Chapter 10
Installing and Managing End-User Technology

A GUIDE TO
COMPUTER USER SUPPORT
FOR HELP DESK AND SUPPORT SPECIALISTS
SIXTH EDITION BY FRED BEISSE

Chapter Objectives

- Major site preparation steps for technology installations
- Preinstallation site preparation tasks
- The purpose and contents of a site management notebook
- Tools needed to install hardware
- Steps to install and configure hardware, operating systems, networks, and application software
- Common installation wrap-up tasks
- Ongoing site management tasks

System Installation Overview

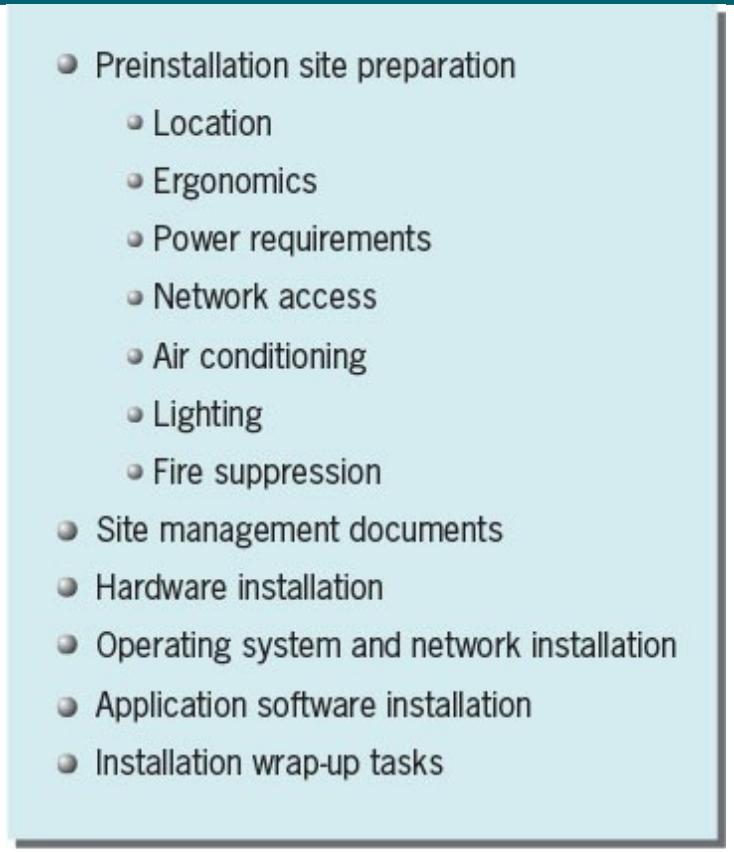


Figure 10-1 Overview of system installation tasks

Preinstallation Site Preparation

- Checklist of issues
  - Space requirements
  - Space constraints
  - Special furniture
  - Material storage requirements
  - Ergonomic issues
  - ADA and OSHA accommodations or issues
  - Adequate power supply
  - Power conditioning requirements
  - Wired/wireless network access
  - Air conditioning
  - Lighting problems
  - Fire-suppression system operational

Locating Technology Components

- Locate computer system
  - Devise strategies to conserve space
- System components
  - System unit
    - **Footprint**: length times width (measured in square inches) of desktop PC
  - Keyboard and mouse: optimal desktop height is 26 to 28 inches from the floor
  - Display screen: optimal user view is straight ahead or slightly down
  - Printer: convenient access for loading paper, retrieving print-outs, and clearing jams

Locating Technology Components (continued)

- Supplies (manuals, ink/toner cartridges, media, printer paper)
  - Convenient access
  - Tip: Avoid storing paper in damp area
- Furniture considerations
  - Importance of adjustable chair
    - Adjustable: seat height, seat swivel, tilt, backrest, arm rest
    - Waterfall seat edge
    - Five-leg base
    - Carpet protector

Space Constraint Solutions

- Space-saver system unit case (small form factor)
- Separate worktable
- Wall-mounted flat-panel display screen
- Keyboard shelf
- Extender cables
  - Permit system unit and peripherals to be under or close to, but not on, a user's desk

