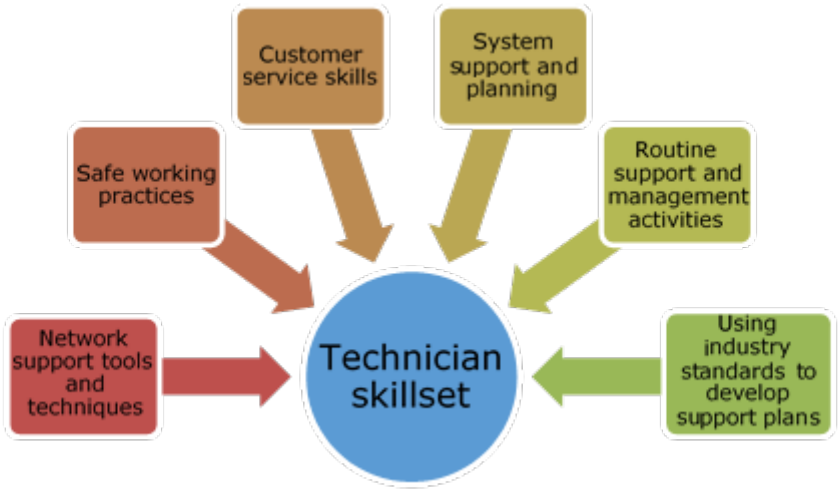
# Unit 12: IT Technical Support and Management

## Delivery guidance

As computers increasingly become the most critical aspect of any modern business system, the need for comprehensive and responsive IT technical support and management continues to grow, often outstripping available demand. Consequently, as it offers one of the most approachable routes into the IT sector through further and higher education, the role of the IT support technician is an obvious path from which many learners successfully start their career.

In addition to having a first-class understanding of the hardware and software that comprise modern computer systems, a successful technician must complement this with a range of common, transferrable skills:




This unit offers learners a rich mix of potential activity types, but primarily the core skills being targeted are those relying on investigation and problem-solving, whether this is examining the IT system support needs of an organisation or carrying out a routine support activity on a problematic IT system.

Ideally, learners should progress through this unit observing professional work practices such as following procedures correctly, documenting findings and actions accurately, and communicating these confidently and appropriately to other stakeholders.

Offering a high degree of 'hands-on' practical activity, the unit will help learners explore and resolve a range of technical issues covering hardware, software (applications and operating systems), administration and networking. As such, it offers many opportunities to complement theoretical content covered in many other units in the programme.

### Approaching the unit

The theoretical content of this unit should be taught in an active fashion using a variety of targeted practical activities, particularly in terms of IT system management and implementation activities or improving the importance of an existing IT system. Where possible, all technologies used (hardware or software) should be up to date, although older equipment is useful as that it may be realistically encountered through the breadth of some larger organisations and workplaces. Ideally, learners should also be exposed to a range of popular operating systems, including Microsoft Windows (client and server), various Linux distributions and Apple Mac OS X. Many popular IT technician software tools are available as open source projects or as freeware and these can offer an acceptable alternative to commercially licensed products. Case studies and

reference material relating to IT support incidents and industry best practice should be as current as possible.

All practical activities that involve hardware and software maintenance (particularly the former where electrical hazards are found) should be carried out under strict supervision in classroom (or lab) conditions using recommended safe working practices. As listed in Topic A2 of the specification document

The centre must ensure that all learners have access to appropriate protection equipment and are aware of current regulations as appropriate in the region the course is being delivered, as well as any international regulations that are appropriate for the use of computer systems.

## Delivering the learning aims

Learning aim A requires learners to demonstrate that they can examine the IT system support and management needs and characteristics of different organisations.

This section focuses on the support needs of different types of organisations and the corresponding characteristics of different IT support systems and would be well supported with current case studies involving growth/expansion of services, server issues, and or new hardware and peripheral uptake.

