

Digital: Digital Support Services

**T Level outline content: final version for
inclusion in ITT**

March 2019

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Introduction

T Levels are new, two-year, technical study programmes, designed with employers to give young people the skills that industry needs. T Levels will provide a mixture of:

- technical knowledge and skills specific to their chosen industry or occupation
- an industry placement of at least 45 days in their chosen industry or occupation
- relevant maths, English and digital skills.

T Levels will become one of three major options for students to study at level 3, alongside apprenticeships for those who wish to study and train for a specific occupation 'on the job', and A levels for students who wish to continue academic education.

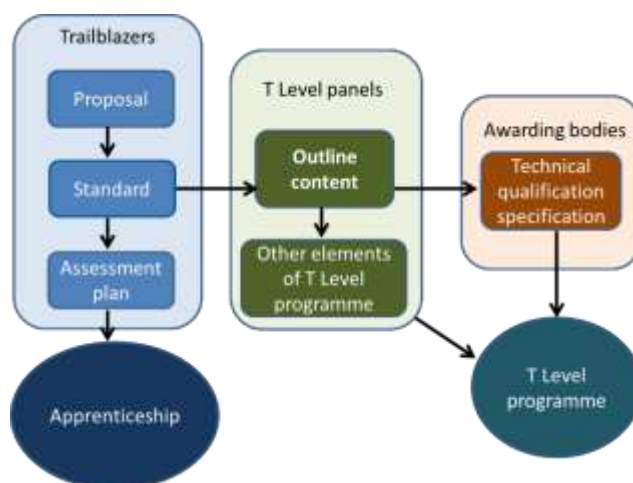
When they complete a T Level study programme, students will be able to choose between moving into a skilled occupation or further study, for example, a higher or degree level apprenticeship, or higher level technical study, including higher education.

Technical education has been categorised into fifteen different technical routes, according to occupational specialism. T Levels will be available across eleven of those routes, with occupations in the remaining four routes accessible through an apprenticeship only. Most routes have been split into a number of pathways; the T Level will broadly sit at pathway level. The occupations within scope for each T Level are set out in the Institute for Apprenticeships and Technical Education's occupational maps.

Outline content

This outline content has been produced by [T Level panels](#) of employers, professional bodies and providers, and is based on the same standards as those used for apprenticeships. The outline content will form the basis of the specifications for T Level Technical Qualifications, which will be developed by awarding organisations for approval by the Institute for Apprenticeships and Technical Education. One awarding organisation will be appointed to develop and deliver each Technical Qualification following a procurement process.

The diagram below demonstrates how the same standard created by employer-led Trailblazer groups is used for both Apprenticeships, and as the basis for this outline content. It also shows that this outline content will be used by awarding organisations to develop the full Technical Qualification specification.

