for reception and office telephones and fax machines.
- Wiring for a local area network (LAN) with broadband connection to the Internet.
- Adequate lighting.

Furniture & Furnishings

The reception area:

- Sign—outside and on the door—telling people where they are

- Desk and chair for reception personnel
- Chairs or benches for waiting people
- Files for participant records
- Sign in computer or other mechanism (sheet/clipboard)
- A large wall clock
- Display area for CTC news, programs, membership advice, etc.

One CTCNet affiliate mounted a large local area map on one wall of the reception area and encouraged each participant to place a pin on his/her home location. Not only was this an attractive display, it also encouraged a sense of personal ownership among participants, and it made a simple and clear method of informing visitors about where participants came from.

The computer area:

- Tables for the computers and other hardware. Those designed for the purpose often have sliding shelves bringing keyboards to the proper height for easy use, and may have troughs to contain the various cables that otherwise have a messy appearance. Built-in counters are more expensive and don't give you the flexibility of changing your arrangement as experience dictates.
- Consider one or two rolling carts for computers. These can be wheeled into areas of greater privacy for those that need it. They can also be wheeled to other places in the building for presentations, demonstrations, or special work. One CTCNet affiliate in Boston affectionately refers to its computer cart as its "Cow" (computer on wheels).
- Chairs for participants (2 per computer) need to be adjustable if you expect a mixture of children and adults. They also need to be comfortable (try before buying). A caution though, children can turn chairs on wheels into bumper cars!
- Files, cabinets, and shelving for software, supplies, participant records and work-in-progress.
- Indirect, glare-free lighting.
- Bulletin board space for participant work and project display.

The office

The CTC staff needs a professionally equipped workspace:

- Desks, chairs, files, supply cabinet(s), shelving
- Administrative computers with telecommunications capability
- Telephone(s), fax, copier

Hardware

While software represents the “content” of your program, hardware is the “vehicle” by which participants have access to that content.

New vs. Recycled Hardware

Although the availability of new hardware may be a draw for participants, there are reasons to consider used or recycled systems:

The pros

- available for free or for far less cost
- often fully capable (at one time were “state of the art”)
- even new systems will be “old” in a matter of months
- can be used in combination with new systems for limited functions:
 - client database and attendance records
 - dedicated Internet stations
 - as a router and firewall

The drawbacks

- the “hand-me-down” impact
- may not be able to run newer software versions
- may not have enough memory
- may be difficult to find replacement parts and/or supplies

Don't be afraid to decline donations of outdated equipment. Accepting all donations can in the end be a disservice to your clients. Establish criteria for what equipment you will accept and turn down offers that do not at meet at least that standard.

Platform

Hardware choices begin with platform: that is, will your center be Macintosh-based, or PC-based, or will it offer a variety of hardware? The platform selected will determine what versions of commercial software are needed or vice versa.

Macintosh-based?

- relatively easy to learn to use and maintain
- preferred by many graphics and multimedia professionals

PC-based?

- predominates in the business arena
- relatively inexpensive due to competition between manufacturers

Mixed platforms?

- offers participants broader skill development
- broader software availability

Note that there are now computers on the market that can read (use) both Macintosh and PC-based software.

Capacity and Capability

The hardware must be able to run the software you're planning to use. The following are general guidelines:

- Internal hard drives with at least 15 gigabytes (GB or "gigs") of disk capacity are desirable for newly purchased equipment. For recycled hardware, you may need to purchase a separate hard drive.
- CD-ROM or DVD drive is needed.
- Random Access Memory (RAM) should provide at least 128 MB of storage; more is preferable. Additional RAM can be purchased for older machines.
- Keyboards (standard with most systems) with special features can be purchased separately. The "ergonomic" variety is likely to slow touch typists but may help in the avoidance of carpal tunnel syndrome.

- Mouse alternatives include track balls and touch pads. The "mouse" advantage is being able to substitute a working one for a dysfunctional one (touch pads are built-in). Since mouse balls are easily extracted and may leave the CTC in pockets of youngsters, consider the purchase of optical mice, which also have the advantage of not deteriorating due to dust build-up. Scrolling wheels on mice can be especially useful for people with shaky hands.

