

Unit 14 – Installing and Maintaining Hardware in Technology Systems

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Introduction



This presentation has been designed to explain the benefits and implications with installing and maintaining hardware components for technology systems. Each slide has been designed to highlight the importance of understanding what you need or want the system to be able to do, choosing compatible components to fit your requirements for the system, and the costs involved with installing, upgrading/replacing or maintaining the hardware in the system.

I will outline the benefits of installing (upgrading or replacing) 4 hardware components in two separate technology systems (one desktop system and one laptop system), I will also explain the benefits of maintaining 4 hardware components in these two systems. Furthermore, I will detail the possible business impacts of installing and maintaining hardware components in a desktop computer system. This will allow you to weigh up the advantages and disadvantages for both methods and make the choice based on your business needs.

Finally, I will discuss the strengths and weaknesses of your desktop computer systems hardware components, which will allow you to analyse the key problems that may be causing your technical issues with these systems.

Overview of Installing and maintaining hardware

Why do we install hardware components?

Hardware components are needed in order for the technology system to run. Without the basic hardware components (such as a CPU, a motherboard, a hard drive, a case, a power supply and cables to connect the components together), you wouldn't actually have a system in which to use.

Obviously, the great benefit of assembling your own computer system is that you can tailor it's internal components to suit your own requirements. And this is why we install hardware, to build, replace or upgrade the hardware in our technology systems to suit our own needs and specifications.

We can install new systems to replace old systems, replace broken or damaged components and upgrade slow or incompatible components with more powerful, capable components to suit the needs of the system and the user.

Overview of Installing and maintaining hardware

Why do we maintain hardware components?

The main reason we need to maintain hardware components is to keep our existing technology systems running, maintaining and cleaning these components can help to increase our components lifespan. Preventing wear and tear is also key to increasing the lifespan of these components, and it can save you a lot of money in the long run. There are a few different ways in which we can maintain hardware components, and they can easily be placed into two categories – physical maintenance and system maintenance.

Physical maintenance of the hardware components can vary between parts but as a general rule, the easiest way to physically maintain components is to clean them at regular intervals. You can do this by purchasing cans of compressed air, which you can use to help remove the dust from the components without damaging them. This is one of the best ways to increase the lifespan of your components.

System Maintenance could be viewed as the internal maintenance of these hardware components, such as disk cleaning and defragmenting the hard drive to help manage and allocate space on the hard drive. The main benefit of system maintenance for components such as the hard drive is that helps to improve the key functions of the hard drive as well as increasing its usability and lifespan in the future. If you never defrag your hard drive, over time the hard drive will be filled with fragmented files which will slow down your hard drive, as it will be more difficult for the hard drive to function efficiently.

Desktop Computer System

Benefits of Installing Hardware

Graphics Card

One benefit of installing a new graphics card into a desktop system is that the clarity of the graphics will be greatly improved than that of an older model, as the technology will be updated and more advanced.

Another benefit of installing a new graphics card into a desktop system, is that the speed and performance of the component will be a lot faster and more efficient than the older model, as the graphics card will most likely have a higher specification and come with a warranty.

Benefits of Maintaining Hardware

Motherboard

One of the best benefits of maintaining a motherboard instead of replacing it, is that you can eliminate the cost of buying one. It can be quite expensive to buy a new motherboard so looking after an existing motherboard can save you a lot of money.

There are problems that can occur with replacing a vital component of a computer system, such as a motherboard, because there are a number of compatibility issues that can arise. For example, if you buy an ATX motherboard but you have a Micro-ATX computer case, then you will be unable to install it into the case as it will be too big for it.

Similarly, you may struggle to remove the components from the original motherboard safely in order to install it into the new motherboard.

Desktop Computer System

Benefits of Installing Hardware

PSU

A PSU is the component which provides the computer system with electric power. The amount of power produced by these power supply units is measured by wattage, and each computer system will require a different wattage. For example, an older computer system with less powerful components won't need a very high wattage and would probably be quite happy on 350watt PSU.

However, a high-spec gaming pc with an 8GB graphics card, a couple of 1TB hard disk drives, 16GB of RAM, high-end motherboard, optical drive, cooling fans and LED lighting will need a PSU with around 850watts, to be able to keep up with this more demanding system.