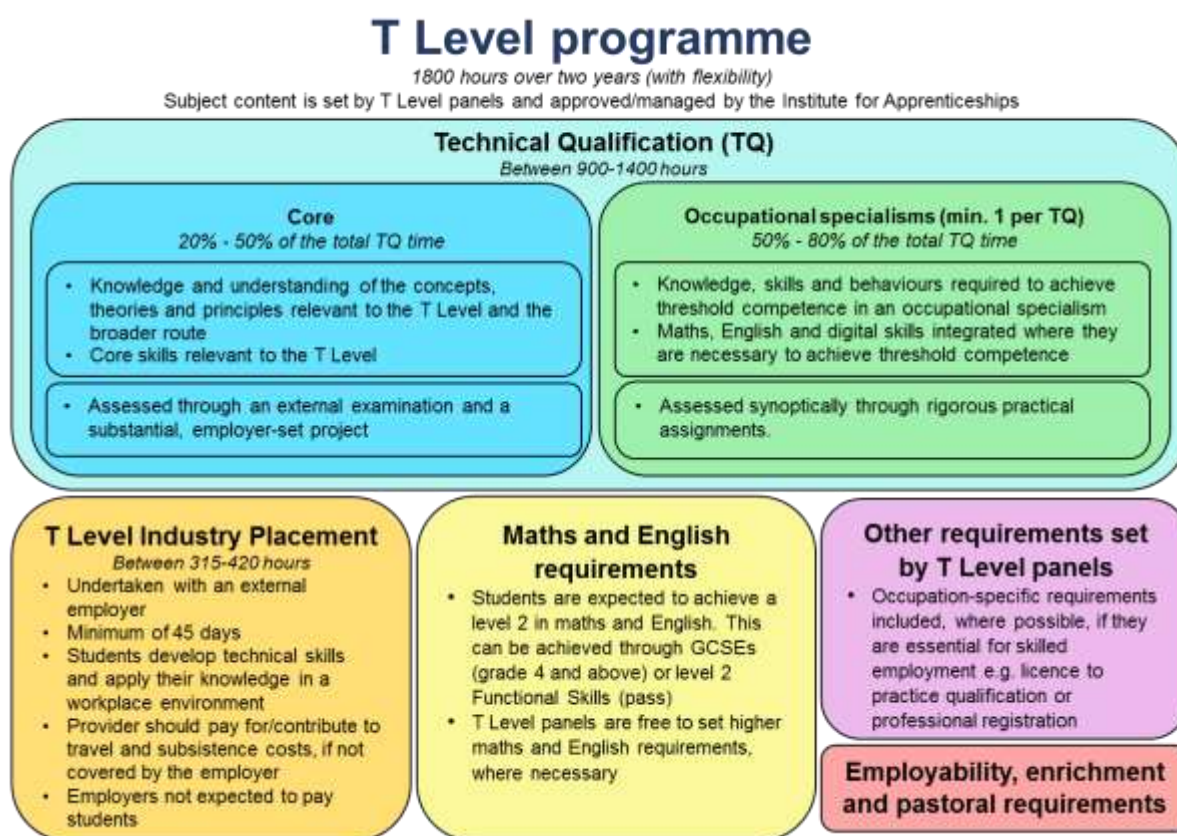


Colleges and other education and training providers will decide how to structure the T Level courses they offer, based on the qualification specifications. This will enable them to deliver the study programme's mandatory components in the most effective way for students.

T Level study programmes will include the following mandatory elements:

- a 'core' set of underpinning knowledge, concepts and skills, tailored for their chosen industry and occupation: 'core content'
- specialist training covering occupational or industry-specific skills: 'occupational specialist content'
- an industry placement with an employer, which will last for a minimum of 45 working days.

The diagram below demonstrates the different elements of a T Level programme. This outline content relates solely to the Technical Qualification part of a T Level programme.



Purpose Statement

Qualification Purpose

The purpose of the level 3 Technical Qualification is to ensure students have the knowledge and skills needed to progress into skilled employment or higher level technical training relevant to the T Level.¹

To achieve this, each level 3 Technical Qualification must:

- provide reliable evidence of students' attainment in relation to:
 - the core knowledge and skills relevant to the route and occupational specialisms covered by the qualification
 - the knowledge and skills required for at least one occupational specialism relevant to the qualification.
- be up-to-date, providing the knowledge and skills needed for the occupations to have continued currency among employers and others.
- ensure that maths, English and digital skills are developed and applied where they are essential to achieve occupationally relevant outcomes.
- ensure that the minimum pass grade standard for occupational specialisms attests to competence, meets employer expectations, and is as close to full occupational competence as possible.
- allow the accurate identification of students' level of attainment and the effective differentiation of their performance.
- provide a clear and coherent basis for development of suitably demanding high-quality level 3 courses, which enable students to realise their potential.
- provide students with the opportunity to manage and improve their own performance.
- support fair access to attainment for all students who take the qualification, including those with special educational needs and disabilities (SEND).