Necessary Peripherals

- **Printers**—one for every 5-10 computer systems (these can be linked to a LAN)—are absolutely essential. These are some of your choices:
 - Laser - for business quality printouts
 - Color laser - not essential
 - Color ink-jet - economical to purchase, expensive to operate because of the cost of color cartridges. Let the ink dry before touching the print!
- **Copier** - participants often want multiple copies of their work. The cost of copying is typically less for a copier than for a printer. The CTC will probably need a copier for office work anyway.

Monitors

Aside from candy-colored plastics, perhaps the most visible change taking place in desktop computer hardware today is the proliferation of the flat-panel LCD monitor. Displacing the traditional clunky CRT monitor, the flat panel invasion is about more than just sex appeal. There are sound ergonomic, economic and environmental reasons to pursue the rapid deployment of LCD monitors on the desktop. Before I discuss them, let me try to clear up what they are.

CRT = Cathode Ray Tube. This is the traditional monitor technology, employing the same kinds of parts as your average television set. This is a 1920s technology! Essentially, electromagnets steer the stream of electrons fired by an electron gun at the back of the monitor to strike rows of phosphors behind the glass, which glow red, green or blue.

LCD = Liquid Crystal Display. Generically termed a flat panel monitor. Comes from the same family tree as your digital wristwatch. By flowing tiny electric currents through segments of each pixel, you can make them change color. Segments for red, green and blue constitute a single color pixel. A backlight illuminates all of the pixels.

LCDs are foremost a pleasure to work with. They virtually eliminate eye strain. They save gobs of precious desk space. They offer the sharpest, straightest and clearest pictures. They bombard the user with less electromagnetic radiation than CRTs by far. They consume substantially less power, consequently producing very little heat. Although working with any monitor under fluorescent light is an assault on the senses, LCDs do not suffer from 60Hz flicker. Nor do they suffer from distortion or jitter due to interference in close quarters with other monitors and equipment. Publishing mavens tend to decry LCDs; they point out that CRTs are still better suited to the kind of careful management of color balance that professional quality output demands. For all but the most exacting high-end color-balancing needs, there is no reason to fear LCDs.

Confusingly, measurements such as diagonal size or viewable area often cannot be easily correlated between LCDs and CRTs. Manufacturers of CRTs commonly advertise the diagonal size of the entire picture tube, a great deal of which is hidden behind the mask that borders the glass on all four sides. For example, the viewable area of a 17" CRT may really be 15". The advertised size of an LCD more accurately reflects the size of the picture.

Fortunately, the viewable area is not as important as the actual resolution of the monitor, because of the higher pixel density that LCD technology comfortably supports. Better yet, those used 14.x" and new 15" displays will pack the same number of pixels (typically 1024x768). That means, that as long as the density of the 14" display does not make text and graphics too small to see comfortably, there are no functional differences among them. The quality of the display is much more significant than its actual size.

Unfortunately, because LCDs are such a visible new technology, manufacturers initially priced LCDs into the stratosphere, but market economics are finally catching up to that reality. For example, the cost of a new 15" LCD monitor has dipped below \$300, down from \$1000 a few years ago.

One way that LCDs can indirectly drive up costs is through more expensive graphics cards. Many new LCDs have a digital interface in place of the customary analog VGA connection that requires a graphics card with a digital output. While the digital route yields the most pristine graphics, flat panels with traditional analog VGA connections abound--particularly at the low end. The only caveat in this case is that the picture quality of an LCD monitor is highly dependent on the quality of the analog signal it receives from the graphics card, which varies a great deal among manufacturers. On the other hand, perhaps the recurring costs are more important. The lower power consumption and lessened heat load on air conditioners will tend to lower the operating costs of LCDs in the form of smaller electric bills.

CRT technology is being phased out of production not just because of the technological superiority of LCDs, but also because of the environmental liability. Chock full of poi-

sonous heavy metals and other wholesomeness, many waste management companies won't accept CRTs as common household garbage, but now designate them as toxic waste that incurs a special disposal fee. As the cost of discarding a CRT grows, this further helps to tip the balance of costs in favor of more environmentally friendly and technologically superior LCDs.