This learning aim is divided into four topics which cover a range of support needs and associated issues to ensuring these needs are supported. The first focusing on the purpose and nature of IT system support and management and the penultimate one examining the available job roles. Learners are likely to have some experience of technical support through their individual use of technology and this can be expanded to include larger organisational processes such as launching new platforms/interactive services, migrating to cloud services and/or improving security. Contextualised IT technical support scenarios in sectors such as media, engineering or public service could include the use of industry specialists or guest speakers to propel these topics.

Learners should examine the safe working practices in IT support and management. Learners must be competent with using equipment properly, particularly around devices that can create electrical and fire hazards. Some centres could consider issuing learners with a safe work practice certificate that demonstrates that they are ready to perform IT support and management functions safely. Each successfully studied aspect, for example, DSE, manual handling, PAT and ESD protection contributes to the learner's certificate to partake in practical sessions.

Learners also have the opportunity to compare the support and management needs of different systems where they can explore practical tasks under controlled classroom conditions. Indeed, many of these aspects are covered in subsequent learning aims, including opportunities to monitor network traffic, set up virtualised clients and servers, deploy operating systems remotely and control another user's desktop to resolve issues, which are often highly enjoyable and rewarding for learners.

Delivery of this element, though mostly theoretical, should give learners ample opportunity to carry out independent research. This is more likely to develop a better learning environment than chalk and talk.

Sessions around safe working practices would benefit greatly from in-class discussions as well as a visit from in-house health and safety officers, if possible, to help demonstrate the practical applications of the theory being learned.

The same is true of network roles and tools – rather than presentation, guest speakers or individuals in similar roles would help give the learners a clear understanding of the roles available to them if following a route of IT technical support. Network tools should be demonstrated, and learners should be allowed to engage with them to gain a firm understanding of their applications.

Learning aim B requires learners to demonstrate their ability to perform routine support and management activities on IT systems, including monitoring and optimising system performance. This learning aim can be delivered through a number of different practical activities that focus on a wide variety of support activities, system management and optimising the performance of IT systems.

It is strongly recommended that you try to simulate IT support request management by using server-based IT helpdesk software (e.g. Deskero, Freshdesk) that allow learners to log requests, reply to customers, recommend solutions and track outstanding tickets. Combine this with suitably rotating role play – learners taking turns as customers or technical support – and the learning experience can become very realistic and rewarding, especially when combined with the practical problem solving.

You can differentiate formative assessment opportunities by providing learners with a granular level of difficulty inherent in each reported fault and service request; with this approach even the strongest, most experienced learners will stay actively challenged in sessions.

Learners should also be encouraged to focus on developing their customer service skills and personal behaviours with all stakeholders when engaging in different service support scenarios.

Due to the nature of this learning aim, the majority of teaching, where possible, should focus on practical work and demonstrations. Practically engaging with the different tools and techniques available will give learners ample opportunity to develop the skills necessary to carry out the support and management activities required for this learning aim.

Learning aim C requires learners to plan, collaborate, justify, evaluate through the development of a plan to support and manage a new IT system using industry standards and methods.

The best approach for tackling this learning aim is to examine existing IT technical support and management plans, perhaps as part of a larger case study. This will help learners to examine and drill down through each aspect that is required for this type of plan, creating a learner-led checklist that will assist them when completing their own assessments. Giving learners an opportunity to practise creating such plans for a model IT system will also provide adequate preparation for assessment, especially if the feedback given is suitably robust and constructive, especially in terms of its evaluation.

## Assessment model

| Learning aim | Key content areas | Recommended assessment approach |
|---|---|---|
| **A** Examine the IT system support needs and characteristics of different organisations, which are essential for their operation | **A1** Purpose and nature of IT system support and management<br>**A2** Safe working practices in IT support and management<br>**A3** Job roles in IT technical support and management<br>**A4** System and network support | A research study of at least two different organisation's IT support and management needs and characteristics. The study should cover four IT support and management characteristics: purpose of the system, safe working practices, job roles and system and network management tools. |
| **B** Carry out routine support and management activities on IT systems | **B1** Management of user support requests<br>**B2** Routine support activities<br>**B3** System management and implementation activities<br>**B4** Performance of IT systems<br>**B5** Personal behaviours | Diary or blog of a range of different completed IT support and management activities and other evidence, including customer service response logs, screenshots and photos.<br>Observation reports, audio or video recording of user, and client feedback. |
| **C** Develop a plan to support and manage a new IT system using industry standards and methods | **C1** IT system diagrams<br>**C2** Incident response and disaster recovery planning<br>**C3** Capacity planning<br>**C4** Sustainability and environmental waste planning<br>**C5** An IT technical support and management plan | An IT support and management plan for a new IT system. |