The reason for this is that different components require different amounts of power, and if you have a system which is operating high-spec components on a low wattage power supply unit, then the system will become unstable, suffer from technical faults and it could potentially become dangerous, so installing a compatible PSU is very important to maintaining the reliability and stability of the system and its working components.

A new power supply unit is crucial to avoid the issues that can arise with old/existing PSU's. With an old or even an existing PSU, over time they build up dust and dirt which can become trapped in the unit, and this will cause the power supply unit to become unreliable, unstable, damage other components and eventually combust. Therefore, it is a good idea to install a new PSU rather than an existing one as it may not be compatible with the system, and it could cause more issues in the long run.

Desktop Computer System

Benefits of Maintaining Hardware

RAM

The most important factor to consider when dealing with RAM is price, currently RAM is incredibly expensive as the price for an 8GB stick of RAM ranges between £40-£80 which is extremely high compared to only a few years ago. Therefore, you can save an extraordinary amount of money by maintaining the existing RAM of your computer systems.

Simply by ensuring the RAM is securely placed in the slots on the motherboard (making sure the side clips have been secured) to prevent damage to the RAM, and keeping the RAM away from water to prevent water damage – you can easily keep the RAM in excellent condition.

Like most components however, the main issue that can arise from maintaining RAM over simply installing new/upgraded RAM, is compatibility. If you wish to make any changes to your computer systems, the RAM must be compatible with the system, the other components and most importantly, the user's requirements.

For example, if you are a multi-tasker using multiple high-performance/demanding programs such as Adobe Photoshop, Fireworks or Illustrator at once and you only have 4GB of RAM, the software most likely won't run on your system because it can't actually handle the software, and even if it does, it will be painfully slow.

This is the same story with a lot of other types of software, such as games. These days, games usually require at least 8GB as standard, so you can imagine it's incredibly important to gauge the compatibility of the RAM in relation to both your computers hardware as well as your needs for the system itself.

Laptop System



Benefits of Installing Hardware

CPU

The main benefit of installing a CPU instead of simply maintaining one is improved performance, a new CPU with updated technology for increased performance, can greatly enhance the multi-tasking capabilities of the system.

For example, if your existing CPU is a very old model and you are finding the system is slow when multiple programs are in operation, you may find upgrading your CPU allows you to multi-task without slowing down.

This is due to the improved performance of the new CPU's cores as the more cores the CPU has, the more tasks it is able to perform.

Benefits of Maintaining Hardware

Battery

The main benefit of maintaining a laptop system battery is increased lifespan of the battery.

If the battery is maintained correctly, it will last longer, which will save you money as you won't need to purchase a new one.

To maintain the battery you should try to drain or deplete the cells of the battery before you recharge the battery.

This will reduce the risk of the cells dying, thereby extending the lifespan of your battery.

Laptop System

Benefits of Installing Hardware Screen

Most laptop system screens last the lifespan of the laptop itself, however, sometimes the screen wiring can become loose or the screen contains lots of dead pixels. In which case, the best thing to do is to replace the screen with a new screen that does not have any dead pixels.

The wiring issue can be harder to fix as the wires (that connect the screen to the motherboard) are often only accessible from the inside of the casing and you may need special tools in order to remove and replace the wiring. This can be both costly for the wire, and time consuming to do, as well as voiding any warranty the laptop has.

However, if the wiring is not an issue and the screen is relatively simple to remove (depending on the make and model of laptop system you have), then replacing the screen is often the easiest solution.

Benefits of Maintaining Hardware Hard Disk Drive

Maintaining the hard disk drive is essential to accessing the data stored on your hard drive and the overall use of the system itself. By maintaining your hard drive you can extend the lifespan of the component which will save you both time and money.

The hard disk drive is a non-volatile memory storage device that controls the reading, writing and position of where data is stored permanently. The data stored on the hard disk drive is written and read from the disk inside the device using a magnetic head to read/write data on the disk's surface.

The best way to keep your hard drive in tip-top condition, is to use both defrag and disk clean-up software to relocate old or junk files and defragment the data on the hard drive.