LCD monitors are definitely consuming the market share of CRTs.

(This section on monitors was contributed by Tom Sobczynski, 8/2002)

Necessary Supplies

Your planning should include secure storage areas for the following:

- Data disks for participants. Do not allow participants to bring in and use their own disks or software. Outside disks may be contaminated with viruses (see Risk Management).
- Extra ink and/or toner cartridges as well as paper for all printers, copiers, and fax machines
- Back up hardware
 - Extra mice (and mouse balls)
 - Extra cables
 - Any extra keyboards and monitors that you can store

Optional Multimedia Equipment

Almost a necessity for personal publication and production, add these as your budget allows:

- **Flatbed scanners** - to digitize photographs, newspaper articles, and other print materials so that the computer can reproduce them for editing, inclusion in documents, etc.
- **Camcorders** - to create video sequences for web pages and other multimedia productions (may require special software as well).
- **Digital cameras** record your snapshots on disks that can be read directly into the computer.
- **Microphones, speakers, and headsets** - to integrate spoken sound

- **Midi-boards or other sound-digitizing equipment** for musical effects
- **Headphones**

Digital Music Studios

Some CTC programs have successfully engaged youth in projects that involve creating and editing music using digital studio techniques. The following information was contributed by Trevor Shroeder, the Technology Manager for the Intel Computer Clubhouse Network concerning music studios of the Intel Computer Clubhouse program (August 2002 online panel).

The Computer Clubhouse provides a creative and safe after-school learning environment where young people from underserved communities work with adult mentors to explore their own ideas, develop skills, and build confidence in themselves through the use of technology. Starting with a single Clubhouse in Boston in 1993, we have grown to serve youths age 10 to 18 in approximately 75 Clubhouses worldwide (slated to reach over 100 by 2005). You can visit us on the web at <http://www.computerclubhouse.org/>.

In the collection of tools we provide to our young people is a studio equipped with all the necessary bits to turn out their own musical creations. I'll describe our particular setup, highlight why we made those choices, and include some pointers for those wanting to change things up a bit.

The studio itself is a closed off space within the Clubhouse. This prevents the work going on in the music studio from interfering with those working in the rest of the Clubhouse. The more sound insulation the better, as members often like to turn the volume WAY up. Soft surfaces (carpeting on the floor; carpets, corkboard, egg cartons, etc on the wall; noise insulating ceiling tiles) also help keep the echoes down inside the room and baffle the sound escaping the room. Typically members will want to work with their friends, so space in the studio for two to five others is ideal. As it's an enclosed space, it's also good to have a window both for checking in on what's happening in the studio and also to tie the two spaces together for the members.

Our base equipment configuration is a PC, MIDI keyboard, microphone, mixer, studio monitors (speakers), headphones, and software.

The PC is the center of our digital audio editing setup. Any reasonably new machine will do but the more disk space the better. CD quality audio takes up 175KB/s so a full CD's worth of stuff is about 600MB. Disks are cheap, buy a nice 40GB or 80GB disk. We equip our audio workstations with a Sound Blaster Audigy which provides high quality (24bit, ensuring no quality is lost when mixing down to 16bit for CD quality audio) low

latency (ensuring that live accompaniment/editing is not thrown off by delay in the soundcard) multichannel (allowing for different tracks to be assigned to different channels so that mixing may be tweaked in real time) audio recording/playback as well as an interface to MIDI devices (such as our keyboard). We use Sonic Foundry ACID PRO, Cakewalk SONAR XL, and Sonic Foundry Sound Forge (which comes with ACID) for editing. These are mid-range multitrack recording packages for raw audio and MIDI.

We include both ACID and SONAR because each has its strengths. ACID tends to be very easy to start with and for many people loop-based composition is just fine. On the other hand, SONAR is more complex but offers a wider range of capabilities including good MIDI scoring. If ACID is removed, some other audio editor should be added to take the place of Sound Forge which comes with ACID.

A cheaper sound card could also be substituted, but it's key that whatever you get be low latency and have the ability to playback and record at the same time ("full duplex"). If you're going to have a keyboard it needs to have a MIDI interface as well.