Ergonomic Factors

- Ergonomics is the study of how to design technology and workspaces to:
  - Minimize health problems
  - Maximize worker:
    - Safety
    - Productivity
    - Comfort
    - Job satisfaction

Ergonomic Problems Overview

- Back or neck muscle pain
- Leg pain
- Eyestrain and headaches
- Wrist and finger pain
  - **Repetitive strain injuries (RSI)**: result from continuous use of joints in a limited range of motion
  - Carpal tunnel syndrome: a common form of repetitive strain injuries that affects wrists and fingers

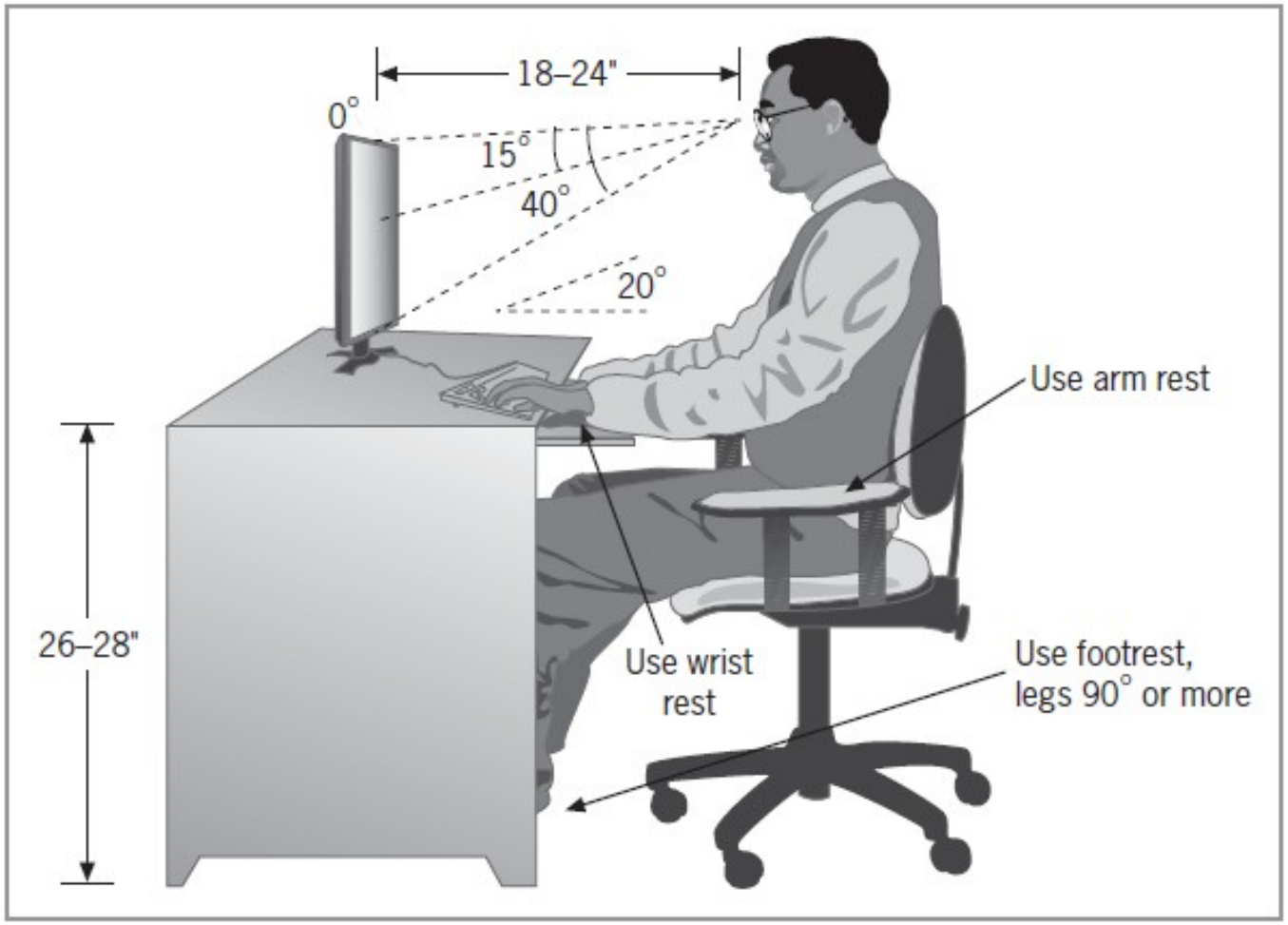
Ergonomic Solutions

Ergonomic Problem	Possible Solutions
Back or neck muscle pain or numbness	• Replace office chair with one that is adjustable. • Adjust keyboard height. • Install adjustable keyboard shelf. • Take frequent breaks and perform exercises to reduce repetitive motion and stress.
Leg pain or numbness	• Replace office chair with ergonomic model. • Place footrest on floor.
Eyestrain and headaches	• Reorient display screen to reduce screen glare. • Reduce office lighting. • Install display screen antiglare filter. • Check eyeglasses for proper fit and prescription. • Replace display screen with larger size and better resolution. • Take frequent breaks and perform exercises to reduce stress.

Ergonomic Solutions (continued)

Ergonomic Problem	Possible Solutions
Wrist and finger pain or numbness; carpal tunnel syndrome	• Adjust keyboard height. • Install adjustable keyboard shelf. • Use keyboard wrist rest. • Use a Bluetooth keyboard with a tablet PC. • Take frequent breaks and perform exercises to reduce stress and repetitive motion strain.

Workstation Ergonomics



Devices to Address Ergonomic Problems

- Adjustable tables and work surfaces
- Adjustable chairs
- Footrests
- Keyboard shelves
- Remote keyboards
- Alternative ergonomic keyboards
- Alternative pointing devices (trackballs and touchpads)
- **Assistive devices**: peripherals and software that adapt technology so that users with various physical limitations can be more productive
- Wrist rests
- Mouse support rests
- Document holders
- Wall-mounted displays