The goal of these two programs is to check the map of sectors that is stored on the hard drive (also known as the file allocation table) which shows a "map" of where the data is stored and where there is free space on the "tracks" and "sectors" of the hard disk plate. These programs then relocate files and data into organised "clusters" for the system to find/retrieve the files and data when later requested by the user.

Desktop Computer System

Installation Impacts on Business Systems

Compatibility Impacts

The main impact to compatibility when installing components on business systems is system components not being compatible with each other.

It is extremely important that you research components before purchasing them in order to get the best performance possible from the assembled system.

For example, if you purchase a motherboard and a CPU without checking to see if they are compatible with each other, you will find that when you try to assemble these components together, the CPU probably won't fit the motherboard, and you will have knock on impacts such as more time spent ordering components and fitting them, as well as more expense for ordering the correct components that are compatible.

Usability Impacts

The main impact to usability when installing components on business systems is staff training.

Staff training will be required if you have a new system installed as employees and workers will not be used to the new system right away and will need a few weeks to get used to how the system operates.

This will cost additional time and money on top of the installation down time itself, as the training of staff members will take at least a few weeks or even a few months. The costs of this are the training itself as you may need to outsource training to a third party expert which can be expensive depending on the level of training involved with the system.

Desktop Computer System

Maintenance Impacts on Business Systems

Compatibility Impacts

The main impact to compatibility when maintaining components on business systems is old system hardware components not being compatible with the software requirements of the business.

For example, if a photographer requires certain types of software to operate his business, such as Adobe Photoshop in order to edit photos for his clients, then he will need a computer system that can operate that particular type of software. So he would not be able to operate his business using outdated hardware as it would not be able to run the high-performance Adobe software.

Another issue with simply maintaining hardware is that out dated hardware is not easy to find so it may be difficult to replace the parts with the correct/compatible components and future technical issues could arise.

Usability Impacts

The main impact to usability when maintaining components on business systems is hardware components performance and loss of functionality.

If the hardware components start to fail, slow the system or lose essential features to their functionality, employees/users will find the system frustrating and difficult to use which could cause knock effects to the business. This could end up costing the business a lot of hours if it takes each employee longer to complete tasks, which in turn will lose a business money on an hourly basis.

If any components fail, they will need to be replaced and if a lot of components fail all at one time, the unexpected costs could become extremely expensive very fast. Additionally, the longer the computer systems are down while replacing these components, the more money it will cost the business.

Desktop Computer System

Installation Impacts on Business Systems

Negative Impacts

The cost of purchasing the components for these computer systems all at once will be very expensive, and the cost will depend on the requirements of the business system as well as the amount of computers required.

The time spent installing components will also cost the business money, as the longer the business is out of operation, the more costs the business will incur as they will not be earning any money, they will just be spending it.

The new hardware components may not be compatible with each other and this create technical issues which will cost the business time and lots of money as the components will have to be replaced with more compatible components.

Positive Impacts

The hardware components are brand new which will increase the productivity of the business and the performance of the computer systems.

This is due to the condition of the components, as they are new and operate perfectly, so the system runs smoothly.

The system will be up-to-date with the latest technology as the components are new and tailored to the requirements of the user/business, which means the business will be getting the most out of the system.

For example, more space to store data on the hard drive, better graphics for clarity on images, easier to use for staff members.

Desktop Computer System

Maintenance Impacts on Business Systems

Negative Impacts

Unexpected cost is a large issue with maintaining computer systems. The costs to the business are expensive if any of the system's components fail, as they will need replacing, and installation downtime will cost a lot of time which will lose the business money on top of the cost of replacing the components.

Replacing older components can be very expensive, especially if they are hard to come by as you may not be able to locate a specific component and it could mean you have to replace an entire computer system's hardware.

Out of date hardware could mean that certain types of operating software are unable to be used as they are not compatible with the system, so the user will not be able use some software programs as they are not compatible with an outdated system.

This is true of high-performance programs like Adobe Photoshop, which can be quite demanding and Adobe recommends that your system has at least 8GB of RAM, Windows 7 or later operating system and at least 3.1GB of hard drive space available for installing the software.

Positive Impacts

All components in existing system are compatible so no issues are present which saves both time and money as nothing needs changing/replacing, which saves both time replacing components and money.

This means less downtime and less knock on effects to the business and less money is lost overall.