We also equip our studios with a Roland XP-30 MIDI keyboard. This is a computer controlled (MIDI) 64-voice (meaning it can play back 64 different notes at once) keyboard with a large patch bank for different sounds. In addition to the ability to record/playback scores on the keyboard, many members also use it as a source of raw audio material by simply recording the sounds of the notes as they play them and then working from there with the sounds themselves. Another MIDI keyboard could be substituted though the XP-30 is especially nice because of the large bank.

For vocals we have Shura Beta 58A microphone and mic stand.

Finally, for previewing tracks, we have a nice set of studio monitors (JBL LSR25Ps) and a pair of headphones (Sony MDR-V900). Other speakers and headphones could be substituted to save money.

This is all tied together with a Behringer Eurorack MX1604A (4 mono + 4 stereo channels, microphone preamp, dual buses). Again, if cost is an issue, another mixer could be substituted. A typical 4 channel DJ mixer would probably be adequate for most things, providing an input for the mic, keyboard, and PC with output back to the PC and monitors.

Robotics

Some CTCs have been integrating robotics into their technology programs. Discussion of such activities took place in an August 2002 online panel on hardware (<http://www2.ctcnet.org/lists/panel12/>). In particular, CTCs have used the robot invention

kits created by Lego Systems of East Longmeadow, MA, which has a product line called Mindstorms and Spybots (<http://mindstorms.lego.com>).

According to Youth Technology Specialist Angie Milakovic of the Center for 4-H Youth Development,

“Our 4-H Technology Program in North Dakota has LEGO Robotic sets. We use catalogs from a company called PITSCO (Science programming materials) which has a separate catalog called “LEGO DACTA” which is filled with robot sets. Currently we have the R2D2 set, the Amusement Park, and the Intelligent House sets. They are just a WONDERFUL resource. But, as someone previously mentioned, they are not inexpensive. The 3 sets we have cost upwards of about \$1000 dollars in the end. But, these were also bought over time. Also, programmable bricks and other components don’t come with the sets... more often than not they are “extras” even though they are essentially the “motherboard” if you will, for the robotics set. You can call PITSCO for catalogs (they are on the web) to see what is out there, but you need to ask for the LEGO division — it’s a separate department. It’s fun to look!”

According to one technology manager, “We have a real difficulty getting our young people engaged in robotics not because there is no interest but because there is a perception that it’s nerdy or immature (being Legos and all) or too hard. When a mentor, adult, or young person comes in and actually sits down and does compelling projects on an ongoing basis, especially if they’re stuff that *isn’t* in the manual, that often sparks some interest. But it’s something that really takes some long term exposure to get across to those who aren’t already into it. “

“So to those looking to get their feet wet with robotics, I would suggest starting with Lego Mindstorms or Crickets, start small but structured (themed contests are a typical approach—like Lego sumo wrestling), and get in experts to help you out. A lot of times local colleges can be your source of experts or expert learners.” Lloyd Spencer suggests that, “FIRST Robotics Competition, First Junior Robotics and 4-H Technology Clubs all offer students and mentors the opportunity to discover the rewards of science, math and technology through brainstorming, teamwork, project management, and friendly competition.” Lloyd suggests that to get started you might contact the FIRST Lego

League <<http://www.firstlegoleague.org>> of a local 4-H technology club.

Internet Connection

Here's the kind of solution that could be appropriate in some locations: Use a 384K DSL line to connect a local area network to the Internet, using a 24 port 100BaseT hub to provide Ethernet backbone for the network, with a router that provides Network Ad-

dress Translation (NAT) and firewall capacity. In other locations, a cable, T1 or wireless solution may be a preferred alternative.

Saving Energy and Money

The following was contributed by Emily Sadigh, Communications Coordinator / Researcher, FAS Computer Energy Reduction Program, Harvard Green Campus Initiative, <http://www.greencampus.harvard.edu/CERP>

Here are some top tips we have developed for saving energy and money:

1. Make sure your computers are turned off at night, on weekends, and when they are not going to be in use for more than an hour or two.