¹ The Institute for Apprenticeships and Technical Education may only approve the qualification "if satisfied that by obtaining the qualification a person demonstrates that he or she has attained as many of the outcomes set out in the standards as may reasonably be expected to be attained by undertaking a course of education" (2017 Technical & Further Education Act).

Technical Qualification Design

T Level programmes will differ in length to reflect the requirements of different occupations, but are expected to last 1800 hours over two years (on average).

To accommodate legitimate differences in content across T Levels, we propose that the total time for the Technical Qualification:

- will fall within a defined range of between 900 and 1400 hours
- is no less than 50% of the time for the T Level programme as a whole and
- is no more than 75% of the total time for the programme as a whole.

Component	Content	Assessment	Grading	Planned Hours
<p>Core</p> <p>Students complete one component which covers all the core content</p>	<p>Knowledge and understanding of contexts, concepts, theories and principles relevant to the T Level</p> <p>Ability to apply core knowledge and skills, through a project, to meet employer-set requirements</p>	<p>Assessed through an externally set test and an employer-set project</p>	<p>Six point scale plus ungraded (U)</p> <p>A* – E and U</p>	<p>Between 20% and 50% of the qualification time</p>
<p>Occupational specialisms</p> <p>Students must complete at least one, or more depending on the minimum requirements specific to the qualification</p>	<p>Knowledge and skills required to achieve a level of competence needed to enter employment</p>	<p>Synoptic assessment of performance outcomes, to determine whether a student meets the minimum competence requirements</p>	<p>Three point scale plus ungraded (U)</p> <p>Distinction, Merit, Pass and Ungraded</p>	<p>Between 50% and 80% of qualification time</p>

Digital: Digital Support Services

This outline content includes reference to specific digital applications, software and platforms, though it is anticipated that these would require frequent updates to reflect technical developments. They have been included in this document in italics for easy identification.

Awarding organisations will need to ensure that students have an up-to-date knowledge of the legal and regulatory obligations relating to employment in the occupations relevant to the T Level and understand the practical implication of these on their work.

Maths, English and digital skills are set out in the final section of this document. Awarding organisations should integrate these within the qualification so that they are applied in occupationally relevant contexts. Other core skills and behaviours important for employability are already integrated within the content and must be clearly specified in the qualification specification.

Core content

The core content relates to the whole route, and the pathway that the Technical Qualification covers. This breadth of content will help to ensure students are able to apply their skills in a variety of contexts and for a variety of different purposes. The content will vary depending on the requirements of the route and the pathway or occupations covered by the scope of the qualification.

The core knowledge and understanding is assessed through an examination and core skills through a practical employer-set project.

The core knowledge and understanding focuses on the students' knowledge and understanding of contexts, concepts, theories and principles relevant to the T Level. This could include, where appropriate, assessment of knowledge and understanding relevant to the route and the pathway.

The employer-set project provides the opportunity to develop and apply a minimum range of core skills important for employability. Awarding organisations can integrate knowledge in the employer-set project, to contextualise core skills.

The allocation of content to each type of assessment will need to be approved by the Institute for Apprenticeships and Technical Education.

Core Knowledge and Understanding

Element	Content
Business Context	<p>The business environment, including the importance of serving customer, end user and business needs, <i>such as, customers, competitors, suppliers, government; and the social, political, legal and technological factors</i></p> <p>The value of Digital to the business:</p> <ul style="list-style-type: none"> • the value of the service to the customer and users • measurable value of the service to growing the business • processes and business models • context and market environment <p>Technical change management including:</p> <ul style="list-style-type: none"> • risk • impact • configuration • document • request for change • roll back planning • reproducibility • traceability <p>Examples of how organisations respond to change, why change is needed, and change management procedures, <i>such as, New Driver Licensing Online System, NHS e-Referral Service (e-RS), Crown court digital case system, AI banking solutions provided by traditional banking services</i> preparing for change, managing change and reinforcing change, relevant to Digital in a range of contexts:</p> <ul style="list-style-type: none"> • legal • regulatory • political • economic • social • technological • environmental <p>Understand the significance of customer needs, including:</p> <ul style="list-style-type: none"> • customer issues • pain points • business value • brand awareness • cultural awareness/ diversity • accessibility • internal/ external audience • level of technical knowledge • profile <p>Understand the risks in business context, including:</p>