- Task lighting
- Antiglare screen filters
- Assistive devices

Impacts of Ergonomic Problems

- Ergonomic issues are important
  - Potential for physical injuries
  - Permanent disabilities
  - Legal rules and regulations
    - Occupational Safety and Health Administration (OSHA)
    - Americans with Disabilities Act (ADA)
- Tip: Ergonomics is an area where user support specialists can develop special expertise to add value to their employment or résumé

Power Requirements

- Most small computer systems and networks do not have special electrical power needs
- Special situations:
  - Two-prong outlets
  - Incorrect outlet wiring
  - Overloaded circuit amperage
  - Shared circuits
  - Power stability
  - Multiple devices

Special Power Requirements

- Outlets
  - Older buildings may have two-pronged outlets
    - Require re-wiring
    - Avoid “cheater” plug adapters
- Outlet wiring
  - Use outlet tester
  - Test three-prong outlets
    - Make sure the hot, neutral, and ground prongs are wired correctly

Special Power Requirements
(continued)

- Circuit amperage
  - Determine the total amperage of devices on each circuit
    - Can each circuit handle its total load?
- Shared circuits
  - Install devices on a circuit that does not also service equipment with heavy motors or generators
  - Tip: A dedicated circuit for hardware devices is preferable

Special Power Requirements
(continued)

- Power stability
  - Get advice from the local electric utility
    - Use a metering device to measure the quality of power
  - **Power conditioner**: a device between computer equipment and its power source that regulates electrical power to keep it within acceptable limits
- Problems with multiple computers
  - Especially for servers and high-end workstations
  - Consult an electrical contractor to verify that the power is adequate and well-conditioned

Tips on Power Cables

- Avoid:
  - Stressed cables
    - Too tight (too much tension)
    - Hard bends
  - Cables on floor or under carpet
- Use:
  - Wall-mounted cable conduits (runways)
  - Protective rubber conduits
  - Plastic cable ties to bundle cables