## Assessment guidance

The assessment for this internally assessed unit would benefit from being divided into three assignments as shown above.

Assignment 1 should cover learning aim A. A thoroughly researched evaluation focusing on at least two different organisations' IT support and management needs and characteristics. Where possible, draw these organisations from a number of different sectors and represent different sizes, for example, SMEs, medium-sized business or larger corporate entities to provide suitable variety and broader scope of research for the learners. Alternatively, learners could create or deliver a presentation, or the tutor can direct learners in a structured debate.

You should expect learners to cover these four areas:

- Purpose and nature of IT system support and management.

- Safe working practices in IT support and management.
- Job roles in IT technical support and management.
- System and network support and management tools.

To offer the best opportunity for a learner to succeed, they will need to access a range of both published and online sources that provide the academic content, including appropriate regulations.

For distinction criteria, learners will evaluate the support and management needs and characteristics of at least two different IT systems. The systems will be different in their nature, for example, the number of users and the IT skill level of the users might be different.

Assignment 2 should cover learning aim B. This assignment task is primarily practical in nature but should be presented by the learner as a log. Learners must successfully complete at least six routine IT support activities safely and optimise a computer system's performance to meet the client's requirements, using processes and behaviours effectively.

To meet the client's requirements, it is recommended that a suitable narrative arc is woven which links these support activities and helps to ground them into a realistic workplace scenario. A recommended tactic is to obtain verbal client requests, for example, recorded telephone calls or live role-play interviews to assess the learners' ability to listen closely; in addition, this can generate evidence of learner's professionalism, communication and questioning skills.

Setting up the practical aspect of this assignment will require each learner to have access to a computer system that has deliberately set up with a number of faults or issues (software or hardware in nature) to identify and resolve. Learners may tackle different tasks (if preferred) but they should generally be pitched at the same difficulty level.

Software based activities can be performed on virtualized computer environments, but hardware activities should use real-world physical equipment.

Common routine tasks include:

- repairing an installation of a software application
- configuring a user environment, for example, mapping a network drive or changing accessibility options
- modifying an operating system's settings, for example, network connectivity, hard disk partitioning and user permissions
- installing application or software upgrades
- installing a new peripheral's drivers
- replacing a faulty hardware item, for example, sound card, optical drive and video card
- demonstrating a workaround solution for an identified fault
- installing and/or configuring new hardware, for example, printers, scanners and additional monitors
- upgrading existing resources, for example, adding more RAM and additional disk storage or
- performing data backup operations, such as archiving or creating disk images.

Learners are required to monitor the performance of an IT system (and its sub parts). This may take the form of accessing the logs of monitoring and benchmarking tools to gain a 'snapshot' of a systems performance over a short period of time, these logs should then be compared against the user/client requirements for the system(s).

Note: The number of concurrent activities is naturally limited through resource availability and safety considerations within the classroom but it is envisaged that learners should be assessed across a range of task types rather than being focused on one type of activity as this better reflects the variety of an IT support technician's real- life workload.

As a requirement for the distinction level, learners should demonstrate they can optimise the performance of a particular computer system (this could be a different computer system, for example, a notebook rather than a desktop system to provide some diversity in the learner's workflow).

Suitable optimisations that could be considered are:

- security optimisation, for example, firewalls, operating system patches and device hardening
- traffic optimisation, for example, resolving system bottlenecks
- basic system performance, for example, firmware (BIOS) and operating system (settings, drivers etc.).