	<ul style="list-style-type: none"> • privacy • non-compliance • audience exclusion • resilience • security <p>Examples of codes of conduct, implications of hacking and non-compliance, a <i>working understanding of putting values into practice e.g. Google code of conduct</i></p>
Culture	Ethical and moral issues that an increasing reliance on technology raises e.g. impact on company culture, autonomous operation, changing behaviours, addiction
Data	<p>Concepts and fundamentals of data, including:</p> <ul style="list-style-type: none"> • search, store, integrate and organise (e.g. index) • how organisations of various types use data, <i>such as analysis of data to reveal trends and patterns and make recommendations for the future</i> • key features and functions of information systems e.g. <i>input, storage, processing, output and feedback loop</i> • data formats and their importance for analysis, e.g. <i>an understanding of file based and directory based structures</i> • entry and maintenance e.g. <i>online data entry taking into consideration the types of data, research population, risk of data entry errors, research processes, privacy, regulations and the necessary time investment for both the creation of the entry screen as well as the data entry</i> • visualisation and presentation i.e. <i>graphs, pie charts, data table and infographics</i> • data modelling e.g. <i>hierarchical database model, relational model and network model</i> • How to manage and access data across different platforms, <i>such as physical access, API</i>
Digital Analysis	<p>An understanding of Algorithms, and how they work using a step-by-step solution to a problem, or rules to follow to solve the problem</p> <p>An understanding of Abstraction such as how to filter details, focusing on the important information only</p> <p>An understanding of Action such as sequence, selection and iteration</p> <p>An understanding of Decomposition such as breaking down a complex problem or system into smaller, more manageable parts</p> <p>An understanding of Pattern Recognition such as looking for similarities among and within problems</p>

<p>Digital Environments</p>	<p>Computing systems fundamentals including physical, virtual and cloud</p> <p>An understanding of the landscape of:</p> <ul style="list-style-type: none"> • network connectivity • resilience of the environment • physical systems: including hardware, peripherals, operating software, software • an understanding of devices, servers, Internet of Things • an understanding of networking fundamentals <i>such as the hardware and protocols used to create networks</i> <p>Cloud:</p> <ul style="list-style-type: none"> • an understanding of Terminology <i>such as cloud portability and cloud sourcing</i> • an understanding of concepts <i>such as SaaS (Software as a Service, PaaS (Platform as a Service) and IaaS (Infrastructure as a Service)</i>
<p>Diversity and inclusion</p>	<p>The value of difference and being sensitive to the needs of others, especially when they are different from one's own, which includes understanding the relevant legislation, <i>such as the nine protected characteristics named in the Equality act 2010</i></p>
<p>Learning</p>	<p>Be aware of emerging technology trends and innovation <i>such as Internet of Things (IoT), Artificial Intelligence (AI), Augmented Reality (AR), Blockchain and 3D printing</i></p> <p>Application of learning techniques:</p> <ul style="list-style-type: none"> • Reflection techniques <i>such as Kolb and Gibbs or 'doing, thinking, evaluating, analysing, concluding, action planning'</i> • The breadth of sources of knowledge <i>reliable and unreliable e.g. internet and search engines, academic papers.</i> • Apply creativity e.g. design thinking
<p>Legislation</p>	<p>The importance of keeping up with the most recent legislation, <i>such as International law in cyberspace, International law and surveillance</i> including professional practice, security standards, regulations and their consequences across at least two sectors; the role of criminal and other law; key relevant features of UK and international law <i>such as international law in cyberspace, international law and surveillance</i></p> <p>Legal and regulatory requirements e.g. Data Protection, Security, Intellectual Property Rights (IPR), Data sharing, marketing consent, personal data definition</p>