Specialized Power Devices

- Use an electrical power strip for convenient access but not as an extension cord
- **Surge suppressor**: a protective device to reduce damage to equipment due to power surges and spikes
- Minimum surge suppression features:
  - UL 1449 (second edition) listed
  - 40,000 or more amps peak protection
  - 330 volts or less clamping voltage level
  - 1 nanosecond or less clamping response time
  - 600 joules or more energy rating
  - Diagnostic LED status lamps
  - Warranty against damage to protected equipment

Specialized Power Devices
(continued)

- Some installations have critical power needs to reduce downtime and increase uptime
  - **Downtime**: the number (or percentage) of hours (minutes) per week or month when the system is unavailable
  - **Uptime**: the number (or percentage) of operational hours (minutes) per week or month
- Examples:
  - Hospital critical care unit
  - Online financial transaction processing system
  - The cost of downtime in these examples is critical

Specialized Power Devices
(continued)

- An **uninterruptible power supply (UPS)** is an electrical device that includes:
  - Power conditioning circuits
  - Battery backup
- A UPS provides backup power and time for connected equipment to be shut down correctly
  - Prevents damage to hardware, software, and data due to abnormal termination
  - The larger the battery capacity, the longer equipment will operate under UPS power

Network Access

- Determine the location of access points before installation in case extension cables are needed to reach the installation site
- Identify the type of network access:
  - Dial-up modem
  - Satellite
  - DSL (digital subscriber line)
  - Cable modem for broadband service
  - Fiber-optic cable
  - T1 or T3 direct lines
  - Wireless

Air Conditioning

- May be required in locations where a large number of devices will be installed in close proximity
  - Physically small office
  - Training room
  - Computer lab facility
  - Network server
  - High-end workstation
- Consult an HVAC specialist
  - Determine BTUs of air conditioning capacity required

Lighting Problems

- Light intensity
  - Reduce lighting in over-lit areas
- Light source
  - Position display screen to avoid glare
  - User should not face light source directly
- Light type
  - Florescent bulbs may flicker at same rate as older CRT-type monitors

Fire Suppression

- Electromechanical equipment is more likely to cause fires than electronic devices, primarily due to:
  - Moving parts (spinning disks, printers, scanners, etc.)
  - Power supply problems
- If an office does not have an existing fire-suppression system:
  - Use portable fire extinguishers rated for electrical fires (Class C)
  - Use Halon-substitute extinguishers

Site Management Documentation

- A **site management notebook** consolidates important information about technology equipment:
  - Hardware
  - Operating system
  - Software
  - Network
- Useful to operate, diagnose, troubleshoot, reconfigure, upgrade, and repair a system and its components
- Critical in multiple-computer situations where many support staff are likely to work on a variety of components and configurations

Typical Contents of a Site Management Notebook

- Hardware configuration
- Operating system configuration
- Network connectivity configuration
- Software licenses
- Application software configuration
- Special operating procedures
- Warranty and repair information
- Problem log
- Backup media log

Example Supplies Checklist from a Site Management Notebook

Furniture/Supplies/Accessories

- ❒ Desk (26–28" height)
- ❒ Printer stand
- ❒ LCD projector
- ❒ Media
- ❒ Power strip
- ❒ Documentation
- ❒ Wrist rest
- ❒ Antiglare screen
- ❒ Security lockdown
- ❒ Cleaning supplies:
  - ❒ Compressed air
  - ❒ Vacuum
  - ❒ Wipes
  - ❒ Cleaner
- ❒ Chair (ergonomic)
- ❒ Printer paper
- ❒ Headset
- ❒ Media storage
- ❒ Surge protector
- ❒ Bookshelf/rack
- ❒ Mouse pad
- ❒ Footrest
- ❒ Tool kit
- ❒ Printer forms
- ❒ Microphone
- ❒ Digital camera
- ❒ Extender cables
- ❒ Antistatic mat

Figure 10-6 Sample furniture, supplies, and accessories page from a site management notebook

Hardware Installation Tools

- Screwdriver set
  - Slotted
  - Phillips
- Nut driver
- Pliers
  - Regular
  - Needle-nose
  - Hemostat (optional)
- Parts-picker