Contrary to what you may have heard, turning computers off when they are not in use will not damage the equipment and will probably extend their life due to reduced heat stress and mechanical wear.

Windows 2000 and XP operating systems offer a convenient 'hibernate' option, which allows you to almost entirely power down the computer but maintain the state of the desktop when it is next turned on. If you have this option, one suggested power scheme is to let the monitor go into sleep mode after 10-20 minutes, depending on your user's needs, and set the computer to hibernate when not in use for more than 1 hour. When turned on from hibernate, the computer presents the desktop just as you left it: Open programs and windows appear in the same place. (You may need to enable hibernate: Go to start --> control panel--> power options/settings--> hibernate tab --> enable hibernate.)

2. Enable power management, particularly for monitors.

CRT monitors can use 2/3 of the total energy of the computer system, so monitor power management is an effective way to save energy without dealing with any glitches that might need to be worked out when you put the hard drive on stand-by.

If your CTC doesn't currently have power management enabled on all its computers (i.e., hibernation, stand-by) we encourage you to start off by using a setting which will cut the energy use of the monitor but not interfere with the hard drive. The monitor will go into a low power mode that it can come out of quickly when the mouse is moved. You may need to devise signs which will educate users to try moving the mouse first so that they don't accidentally hit the power button and restart the computer.

The EPA offers the following free software tools: EZ Save Network Based Software Tool

for small organizations with a mixture of operating systems that want to start a comprehensive monitor power management program. EZ Wizard Web Based Software Tool for small organizations without centrally controlled logins. End users can enable power management on their computers in seconds. (<http://www.energystar.gov/powermanagement/small.asp?orgtype=small>)

3. Consider purchasing flat-panel monitors.

If you are considering the purchase of new computer systems, factor into your decision the long-term cost and environmental savings of purchasing a laptop or flat-panel (LCD) monitor. A laptop uses one-fourth the power of a desktop, while a flat panel monitor uses one-third the power of a regular CRT screen.

These sites give more details about the benefits of flat-panel LCD monitors:

EPA Energy Star: <http://yosemite1.epa.gov/estar/consumers.nsf/content/LCDorCRT.htm>

Total Cost of Ownership Information:

From EPA: [http://yosemite1.epa.gov/estar/consumers.nsf/attachments/LCDCosts.jpg/\\$File/LCDCosts.jpg](http://yosemite1.epa.gov/estar/consumers.nsf/attachments/LCDCosts.jpg/$File/LCDCosts.jpg)

From Manufacturers: http://www.hp.com/sbso/advice/articles_computing19.html (HP) <http://www.necmitsubishi.com/markets-solutions/tco/> (NEC) <http://www.redclaycreative.com/tco/calc.asp> (Phillips) [http://www.sharp-business.com/Calculator/calc.asp\(Sharp\)](http://www.sharp-business.com/Calculator/calc.asp(Sharp)) Dell white paper discussing the TCO advantages of flat panel monitors: http://www.dell.com/us/en/biz/topics/tco_learn_monit_tco.htm

In any case, seek out Energy-Star-labeled computers, monitors, and peripherals: (<http://www.energystar.gov/products/>)

4. Minimize printing.

Paper production is even more energy-intensive than printing per page, so plan to print less. Some steps you might consider encouraging users to take are editing and print previewing on screen, saving files to disk (particularly web pages), reducing margins, and printing more than one page per sheet of paper.

For more information on responsible printing, please see CERP's printing page, University of Delaware, Steps to Reduce Your Paper Usage (<http://www.udel.edu/topics/printless/how.html>), Rice University, Printers (<http://www.ruf.rice.edu/%7Erecycle/guides/printers.htm>), or Colby College Information Technology Services on Green

Computing (<http://www.colby.edu/info.tech/green/>).

A one-time expense of several hundred dollars will allow double-sided printing on your laser printer, which, in the long term, will conserve both paper and energy. Duplex features can be purchased at CDW via the Internet at www.cdw.com.

Using less paper to print documents also means faster print jobs and less time that users must wait in line for the printer!