To complete this task, learners should have access to:

- administrative rights and permissions on target systems
- diagnostic software, for example, system monitoring software or a range of system utilities
- IT technician toolkit, for example, screwdrivers, needle-nose pliers and multi-meter
- safety equipment that protects both the user and their equipment, for example, ESD wrist-straps and mats
- appropriate diary, blogging or IT helpdesk software.

You should expect learners to demonstrate evidence for:

- actions taken supported by screenshots, photographs or video evidence
- rationale for changes made, particularly in terms of optimisations performed, supported with suitable evidence such as 'before and after' system monitoring
- customer service correspondence through the use of emails, screenshots or photographs
- feedback to client reflected through observation reports, witness statements, audio or video recording
- time management, including planning, target setting and getting feedback from others
- reviewing and responding to outcomes, including the feedback received from others
- professional attitude to their work reflected in their etiquette, communication, support, leadership and responsibility.

Assignment 3 should cover learning aim C**.** The task requires learners to develop and review a plan to support and manage a new IT system using industry standards and methods.

Learners may be introduced to the requirements of the organisation through a written case study, role play (e.g. interview – live or recorded – of a client) or observation of a real workplace.

A suitable example could be that the client established in learning aim B would like the learners to produce and refine a plan to support and manage a new IT system. This could be presented as a new business moving to the local area that needs their IT infrastructure securely in place before starting up.

- disaster recovery
- incident response
- capacity management
- sustainability and environmental management.

Other aspects that the learners should tackle include:

- ergonomics
- floor plans
- IT service outsourcing requirements

IT services procedures and policies, for example, fault and issue report, escalation and acceptable usage.

The plan should use diagrams (e.g. route maps, upgrade paths, schedules, checklists), wherever appropriate and make references to current standards (e.g. ISO/IEC 27031), concepts (e.g. RPO and RTO) and legislation (e.g. Waste Electric and Electronic Equipment (WEEE) Regulations 2013), as applicable.

This report should be then reviewed by others (e.g. peers, assessor, other members of the programme delivery team or industry experts) against the client/scenario requirements identifying the extent to which they meet these requirements. They should provide suggestions on how address any shortfalls. The learner should also analyse this feedback to identify flaws, make improvements and justify how well their plan meets the client's requirements and whether it is actually fit for purpose.

Grade differentiation will focus on the standard of problem solving, that is, how well the learner has interpreted the client brief to support and manage a new IT system, the underlying quality of their plans, their application of feedback (to identify and inform improvements) and the standard of evaluation provided.

For distinction standard, learners will evaluate their refined IT support and management plan and will consider the feedback from others. They will provide evidence of the feedback they have obtained and show how they have used it.

# Getting started

**This gives you a starting point for one way of delivering the unit, based around the recommended assessment approach in the specification.**

## Unit 12: IT Technical Support and Management

### Introduction

Introduce this unit by ascertaining the learners' experience with IT technical support (most will have had some interactions with a technical help desk at some point) and detail the full expectation of the unit's outcomes and the skills (and professional behaviours) the learners are expected to develop before its completion.

Give learners the titles of different network support roles to research and feed back to the class on the description and duties of the roles. This will give an overview of the IT sector, and the number of entry-level roles available for support technicians is a useful motivating factor; gauging learner interest levels in pursuing such a route post- qualification can also be beneficial.

You may consider measuring initial learner skills by using a simple skills and behaviours audit, permitting the creation of individualised starting points based on prior experience. This would help you manage practical sessions more appropriately, spending limited support time in the most efficient manner. Repeat this process at the end of the unit using the same document to measure distance travelled.

Introduce learners to the concept of risk assessments in the work placements and ask them to carry out their own in the classroom/their home. Give learners specific scenarios for a range of employees and ask them to consider the most suitable outcome, e.g. manual handling training, PAT testing of equipment, Hazard mitigation methods.

You may also consider appointing (or asking for volunteer) learners with more experience to act as classroom support.