Additional Hardware Installation Tools

- Pocketknife
- Small parts container
- Mirror
- Small flashlight
- Isopropyl alcohol or other cleaner
- Lint-free cloth or foam tip brush
- Microfiber cloth
- Antistatic wrist strap
- Cable ties
- Electrical tape
- Masking tape
- Compressed air
- Circuit tester
- Multimeter (VOM)
- Paper clip
- Notepad and penc

Example Hardware Tool Kit

Common Hardware Installation Steps

- Follow the *Guidelines for Working Inside a System Unit* in Figure 10-10
- Major hardware installation steps:
  - Assemble the tool kit
  - Unpack the system
  - Connect the power and signal cables, basic components
  - Install (optional) upgrades
  - Power up the system
  - Test the system
  - Update the site management notebook

Typical Operating System and Network Installation Steps

- Make backup copies of existing system and user data
- Install and configure operating system software
  - Update device drivers
- Install and configure network client software
  - LAN networking
  - Security software
- Test network connectivity
- Perform network administrative tasks
  - User accounts
  - Access rights
- Update the site management notebook

Typical Steps to Install Application Software

- Is the software compatible with the hardware and network?
- Make backup copies of user data files
- Choose the type of installation
- Configure the application to meet user needs
- Install organization-specific utilities, templates, and style sheets
- Reboot and test all applications
- Retain in the site management notebook:
  - Distribution media
  - License information
  - Installation codes (product keys)

Application Software Compatibility Issues

- CPU types the software runs on
- Space requirements
  - RAM memory
  - Hard drive storage
- Software compatibility with:
  - Hardware peripherals
  - Operating system
  - Network environment

Distribution Media

- **Distribution media**: media that contains original vendor copies of software
  - CDs
  - DVDs
  - Internet downloads
- Tip: Don’t install software by just copying an executable image from another computer
  - Registry and start-up files don’t get updated

Installation Types

- **Express installation** (typical or default)
  - The most commonly used features
- **Custom installation** (special or expert)
  - The user selects the features to install
- **Minimal installation** (laptop or space-saver)
  - For users with little hard drive space available
  - The smallest set of functions and features possible
- **Full installation** (maximum or complete)
  - All program features
  - Takes the maximum amount of hard drive space

Typical Installation Wrap-Up Tasks

- Document the system settings
- Back up critical files
- Create rescue/bootable media
- Address ergonomic concerns
- Make sure the user can use the system
- Update the site management notebook
- Fill out warranty and registration cards
- Document any problems
- Verify that the user is satisfied

Site Management Responsibilities

- Media backup
- Monitoring potential security threats
- Disaster and contingency planning
- Other site management activities
  - Preventive maintenance
  - Computer supplies
  - Recycling computers and peripherals

Media Backup

- **Media backup**: copies files and folders of software and data from a PC's hard drive onto a separate storage medium
  - Preserves data in case the original is:
    - Damaged
    - Accidentally deleted
- Backup sources:
  - Server storage space
  - User data files
  - Software installed?

Media Backup (continued)

- Backup media:
  - A hard drive on a network server
  - Cartridge tapes (magnetic)
  - Writeable optical media (CDs and DVDs)
  - Removable hard drives
  - USB flash drives
  - Internet (Cloud) backup services
- **File restoration**: a procedure to copy files from backup media to an original or replacement drive
  - When the original has been erased or destroyed
  - Tip: Test to verify that the file restore procedure works!

Security Problems and Challenges

- Sources of security threats:
  - *Electronic threats* arise from attempts to breach information or resources in a system
  - *Physical threats* arise from attempts to damage or disrupt equipment or facilities
  - *Internal threats* arise from inside an organization
    - Employees
    - Users
  - *External threats* arise from outside an organization
    - Clients
    - Hackers
    - Public users

Electronic Threats to Security

- Viruses, worms, Trojan horses
- Spam email attacks
- Unauthorized access
- Operating system vulnerabilities
- Malware software
- Insecure data transmission
- Tools: password protection, anti-malware software, firewalls, utility software

Physical Threats to Security

- Theft
  - Equipment
- Disgruntled employees
- Members of the public who are threatened by:
  - Technology
  - Bureaucracies