5. Keep peripherals off when not in use.

Turn on peripherals (printers, speakers, etc.) only when they are needed. If feasible, turn off power strips at night so equipment and transformers do not continue to draw power unnecessarily.

Risk Management

Risk management encompasses issues of security for the CTC and insurance of the CTC property, employees, and the public. The Steering Committee should investigate and examine any local regulations that may be germane to risk management and incorporate them in its planning.

The best way to minimize risk in a CTC is to promote a sense of ownership and pride in the CTC among its participants and in the community at large. Certain routine measures can, however, be taken to secure the CTC, its staff, visitors, and equipment, and thus protect the CTC from unrecoverable loss and from certain types of claims.

Risk to systems, software, & data

Center management should be aware that there are risks to data and content on disk drives as well as to life, limb, and equipment. To address risks to data and software, the CTC should:

- Prohibit the use of disks or software brought in by participants. Install virus protection software on all systems.
- Educate participants about the dangers posed by viruses and the effects that virus introduction could have on the ability of the center to function.
- Encourage CTC staff and participants to monitor internet advisories regarding new viruses that may enter the center's system through internet usage.
- Be sure to have effective procedures in place to easily restore system and application software to a stable condition if they have been corrupted.

Insurance policies that guarantee against loss of data and software due to viruses are available, but are expensive and thus not recommended to CTCs that take reasonable precautions such as those outlined above.

Risk to life, limb, and equipment

Damage or harm could come to the CTC building/room/space, its hardware, software, furnishings, personnel, and participants. Such harm includes theft, vandalism, accidents, aberrant behavior, and natural disasters. For example, an overhead pipe may burst, putting a number of systems out of operation and damaging clothing and personal possessions of participants. Someone may trip over a cable and fall. Or a participant (or staff member) may have cause to claim sexual harassment or child molestation.

Establishing a risk management program means first, treating the risk as real; second, establishing preventive measures designed to minimize risk; and third, insuring that staff and participants are knowledgeable regarding those measures and do their best to follow the specifics of the preventative program.

Examples of preventive measures include but are not limited to:

Minimizing the opportunity for accidents

- Establish rules of behavior such as “No Running. No Ball-playing. No Food or Drink by the Computers.” Post these rules in an obvious place. Make sure all CTC users are familiar with them (if necessary, read the rules out loud to them). Make certain that staff (including volunteers) understand, abide by and enforce the rules. Allow participants to help create and add to the rules to cultivate a "sense of ownership."
- String cable over the ceiling instead of on the floor. Contain extra cable length in bins or behind stations. Use extra twist ties (like the ones found in your grocer's produce department) to bundle long cords and wires.
- Have available roll-out carpet or mats by any outside entrance.
- Use power surge protectors on all systems.
- Regularly check any overhead installation of plumbing or wiring for defects.

Limiting harm to employees and the public

- Provide escorts for any person leaving the building after dark.
- Provide escorts for any senior citizen coming to or leaving the CTC.

- Ensure that more than one person staffs the CTC in the evening.
- Arrange for additional police attention to the CTC neighborhood (offer classes for the police).
- Hire a security guard, if appropriate.
- Educate all staff and volunteers as to appropriate behavior with young children and persons of the opposite sex.

Minimizing opportunities for theft and vandalism:

- Limit, and maintain a list of all people who have keys to the CTC.
- Change the locks periodically and immediately after any employee is separated involuntarily.
- Install a buzzer system and keep the CTC locked otherwise.
- Secure computers, keyboards, printers, and other hardware to desks or tables.
- Lock all portable equipment in closets when not in use.
- Store software backups in a secure space or off the premises.
- Keep the lights on at all times when the CTC is not in use by participants.
- Install an alarm system.
- Install security cameras inside and/or outside the CTC.
- Consult with local police for additional suggestions.

Once the risk management plan has been determined, distribute copies of the plan to all staff, assigning and scheduling routine implementation.

Insurance Coverage

Before purchasing any insurance, the Steering Committee should consult the local fire department, planning office, and health department to learn what regulations will govern the CTC. These may include fire or zoning codes, occupancy limits, or cleanliness regulations.