## Learning aim A: Examine the IT system support and management needs and characteristics of different organisations, which are essential to their operation

### A1: Purpose and nature of IT system support and management

You will detail purpose and nature of IT system support and management.

- Present the main purpose of IT system support and management – this is a good opportunity to ask learners to discuss why they think support and management of IT systems is important. Encourage learners to discuss large scale impacts such as banks being unable to operate as well as security issues that affect them directly, e.g. PSN network being down.
- Discuss the support and management needs of an organisation and how it varies across the system's life cycle (this can be linked to themes in other units), including newer (and growing) initiatives such as bring your own device (BYOD).
- Ask learners to create a five-stage system life cycle poster (design, build, test, operate and de-commission) where they link IT system support and management functions to each stage, e.g. decommissioning would involve archiving and migrating system data and recycling hardware appropriately.
- Discuss the nature of IT system support and its resource types, demand cycles, compromises which affect its policies and processes and how its operation and scope varies depending on the sector it occurs, e.g. office and engineering sector needs being similar but having unique challenges. Inviting guest speakers from IT technical support functions based in different sectors is a useful tactic as it allows learners to compare and contrast the situational scope of their respective roles and responsibilities.

- Learning aim A1 should take approximately 2 hours.

**A2: Safe working practices in IT support and management**

You will discuss and demonstrate (where possible) safe working practices in IT support and management.

- Ask learners to research and feed back on the safe working practices for the use and care of IT equipment in organisations, including legislation that is appropriate to the region in which the course is delivered in relation to areas such as:
    - What was the rationale for this purchase?
    - Health and Safety and the use of computer screens
    - Manual Handling
    - the use, safety and maintenance of electronic equipment.
- Ask learners to research and summarise appropriate guidelines and legislation, possibly through the creation of a wiki, podcast or in-class poster.
- Explore suitable case studies or reported incidents of effects on organisations where safe working practices have not been followed. Ask learners to discuss these and see if these could have been avoided.
- Show a suitable Health & Safety video (or ask for a specific presentation from the institution's Health & Safety representative) which demonstrates the specific health and safety hazards encountered when working in an IT support environment.
- Demonstrate and ask learners to participate in the use of hazard mitigation methods, e.g. ESD wrist strap, ESD mat, firefighting equipment and training, first- aid training. Third party expertise, e.g. local fire and rescue resources or the local designated first aider may assist, if asked.
- Learning aim A2 should take approximately 3 hours.

**A3: Job roles in IT technical support and management**

You will detail and differentiate the typical job roles in the IT technical support function, which includes the following.

- Different support levels, e.g. 1st, 2nd and 3rd lines.
    - Ask learners to research and present to the class the responsibility of each support level giving example duties and responsibilities.
- The role of infrastructure architects.
- The role of network administrators and their contribution to 2nd and 3rd line support.
    - When explaining the job roles and duties of infrastructure architects and network administrators, it is often useful to employ the use of guest speakers (possibly from the institution's own support function), workplace visits or work experience.
- Learning aim A3 should take approximately 3 hours.

**A4: System and network support and management tools**

You will discuss, demonstrate and manage learner-led classroom activities which detail the following.

- Give learners (in groups) one of a range of network performance monitoring and management tools, particularly those which focus on bandwidth and application monitoring and network scanners (e.g. wireshark) for protocols and ports. Learner groups prepare informative posters on their tools to be displayed in the classroom – these can help with summative assessment later in the unit.
- Provision of user desktop computing by various means, including server virtualisation with thin client computing and web-based applications (e.g. vagrant and virtual PC).
- Introduce learners to tools used to create and remotely deploy desktop disk images – this could

be done via a demonstration through in-house IT support, where learners can take notes for future reference.

- Asset management, including the use and registering of software licences.
- Remote desktop access and control and administration, including performing updates of both operating systems and applications.
- Learning aim A4 should take approximately 3 hours.

## Learning aim B: Carry out routine support and management activities on IT systems

### B1: Management of user support requests

Demonstrate how learners should carry out routine support and management activities on IT systems using best practice.