An existing system means workers/employees are already trained to use the system, this means that they do not need any training, which costs money and time, so maintaining a computer system saves money.

Desktop Computer System

Strengths of Specified Desktop System

Desktop Specification:

- Operating System: Windows 10 (64-bit)
- Processor: Intel Core i7-6700 Quad core, 3.4GHz with 4.0GHz turbo boost, 8MB Cache
- Memory (RAM): 8GB DDR3 (16GB maximum installable RAM)
- Graphics card: NVIDIA GeForce GTX 745 (4GB)
- Storage: 1TB HDD, 5400RPM
- Ethernet: 10/100 Ethernet
- Bluetooth: Bluetooth 4.0
- Video interface: HDMI x 1, DVI x 1
- Audio interface: 3.5mm jack
- Optical disc drive: DVD/RW with double layer support
- Memory card reader: SD memory card reader
- Expansion card slot: No
- PSU: 220W

Strengths

The operating system is Windows 10 (64-bit) which is the most up-to-date version of the Windows operating software, this is good for software compatibility.

The processor is an intel core i-7 Quad core with 3.4GHz of speed which is a very expensive processor and will have no problems handling any task you throw at it, this is a powerful processor which is perfect for highly demanding tasks such as running video and image editing software.

The 8GB RAM memory is compatible with adobe software (such as photoshop) as stated on their website under the system requirements. 8GB is usually the standard amount of RAM for most computer systems, so this should allow the user to use most types of software.

The storage is 1TB size, which is good for average use and could be used to store the main operating system.

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Strengths

The ethernet feature allows for fast ethernet network connection speeds of between 10-100Mbps (MBs per second) which is standard for any good internet connection. The Bluetooth 4.0 feature allows the user to connect to devices wirelessly, such as mobile phones.

The system contains output ports for one HDMI cable and one DVI cable, so the user can connect the system to two different screens at once.

The audio 3.5mm jack is included in this system which allows the user to listen to music/sound using earphones or headphones.

The optical disk drive supports DVD reading and writing, this will allow the photographer/user to burn images and videos onto disks for clients.

The SD memory card reader allows the photographer/user to insert SD memory cards directly into the memory card reader to upload the images contained in the SD card directly into the computer system.

Desktop Computer System

Weaknesses of Specified Desktop System

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Weaknesses

The RAM is a standard size of 8GB but it is only got a 16GB maximum installation capacity, this means that the user is restricted to 16GB for this desktop system which is very low for a desktop system.

The NVIDIA GeForce GTX 750 graphics card is only 4GB, which is average considering the user is going to be using the system for the purpose of editing images and possibly videos too. I would advise at least 6GB for a image/video editing system.

However, this graphics card is not at all compatible with the power supply unit for this system. I checked the wattage requirements for the graphics card and found that it needs around 300 watts power for the graphics card alone, the graphics card wouldn't operate with the power supply included in this system.

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Weaknesses of Specified Desktop System

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Weaknesses

The storage is good for the average user but for a image editing business I would advise having at least 2 HDD drives at 1-2TB, 7200rpm (5400rpm is a lot slower than 7200rpm) and only add a solid-state drive if you can afford too.

This is because you will need one hard drive to run your main operating system and one to dump your current live projects onto for extra storage capacity. Optionally you could pay for a 500GB Solid-state drive, use one HDD for storing old files and the other HDD for storing current live projects. This would free up a lot of space for the user but it would be very expensive.

There are no cooling fans to disperse any heat created inside the systems.

There are no VGA, USB 2.0 or USB 3.0 ports in this desktop system so you cannot connect any devices that require these cables.

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Weaknesses of Specified Desktop System

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Weaknesses

There are also no expansion slots available, so you cannot add any additional components or devices to the system such as sound cards.

The power supply unit is disgraceful, absolutely shocking how low the wattage is on the power supply. The graphics card alone needs about 300 watts of power, this system would not be powered by 220 watts, it simply wouldn't power the system and might even damage the components which would cost the business a lot to replace. I would advise at least 500 watts for this desktop system, anything less and it could make the system unstable/unreliable.

The video interface is also not great as most computer systems have at least two HDMI ports but you could always buy DVI to HDMI adapter leads and use that to connect two HDMI screens/monitors.