	The role and importance of Industry Standards and where to find them (e.g. ISO standards, IETF RFCs)
Planning	<p>The principles of planning including:</p> <ul style="list-style-type: none"> • cost • cost benefit analysis • dependencies • people • prioritisation • quality • time
Security	<p>The importance of maintaining privacy and confidentiality of company information, as well as that of customers and colleagues, <i>such as not sharing information about salaries, employee perks, client lists, trade secrets, sales numbers, customer information, news about pending terminations, reasons for a firing, phone codes or computer passwords</i></p> <p>An understanding of processes and protocols used to ensure internet security, including concepts of security assurance</p> <p>An understanding of threats and vulnerabilities including the following areas:</p> <ul style="list-style-type: none"> • technical, <i>such as Botnets, Distributed denial-of-service (DDoS), Hacking, Malware, Pharming, Phishing, Ransomware, Spam</i> • physical, <i>including vulnerabilities such as the characteristics and circumstances of a community, system or asset that make it susceptible to damaging effects</i> • human <i>such as human error, malicious employees and disguised criminals</i> <p>The interrelationship between security, identity, confidentiality, integrity, availability, threat, vulnerability and risk management</p>
Testing	<p>A fundamental understanding of the importance of testing for all components (including software, hardware, data), interfaces and the resulting service</p> <p>Application of root cause analysis to problems</p> <p>Concept testing</p> <p>Usability (audience) testing</p>
Tools	<p>An understanding of Digital tools and their use in business:</p> <ul style="list-style-type: none"> • management and presentation tools, <i>such as presentation tools</i> • evaluation tools and techniques, <i>such as project management tools</i>

	<p>Examples of collaborative technologies:</p> <ul style="list-style-type: none"> • communication tools and technologies for collaborative working e.g. discussion threads, document collaboration, markdown
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Core Knowledge and Understanding across Digital Support Services

Element	Content
<p>Careers within the digital support services sector</p>	<p>Responsibilities, role profiles, skills needed of various professionals involved in:</p> <p>Digital infrastructure, including an overview of:</p> <ul style="list-style-type: none"> • the type of support to internal and external customers and the skills needed to work across software and hardware solutions • maintaining the efficiency and effectiveness of organisations through the use of good practice processes, procedures, structured techniques and methodologies for both the proactive management of digital services to ensure optimal availability as far as possible and the reactive approaches to recovery to restore digital services as quickly as possible from unavoidable failures • using digital tools to support system availability, incident and problem detection, problem solving and collaborative working, such as monitoring and diagnostic tools, logging systems and enterprise social media, for example wikis and messaging • typical job roles and the types of organisations where these exist <p>Network cabling including an overview of:</p> <ul style="list-style-type: none"> • the size and range of tasks and projects that a network cable installer could be involved in • skills needed e.g. physical demands such as lifting and moving heavy equipment • the need for excellent and consistent levels of customer service • typical job roles and the types of organisations where these exist <p>Unified communications including an overview of:</p> <ul style="list-style-type: none"> • the need to establish and maintain communications systems • the range of remote and physical tools and equipment • skills needed including flexible working; alone or as part of a team, office based, field-based, or in remote sites as required