Physical Security Tools

- Keypad entry locks
- ID badges and ID cards
- **Biometric readers**: hardware devices that can uniquely identify a user through:
  - Eye patterns
  - Fingerprints
  - Signature recognition
  - Hand geometry
  - Voice recognition
- Motion sensors and heat-detection devices
- Camera systems to monitor facilities
- Reception desks
- Metal detectors
- Physical barriers (walls and windows)

Disaster and Contingency Planning

- Sources of disasters:
  - Power failures
  - Floods
  - Fires
  - Storms
  - Earthquakes
  - Tsunamis
  - Terrorist attacks
  - Sabotage
- **Risk management**: tools and strategies to reduce the threat to an organization from unpredictable, uncontrollable disasters, intentional events and accidents
  - Helps an organization recover with minimal financial or customer service loss

Disaster Management Tools

- **Business interruption insurance**: offsets the cost to return to normal operation
- **Engineering inspection**: identifies the potential for damage to equipment and facilities
- **Media backups**: may be stored off-site to facilitate data recovery after a disaster
- **Disaster/contingency plan**: describes activities that will occur if a facility experiences a disruption of service

Preventive Maintenance

- **Preventive maintenance**: tools and procedures to reduce the likelihood of equipment failure and repair costs
- Procedures to clean and adjust:
  - System unit
  - Disk drives
  - Printers
  - Keyboards
  - Mice
  - Display screen

Preventive Maintenance
(continued)

- System unit
  - Remove dust buildup with a vacuum cleaner
  - Test electronic components with diagnostic software
  - Test battery strength
  - Check internal and external cable connections
- Disk drives
  - Serviced only by a qualified technician
  - Usually replaced rather than repaired

Preventive Maintenance
(continued)

- Printers
  - Remove dust and paper particles with a vacuum cleaner
  - Keep the inside free of ink and toner spills
- Keyboards
  - Remove dust and dirt particles with a vacuum cleaner or compressed air
  - Clean the keys with a lint-free cloth and isopropyl alcohol

Preventive Maintenance
(continued)

- Mice
  - Clean glides and case on optical mouse
  - Avoid optical eye opening
  - Use isopropyl alcohol
- Display screen
  - Clean the screen regularly to improve visibility
  - Avoid using harsh chemical cleaners on LCD panels
  - An older CRT-type monitor case should be removed only by a qualified repair technician

Computer Supplies

- Maintain an inventory of:
  - Printer supplies
  - Media
  - Cleaning supplies
  - Replacement parts
- Sources:
  - Local office supply stores
  - Electronics vendors
  - Mail-order catalogs
  - Internet vendors

Managing the Recycling of Computers, Peripherals, and Supplies

- Equipment replacement poses disposal problems
  - Hand-me-down strategy
  - Donate obsolete equipment
  - Recycle:
    - For use by charitable organizations
    - For salvage value of materials
- Some supplies and peripherals can be recycled
- Tip: Disposal in a landfill is illegal in many areas and should be avoided in others

Chapter Summary

- Basic steps to install a computer:
  - Site preparation
  - Hardware installation and configuration
  - Operating system and network installation and configuration
  - Application software installation and configuration
  - Wrap-up tasks
- Site preparation steps for computer installations:
  - Location
  - Ergonomic concerns
  - Power requirements
  - Network connectivity
  - Air conditioning
  - Lighting problems
  - Fire suppression precautions

Chapter Summary (continued)

- A site management notebook organizes information about a system in a convenient location
- Hardware installers:
  - Assemble a kit of mechanical tools for installation tasks
  - Follow safety precautions for work inside a system unit
- Installers develop checklists of installation procedures for:
  - Hardware
  - Operating system and network software
  - Application software
  - Wrap-up tasks
- The ultimate measure of installation success:
  - *Is the user satisfied?*

Chapter Summary (continued)

- Common facilities management tasks support specialists may perform:
  - Maintain media backups
  - Monitor network performance
  - Track and prevent security threats
  - Prepare disaster and contingency plans
  - Perform routine preventive maintenance
  - Purchase supplies
  - Recycle used equipment