- Describe the source of user support requests, e.g. forgotten login details, lack of user training, hardware or software faults and the impacts these have on the function of the organisation.
- Present a breakdown of IT support and management processes, including:
    - issue and fault management (support tickets, severity and priority concepts, request classification, job allocation, escalation and communicating with the user)
    - the role of SLA (service-level agreements) in monitoring the IT support function load, overall performance and responsiveness
    - gathering user satisfaction levels as feedback and informing further improvements
    - tracking resource requests: identify fault trends, analysis of skills needs and required staffing levels
    - desirable and undesirable aspects of communication, e.g. being attentive when listening to a user, demonstrating empathy and providing factual information. Learners could summarise these as part of a person's specification for an IT helpdesk job.
- The use of open source IT helpdesk ticketing systems can be beneficial here as a form of simulation and role play, allowing users to directly respond to users, solve problems and report back using a realistic software solution. This could be a good opportunity for learners to experience the in-house help desk facility for IT support.
- Discuss the importance of IT support and management systems, covering reporting systems, types of information that should be reported per fault (including actions and outcomes) and the role and content of knowledge bases. Providing learners with examples of real-life IT fault logs to explore can be particularly beneficial.
- Learning aim B1 should take approximately 6 hours.

### B2: Routine support activities

You will detail routine support activities.

- Demonstrate and ask learners to replicate practically a range of routine support activities for a range of different IT systems. Learners should be as involved as possible with these demonstrations, with others recording if possible, these activities should include the following:
    - issue and fault logging and management
    - communicating with users
    - performing routine support and repair tasks, e.g.:
        - installing applications software
        - updating drivers for a non-functioning peripheral
        - configuring a user's environment
        - changing an IT system's basic configuration, e.g. BIOS or operating system settings
        - creating a new user account, setting and adjusting its permissions

    - creating and deploying workaround solutions.
  - analysing system data to identify problem areas and trends, e.g. using a set of helpdesk reports to identify and calculate hard disk failure rates from a particular manufacturer or a number of similar user requests that may indicate a need for additional user training and staff development.
- Learning aim B2 should take approximately 8 hours.

**B3: System management and implementation activities**

You will detail system management and implementation activities.

- Demonstrate and ask learners to replicate practically a range of system management and implementation activities for a range of different IT systems, including:
  - System installation
  - upgrades (RAM, hard drive, additional expansion cards, etc.)
  - adjusting system settings on a range of devices
  - storage management, including backup and restore of data
  - software management, including installation, configuration, updation and removal
  - disk configuration, including mapping network shared drives, creating disk images, setting and changing folder permissions.
- This activity can be managed using pairs or small groups, rotating through a series of round-robin practical activities. Log each learner's successful completion of each task using an individual learning plan or personal development log.
- Learning aim B3 should take approximately 5 hours.

**B4: Performance of IT systems**

Discuss and demonstrate to learners the performance of IT systems, how it can be monitored, measured and improved through various forms of optimisation.

- Demonstrate and ask learners to try various forms of security optimisation, e.g.:
  - firewall configuration (MAC filtering, encryption, reserved IPs, NAT etc.)
  - access control rules
  - common vulnerabilities and exploits (CVEs) and how to deploy patches
  - device hardening, e.g. removing redundant services and moving services to non-standard ports
  - management of system permissions.
- Identify typical ways to optimise system traffic and how to check performance (at rest, under load); identification of system bottlenecks and possible solutions, e.g. more RAM, improved CPU, optimised operating system and improved drivers.
- Discuss techniques for improving system performance including common techniques and upgrade options with suggestions sourced from the learners.
- Demonstrate automated system monitoring techniques.
- Ask learners to identify and practise performing certain optimisations under controlled conditions, documenting their findings with analysis of the improvements made.
- Learning aim B4 should take approximately 7 hours.