A CTC can insure its employees, visitors and property by purchasing an insurance policy or by self-insurance. Self-insurance requires the CTC to set aside a certain amount of money to cover any claims against it and to protect CTC employees, visitors

and property from damage or harm.

When a CTC rents or leases space, the owner may have property insurance. In all likelihood, such insurance will have to be augmented by the CTC to cover staff and CTC property.

Generally, insurance coverage applicable to a CTC is of 3 types:

Liability insurance

- **Definition.** Liability insurance protects a business against lawsuits and other claims arising from harm to persons on the business property. In general, a liability insurance policy contains a yearly maximum coverage. This means that the insurance company will not pay any claims that exceed a certain amount within a year.
- **Coverage.** A commercial general liability policy includes personal injury claims (such as slips and falls), fire damage, and medical payments. Liability insurance would also protect a business against claims arising out of contracts it enters with others, such as the lease of the property and elevator maintenance agreements. A business can also choose to cover employees under the liability insurance. This would give employees coverage for any bodily injury or property damage employees cause during their employment.

Property insurance

- **Definition.** Property insurance protects a business against damage to the building, furnishings, and equipment. Most property insurance uses a deductible system which requires the insured to pay a portion of the loss up to a certain amount-the deductible. The insurance company pays the rest of the loss.
- **Coverage.** There are four types of coverage: basic, broad, special, and difference in condition coverage.
 - **Basic** coverage includes losses caused by events such as fire, lightning, explosions, smoke, vandalism and mischief, and sinkhole collapses.
 - **Broad** coverage includes losses covered in “basic” coverage and also water damage, glass breakage, and damage caused by freezing and falling objects.
 - **Special** coverage includes everything not excluded by the policy. “Special” coverage is the most comprehensive because in the

event of loss, the insurance company must find an exclusion in the policy to deny the claim rather than the insured having to find a coverage in the policy which applies.

- **Difference in Condition** coverage usually includes coverage for those occurrences excluded by the other types of coverage, such as earthquakes, tidal waves, and floods.

Workmen's Compensation insurance

- **Definition.** Workmen's Compensation insurance protects a business from injuries to or illnesses of employees arising from the workplace.
- **Coverage.** The CTC must call the state department of labor to find out its obligations regarding this type of insurance. The extent of coverage and its limits vary from state to state.

Documentation

Space

- A floor plan
- An inventory of all furniture and furnishings purchased or otherwise acquired (with date, price or value, and supplier)
- A plan outlining potential expansion capability

Hardware

- An inventory of all purchases and acquisitions, with model numbers, registration numbers, dates, sources, purchase price or value, warranties
- A list of sources for maintenance and repair for each type of equipment

Risk Management

- A risk prevention plan, including staff assignments and responsibilities
- A list of applicable insurance policies, including numbers, agents, emergency phone numbers

Exhibit 6-1: Checklist of Start-Up Physical Needs

Space Needs and Utilization		
rent		heat, ventilation, air-conditioning
partition walls		installation of closets/secure space
Hardware		
computers (including monitor, keyboard, and mouse)		
printers		modems
server		scanner
service contracts		additional warranties
Computer Supplies		
disks		back-up media (e.g., tape, zip disks)
toner cartridges		
Furniture		
computer tables		rolling carts
sign-in table		work tables, desks
chairs for desks, computers, tables		couch
lighting for all areas		bulletin boards
a large wall clock		coat racks
filing cabinets		anti-static floor covering
carpet		CTC signs (interior and exterior)
Electrical Considerations		
expansion of power capacity		telecommunications lines
installation of electrical outlets		installation of overhead lights
telephones		telephone installation
computer cables		computer wires
extension cords		surge protectors

Office Supplies			
	white and colored printing paper (letter/legal)		white and colored photocopy paper (letter/legal)
	pads of paper		pens/pencils
	crayons		colored markers
	rulers		file folders
	toilet paper		soap/paper towels
	first aid kit		cleaning equipment
Office Equipment			
	copier		fax
	computer		printer
	modem		

Exhibit 6-2: *Sample Rules*

Welcome to Public Access at The Somerville Community Computing Center

When you sign in, you agree to abide by the following:

- 1.** All users must sign in before sitting down to work.
- 2.** If you are able, please contribute \$2.00 for the use of the computers, it really does make a difference.
- 3.** No food or drink at or near the computers!
- 4.** If the application you are using has sound, please turn it off or use headphones.
- 5.** Users under the age of 14 are welcome in the center until 7:00, when they are asked to leave.
- 6.** Children under the age of 10 must be accompanied by an adult.
- 7.** Adults and youth have equal access rights to the computers during the times both are present.
- 8.** The Center staff and volunteers reserve the right to ask anyone to leave the Center at any time for any reason.
- 9.** Copying software from any of the computers and/or intentionally deleting or altering contents of the hard drive will be cause for expulsion.
- 10.** Users of the center are asked to remain in the labs, the hall ways connecting the labs and the restrooms to avoid disturbing other classes.
- 11.** No Rollerblades (or other skates) in the labs.
- 12.** When the volunteers ask you to finish up because it's closing time, please be considerate and do so.
- 13.** The computer labs are only open for public access during posted hours; if you arrive before public access hours begin, please wait in the front hall.

Exhibit 6-3: *Energy Use FAQ*

1. How much damage can my computer operations cause the environment?

One typical computer system left on all day results in the emission of 1600 pounds of CO₂ in a year. It would take 100 to 500 trees to offset that amount of extra CO₂ released into the atmosphere! The energy it takes to power 15 computers for one year emits as much greenhouse gases as a 4WD Ford Explorer does in the same time period.

2. How much does it cost to supply electricity to a computer on 24/7?

One computer left on all day can cost more than \$110 a year to power.

3. I've heard that turning off my computer is bad for my hardware. Is this true?

No. Studies conducted at the Lawrence Berkeley National Laboratory (<http://www.greencampus.harvard.edu/CERP/LBNL.pdf>) have found that hard disks are not affected by frequent shut-downs. In fact, your hardware may actually last longer due to reduced heat stress and mechanical wear.

4. Don't computers use less energy when they're "idling" anyway? Why should I use an energy management program?

Unfortunately, this isn't true. Computers use about the same amount of power whether in use or not (about 45 watts for your CPU and 80 watts for your CRT monitor). The CPU draws only slightly more energy when under heavy use, like opening up an application. As a result, an energy management program is very important in order to reduce wastage.

5. What about screen savers? Don't they save energy?

Screen savers were developed in order to lengthen the life of monochrome monitors. Technological developments have made them obsolete: they certainly don't save energy or the environment! Disable your screen saver today and replace it with monitor power management.

6. Isn't it true that when you turn your computer on, a power surge consumes so much energy that leaving your equipment in normal operating mode wastes less energy than turning it off?

No, start-up current surges are of very short duration and at most they consume a few seconds of average running time energy.

7. Where can I find more information about green computing?

Many universities and colleges are working to reduce their energy consumption and have created informational websites. Some of these include:

State University of New York at Buffalo UB Green Program on Green Computing (<http://wings.buffalo.edu/ubgreen/content/programs/energyconservation/greencomputing.html>)

Colby College Information Technology Services on Green Computing (<http://www.colby.edu/info.tech/green/>)

Tufts Climate Initiative Computer Energy Saving Initiative (<http://www.tufts.edu/tie/tci/Computers.html>)

University of Michigan Guide to Green Computing (http://www.energymanagement.umich.edu/ems/Green_Computing.html)

Radcliffe IT Energy Conservation and Waste Reduction in Technology (<http://www.radcliffe.edu/rito/tips/conservation.html>)

Missouri University's Guide to Green Computing (<http://www.cf.missouri.edu/energy/greencom.stm>)

University of New South Wales, Australia, PC UNSwitch Turn Off Your PC Campaign (<http://www.cf.missouri.edu/energy/greencom.stm>)

Thank you for your efforts!

Emily Sadigh
Communications Coordinator / Researcher
FAS Computer Energy Reduction Program
Harvard Green Campus Initiative
Hoffman Laboratory, Harvard University
20 Oxford Street, Cambridge MA 02138
(617) 384-9605
emily_sadigh@harvard.edu