// Assignment 1

/ Trouble Free Systems

// by George Hotten

// Issues that must be considered when planning computer systems maintenance

// Organisational Policies and Procedures

/ Procurement of equipment

When planning maintenance of computer systems, you must ensure you have the correct tools for the job. For example if you need to clean out a system, items that should be procured are a screwdriver to open the case, compressed air to blow away any dust, and a thermal compound if the cooler must be removed.

/ Sustainability and environmental issues

Before completing the maintenance on a computer system, you should ensure that the items and methods you are using are sustainable and good for the environment. For example, a lot of compressed air canasters may not be recyclable which will create a large amount of waste if consumed often. To combat this electric air dusters can be bought, usually for around £30, which can be charged without batteries helping make your work sustainable as it can be reused as many times as needed without creating any waste.

/ Documentation and problem escalation procedures

Once planning has been completed, it should be properly documented in the steps that must be taken to complete the maintenance along with the estimated time on how long each step should take to be completed. Included in the documentation should be the escalation procedures to take if the maintenance cannot be completed. For example, if an update fails and corrupts the operating system, the steps on who to contact and what should be done will be included.

/ Employee and employer responsibilities

Before starting any maintenance, it should be made clear what the employee and employer's responsibilities are. For example, it may be the employer's responsibility to oversee the maintenance as it happens making them responsible for ensuring the maintenance is performed correctly.

// Relevant Legislation

/ Health and Safety

The act that governs health and safety whilst at work is the Health and Safety at Work etc Act 1974. This act outlines the duties which:

/ Employers have towards their employees and the public

/ Employees have towards themselves and colleagues

/ Specific self-employed members have towards themselves and colleagues

This ensures that employers provide their employees with a safe place to work in, along with providing the necessary safety equipment needed. Employers must ensure everyone is trained in what they do, carrying out risk assessments to minimize risk.

This act also ensures employees are responsible for keeping themselves and others safe. Employees must not interfere with anything provided to assist in health and safety and should always be working in a safe way. If the laws of the act aren't followed, they could be fined or convicted.

/ Portable Appliance Testing

Portable Appliance Testing involves checking the safety of electrical appliances. This is usually done by visually inspecting the appliance and performing electrical tests. This should be carried out by someone trained in PAT testing, called a "competent person". The competent person should visually inspect the appliance, its lead and its plug. If the appliance being tested is Class I (meaning an earth conductor is needed for safety), the competent person will inject test signals into the appliance and its cable to ensure its integrity.

// Why relevant policies and procedures are needed for the maintenance of computer systems

It is important to have relevant policies and procedures to control the maintenance of computer systems for the health and safety of the people performing the maintenance. There are many risks that can come from performing computer maintenance, such as electrocution and electro-static discharge. By having the relevant policies and procedures it helps ensure that the maintenance is done in a safe way, all the proper precautions are taken, and all the needed safety equipment is provided such as electro-static mats and grounding wrist bands. Without the health and safety legislation we have today, companies would not be required to provide their employees with the proper safety training and equipment, causing significant risk of injury or death.

It is also important to have relevant policies and procedures to ensure that the maintenance is done without risk of damage to the computer's components or risk of data loss. For example, delicate components such as the CPU (specifically a PGA CPU which have pins on the bottom) could be at risk of being damaged or broken if the people performing the maintenance have not received the proper training. If a pin on a PGA CPU or of an LGA motherboard is bent the CPU won't fit into the socket and could damage more pins during the process. If pins are missing from the grid-array it could prevent the CPU from functioning at all. Another way the system could be damaged is if the maintenance is not performed in a safe environment. For example, if the maintenance is taking place on top of an uneven or wobbly workbench, you could risk components falling off the table and being damaged. For some components the risk is minimal as its PCB (printed circuit board) is protected by an outer casing. However, for components that have moving parts dropping it from height can be drastic. For example, a hard disk drive could be destroyed if dropped from a height with data potentially being unrecoverable.

// What are the risks that face practitioners when using and maintaining computer systems?

// Electrocution

Generally, the maximum amount of current your computer receives to the motherboard isn't enough to cause any serious harm. Your computer's PSU cables output a maximum of 12 volts DC, which due to our body's resistance does not have enough current to push electricity through your body. However, the one component you should not open or touch the internals of is the power supply. The power supply can have huge amount of current stored inside them which could cause serious injury or even death if touched.

// Injury from Equipment and Tools

When performing computer maintenance, you will often need tools such as a screwdriver and compressed air. If used with care, these items are harmless. However, if misused they can cause injury or harm. For example, compressed air can often cause burns due to the pressurized gas within the aerosol spray if sprayed onto skin. Screwdrivers can also cause injury in rare occasions if used without care. For example, if a screwdriver is used not for its intended purpose (perhaps to act as a prying tool), you could accidentally use too much force and drive the screwdriver directly into your hand causing cuts and injury.

If someone sustains an injury, there should be a first aid box onsite with necessities. There should always be a trained first aider on site at all times to assist if someone is injured.

// Heavy Lifting

In most cases, computers aren't relatively heavy and therefore are very unlikely to cause any injury to your back or arms. Despite this, care should always be taken, and the proper method of lifting should be used. This can be done by assessing the weight of the item, how far it must be moved, and how you will keep a steady hold on the load. The way you lift the load is also important, by slighting bending your back, hips and knees when picking up the load. If manual handling training is properly followed, there should be no injury caused. It is important everyone whose job might require heavy lifting receive proper manual handling training before being allowed to lift anything heavy.