**B5: Personal behaviours**

- Help learners to reassess their professional behaviours. Learning aim B5 should take approximately 2 hours.
- Recap the personal behaviours that are intrinsic to the IT support and management function, e.g. time management, planning, setting targets and gathering feedback.

- Reflect on how behaviours impact outcomes, especially the impact of:
    - being professional
    - having good etiquette
    - using good communication
    - being supportive
    - taking leadership
    - acting responsibly.
- You should now reissue the skills and behaviours audit completed by learners in the first session so that they can now revisit the document and make additional observations about where and how they feel they have improved. Learners may also find it useful to reference communications and associated 'tickets' in order to evidence this as well as reference to their ILPs when completing this task.
- Learners should use the internet (or the centre's own learning centre resources if any exist) and identify sources such as videos or other materials that would help them to improve the skills they identified as those need improvement. A combined list of resources from all learners should be published and/or shared by the class.

## Learning aim C: Develop a plan to support and manage a new IT system using industry standards and methods

**C1: IT system diagrams**

- You introduce learners to the concept of IT system diagrams and the different types commonly used. Learning aim C1 should take approximately 3 hours.
- Introduce, describe and decompose different types of IT system diagrams, including:
    - route maps
    - upgrade paths
    - schedules
    - Gantt Charts
    - network performance monitoring
    - maintenance checklists.
- Lead a directed question and answer session, asking small groups of learners to take turns (round-robin style) interpreting IT systems diagrams of each type.
- Task learners with creating different types of IT systems diagrams for given scenarios, e.g. from a verbal interview describing an intended hardware and software upgrade path of a given organisation in the upcoming 5 years.

  Note: Some products can make use of practical resources to create electronic documentation, e.g. Gantt charts using commercially available products such as Microsoft Project or online Gantt Chart creation tools.

**C2: Incident response and disaster recovery planning**

Introduce learners to incident response and disaster recovery planning.

- Discuss the importance of organisation continuity planning in accordance with the current ISO/IEC 27031 or other relevant international equivalents.
- Present how incidents should be managed, including:
    - their identification
    - their classification
    - prioritisation

  - how to minimise their impact on the business
  - use of workaround solutions.
- In groups, give learners the same sets of incidents that they need to rank in the order of classification and prioritisation – each choice must be justified. The class then should discuss each group's findings and see how plans and perceptions can differ.
- Introduce metrics for continuity, security and readiness for a potential disaster, including recovery time objective (RTO) and recovery point objective (RPO).
- Discuss backup planning and the best use of site mirroring.
- Detail disaster recovery procedures and planning involved for unexpected downtimes.
- Examine case studies to reinforce learning and contextual incident response and disaster recovery planning concepts. Ask learners to examine case studies in groups.
- Learning aim C2 should take approximately 2 hours.

**C3: Capacity planning**

Introduce learners to the concept of capacity planning.

- Present the basic concepts involved in the active planning and management of capacity of a given period, e.g.:
  - Calculating required capacity based on factors such as type, location, concurrent users and working hours. Learners could be asked to perform basic calculations of these based on simplified case studies.
  - How to practically optimise network systems and assets to provide better value for money, e.g. network printing, shared folders and use of thin clients. Learners must have an opportunity to implement some of these resourcing techniques on a quarantined network to observe their impact on capacity, costs and available resources.
  - Stressing the importance of checking system requirements, the ability of an IT system to scale, its availability and suitability for public, private or hybrid cloud- based solutions and the impact this may have on the overall customer experience.
  - Monitoring a system over time to check capacity and performance over a system's life cycle, identifying bottlenecks, peaks, spikes and troughs in activity levels. Learners could be asked to identify causes of bottlenecks or unusual activity levels and, perhaps, calculate capacity trends of a given organisation moving forward (e.g. doubling workforce or opening a new office) and, if possible, make suitable planning recommendations.
- Learning aim C3 should take approximately 2 hours.

**C4: Sustainability and environmental waste planning**

Introduce learners to the role of sustainability and environmental waste planning when working in IT technical support and management.