	<ul style="list-style-type: none"> • typical job roles and the types of organisations where these exist <p>Digital support including an overview of:</p> <ul style="list-style-type: none"> • large and small organisations, in all sectors, and within public, private and voluntary organisations • skills needed including supporting service users though online and digital channels • the difference between digital applications and digital service • typical job roles and the types of organisations where these exist <p>Routes into digital support services, such as:</p> <ul style="list-style-type: none"> • apprenticeship route • degree route • the role and range of professional qualifications • professional recognition and the organisations involved
Communication in digital support services	<p>Communication methods, formats and techniques, including:</p> <ul style="list-style-type: none"> • written, verbal, non-verbal • presentation, email, conversation, incident ticket, status updates • audience • active listening <p>Range of roles within an organisation, how they relate to and interact with each other including:</p> <ul style="list-style-type: none"> • customer • manager • client • peer • technical and non-technical
Fault analysis and problem resolution	<p>Problem analysis including logs, live traces</p> <p>Organisational frameworks for troubleshooting, including practical problem management including:</p> <ul style="list-style-type: none"> • problem identification • logging • establishing probable cause • action plan to resolve problem • escalating as necessary • implementing solution • problem closure and review <p>Root cause analysis including the ‘five whys’</p> <p>Principles of incident management <i>e.g. the ITIL ® model</i></p> <ul style="list-style-type: none"> • <i>Detection</i>

	<ul style="list-style-type: none"> ○ <i>Reporting and communication: reporting the type of incident clearly to appropriate people in the organisation.</i> ○ <i>Investigation and analysis: understanding the depth of the problem</i> ○ <i>Prioritisation and classification based upon an analysis</i> ● <i>Response</i> <ul style="list-style-type: none"> ○ <i>Incident ownership: assigning an incident owner or setting up an incident team</i> ○ <i>Resolution</i> ○ <i>Recording: the incident type, interventions and outcome</i> ● <i>Intelligence</i> <ul style="list-style-type: none"> ○ <i>Lessons learned: root cause analysis to understand how the incident occurred</i> ○ <i>Forensic analysis</i> ○ <i>Feedback to organisational processes or design to reduce the risk of repeat incident</i> <p>External reporting requirements e.g. if there is a significant loss of personal data which presents risk to the data subject, the incident may need to be reported to the Information Commissioner's Office</p>
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Employer-set project

The employer-set project ensures students have the opportunity to combine core knowledge and skills to develop a substantial piece of work in response to an employer-set brief.

To ensure consistency in project scope and demand, awarding organisations will develop assessment objectives, which require students to:

- plan their approach to meeting the brief
- apply core knowledge and skills as appropriate
- select relevant techniques and resources to meet the brief
- use maths, English and digital skills as appropriate
- realise a project outcome and review how well the outcome meets the brief.

The awarding organisation will work with a relevant employer or employers, to devise a set brief that:

- ensures a motivating starting point for students' projects, for example, a real-world problem to solve
- ensures students can generate evidence that covers the assessment objectives
- is manageable for providers to deliver
- is officially approved by the awarding organisations and employer.

For Digital Support Services, in achieving the assessment objectives and meeting the brief, students must demonstrate the following core skills:

- Communicate information clearly to a technical and non-technical audience, for example, develop a specification in response to customer requirements and present that specification and the benefits to a non-technical panel
- Work with stakeholders to clarify and consider options to meet requirements for example, scoping and prioritising a project
- Apply a logical approach to solving problems, identifying and resolving faults whilst recording progress and solutions for example, solve problems as they arise by selecting and applying appropriate methods to identify causes, developing solutions and implement tactical fixes and strategic remediation
- Ensure activity avoids risks to security for example, observing processes which protect privacy and confidentiality of data.

Awarding organisations offering technical qualifications will need to produce new employer-set project briefs each year. This will help to avoid predictability and ensure students produce outcomes that keep pace with the needs of industry.

Occupational Specialist Content

Specialist content is structured into different occupational specialisms, which correspond to the apprenticeship standards listed on the occupational map covered by the T Level. Occupational specialisms ensure students develop the knowledge and skills necessary to achieve a level of competence needed to enter employment in the occupational specialism.

Achievement of this minimum level of competence signals that a student is well-placed to develop full occupational competence, with further support and development, once in work (including an apprenticeship). The knowledge and skills listed are required to achieve one or more 'performance outcomes'. These indicate what the student will be able to do as a result of learning and applying the specified knowledge and skills.