Enterprise-grade hardware is usually the heaviest and may sometimes need a cart to move around or a secondary person to help lift.

// Fire

As computers are made up of electronic components, there is a fire risk. With modern standards, however, this risk is significantly lowered. Fire can be caused by old components, most notably power supplies, or components that have manufacturing defects. By ensuring all components used are bought from reputable manufacturers and used within their operating standards, it is very unlikely a fire could ignite.

In the unlikely event of a fire, the proper fire evacuation procedures should be in place, with fire extinguishers nearby to be used if you become trapped or if you are trained in using them. Optionally, providing training has been received, sand buckets can be used to place components in if they ignite assuming it is safe to do so.

To help prevent fires, especially electrical fires, PAT testing should be done regularly to ensure there is no risk of a component bursting into flames.

// Electrostatic Discharge

Electrostatic discharge (ESD) is caused by the rush of electric current between two charged objects. For example, a human and a computer component! ESD does have the potential to damage computer components, however this has been proven to be a minimal risk. Despite this, the proper precautions should aways be taken.

When performing computer maintenance, you should be operating in an ESD-safe workspace. This can be done by using a special ESD proof mat, which should be connected to a ground source. You should also wear an ESD wristband which transfers any ESD from you to the ground rather to a component, protecting it from damage. You can connect your wristband to an ESD mat providing it is connected to a ground. An example of a ground you can connect to is your

power supply: if you are not working on anything connected to it, turn it on and connect your workspace to its chassis to be grounded.

// Ergonomics

Bad ergonomics can cause serious injury if used for a prolong period, this can include bad posture when sitting, a monitor that isn't level with your eyes, or using a mouse and keyboard at an angle or distance. This can cause injury to your back, shoulders, wrists and more. To minimize risk of injury, you should always be sitting with your back straight with proper support, your monitor should be level with your eyes, so you don't strain your neck looking down or up.

// Planning techniques that can be used to schedule maintenance activities

// Gantt Chart Example
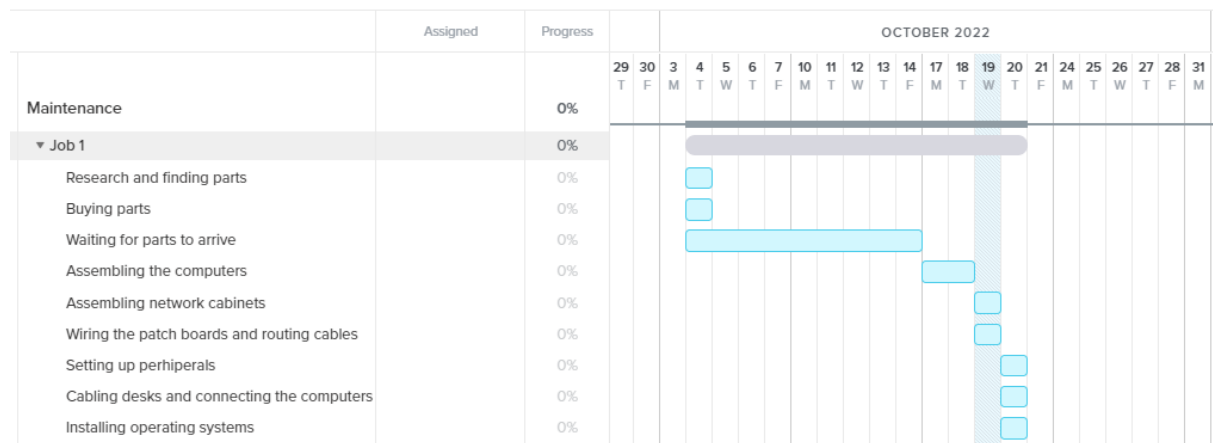
This is an example of part of a Gantt chart I created and used when buying and setting up new computers and networking equipment. Gantt charts are helpful for planning tasks that have lots of steps that are spread across multiple days, as they provide a visual representation of what needs to be done a when. Gantt charts can also be measured in any time scale you need, for example hours, 30 minutes, weeks, etc. In my example, it helped me know what needed to be done and when and how long roughly I should take per maintenance task. This ensured I completed my tasks within a reasonable time frame.

// What are the benefits of Gantt Charts?

/ Supports jobs with a large amount of tasks

/ Allows a structure to be maintained when doing maintenance to ensure no steps are skipped

/ Creates an easy to understand visualization of how long tasks will take and what tasks needs to be done and when

// How do Gantt Charts compare to other planning methods?

/ Simple Lists

Unless the visualization of your job is important, there is no reason not to use a simple list. All that is needed is a pen and paper, and you can write down everything that needs to be done and check them off whilst performing the maintenance. If timings are important, they can just be written next to the item. If the maintenance you are performing is routine, the steps can be written into a table in a word document and easily saved and printed off.

/ No Planning

Without planning, it is likely that you may miss steps whilst performing your maintenance. Some steps may be critical to the maintenance and missing it could damage or corrupt components and data. This also limits the company you are performing maintenance for, as if you cannot complete the maintenance due to illness or injury no one will be able to complete the maintenance as the instructions needed haven't been planned or written down.

/ No Maintenance

If routine maintenance isn't planned or scheduled, it could put the longevity, performance, and safety of a system in jeopardy. If maintenance isn't completed it could cause components to be damaged, for example by heat, if the system isn't cleared of dust regularly. Without regular maintenance the security of your network can also be at risk as security patches may not have been installed on the system leaving vulnerabilities in your network.