- Discuss the concept of sustainability and environmental waste planning, particularly in terms of practical considerations such as:
  - reduction of waste with recycling or repurposing
  - repair of hardware and software instead of replacing
  - source products that reduce carbon and
  - implementing a remote-work policy and enabling it through technologies such as VPNs to reduce travel (and associated carbon emissions).
- Discuss the practical aspects of environmental management:
  - on-site IT system effects
  - recycling, including legislation such as Waste Electric and Electronic Equipment (WEEE) Regulations 2013 or other international equivalents.

- Ask learners to investigate sustainability and environment waste planning and policy for given organisations.
- Task learners with generating their own sustainability and environment waste planning policies, obtaining feedback from their peers after presenting them.
- Invite guest speakers who specialise in recycling of electronic goods, especially old IT systems, to partake in moderated question and answer sessions.

**C5: An IT technical support and management plan**

Discuss and walk through an IT technical support and management plan.

- Discuss the purpose and scope of an IT technical support and management plan, i.e. what is included and what is not.
- Detail the common sections of an IT technical support plan, e.g.:
    - What was the rationale for this purchase?
    - disaster recovery
    - incident response
    - capacity management
    - sustainability and environmental management.
- Highlight other aspects that the learners should tackle include:
    - Ergonomics
    - floor plans
    - IT service outsourcing requirements
    - IT services procedures and policies, e.g. fault and issue report, escalation and acceptable usage.
- Ask learners to work through a sample IT technical support and management plan, identifying aspects which have poor, average and good coverage.
- For a given scenario, tasks small groups of learners to create a suitable IT technical support and management plan, presenting these to their peers for feedback.
- Ask each group to recommend improvements to their plan based on received feedback.

## Details of links to other BTEC units and qualifications, and to other relevant units/qualifications

This unit links to:

- Unit 1: Information Technology Systems- Strategy, Management and Infrastructure
- Unit 2: Creating Systems to Manage Information
- Unit 9: IT Project Management
- Unit 11: Cyber Security and Incident Management
- Unit 14: Customising and Integrating Applications
- Unit 15: Cloud Storage and Collaboration Tools
- Unit 18: The Internet of Things.

## Resources

In addition to the resources listed below, publishers are likely to produce Pearson-endorsed textbooks that support this unit of the BTEC Internationals in Information Technology. Check the Pearson website at http://qualifications.pearson.com/endorsed-resources for more information as titles achieve endorsement.

### Textbooks

- Bruton N, *How to Manage the IT Helpdesk,* Routledge, 2002 ISBN-10 0750649011, ISBN- 13 9780750649018.
- Clarke GE, Tetz E and Warner T, *CompTIA A+ Certification All-in-One For Dummies* (Fourth Edition), John Wiley & Sons, 2016 ISBN-10 1119255716, ISBN-13 9781119255710.
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- Sanchez A, *Technical Support Essentials (First Edition*), Apress, 2010 ISBN- 101430225475, ISBN-13 9781430225478..

### Videos

- *Manual Handling 8 basic steps to correct lifting technique* (www.youtube.com/watch?v=RuhHroEh31i0).
- *1st Line Support Process* (www.youtube.com/watch?v=BTtfSlMqpoQ).

### Websites

- *https://ganttpro.com/ – Ganttpro* – Online Gantt chart software for project management.
- *www.hse.gov.uk/waste/waste-electrical.htm* – Waste Electrical and Electronic Equipment recycling (WEEE).
- *http://osticket.com/ – OSTicket* – A simple and lightweight open-source support ticket program designed to be easy to install and set up.
- *www.vagrantup.com – HashiCorp Vagrant* – Create and configure lightweight, reproducible and portable development environments.
- *www.virtualbox.org – Oracle VirtualBox* – An Intel x86 and AMD64/Intel64 virtualization product for enterprise as well as home use.
- *www.wireshark.org – Wireshark* – A network protocol analyser for Unix and Windows.

### Software

- *Event Sentry Light* – A free server and network monitoring tool.
- *Famatech Advamced IP Scanner* – A free network scanner and remote control software.

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