In essence, each performance outcome describes, at a high level, what the student 'can do' to have met minimum competence requirements in an occupational specialism.

Core skills and behaviours are specified in occupational specialism(s) only where they are essential to achieving the given performance outcome. Although the behaviours maybe assessed implicitly through application of skills, they must be clearly specified in the qualification specification to support effective application of those skills.

Occupational Specialism: Digital Infrastructure

Performance Outcome 1: Apply procedures and controls to maintain the digital security of an organisation and its data

Knowledge specific to Performance Outcome	Skills specific to Performance Outcome
<p>Business control techniques (physical and administrative) and associated roles including an understanding of:</p> <ul style="list-style-type: none"> • a recovery plan • preventative e.g. <i>Fencing/gate/cage, Separation of duties</i> • detective e.g. <i>CCTV, Logs, audit</i> • corrective e.g. <i>Fire suppression, Standard operating procedure</i> • deterrent e.g. <i>security guards, employment contracts</i> • directive e.g. <i>sign, Agreement types, general security policies</i> • compensating e.g. <i>air conditioning, Role-based awareness training</i> • how a disaster recovery plan works, e.g. <i>backups, business continuity</i> <p>An understanding of impact and risk management for the mitigation of threats and vulnerabilities</p> <p>Impact :</p> <ul style="list-style-type: none"> • types e.g. <i>Life, Property, Safety, finance, reputation</i> • privacy e.g. <i>breaches to business data which could compromise company confidential information</i> • measures e.g. <i>RTO/RPO, MTBF, MTTR</i> • identification of critical systems e.g. <i>single point of failure, mission essential functions</i> <p>Risk management :</p>	<p>Apply and maintain procedures and security controls in the installation, configuration and support of physical and virtual infrastructure to ensure confidentiality, integrity and availability, such as:</p> <ul style="list-style-type: none"> • set up a small Workgroups environment and apply groups and roles within directory services • set up and apply a certificate authority • implement security controls in a small business environment according to NCSC cyber essentials • manage physical documents in line with the GDPR • set up a simple network and apply access controls <p>Protect personal, physical and environmental security in accordance with procedures, controls and policies</p> <p>Install software for network and end user devices and network such as servers, firewalls and desktop computers to identify and mitigate vulnerabilities, including:</p> <ul style="list-style-type: none"> • vulnerability scanning • anti-malware • device hardening <p>Explain organisational and departmental procedures in respect of adherence to security</p> <p>Undertake a security risk assessment for a simple system such as a desktop or laptop computer connected to a local area network</p>

Knowledge specific to Performance Outcome

- threat assessment e.g. *Environmental, Manmade, Internal vs. external*
- risk assessment e.g. *Asset value, Likelihood of occurrence, Supply chain assessment*
- an understanding of Qualitative and Quantitative approaches using tools *such as Fault Tree Analysis, Failure Mode Effect Critical Analysis, Annualised Loss Expectancy and /or CCTA Risk Analysis and Management Methodology*
- testing e.g. *Penetration testing authorisation, Vulnerability testing authorisation*
- risk response e.g. *Accept, transfer, avoid, mitigate.*

Design and execution of risk mitigation techniques that are appropriate to the perceived business risk, including:

- technical security controls *using e.g. the 5 Cyber Essentials controls*
- encryption *using industry standard tools e.g. Windows 10, Apple macOS, for Full Disk Encryption or File encryption and TLS and SSL for data in transit. Knowing when each would be applicable*
- backups
- *policies including the relationships of organisation policies and procedures in risk mitigation*

Industry, international standards and regulatory compliance e.g. *Cyber Essentials, 10 steps to cyber security, ISO27001 and GDPR/DPA 2018*

Principles of network security *including the general principles of CIA, role-based access and the IAAA model (Identification,*

Skills specific to Performance Outcome

Demonstrate continuous improvement, such as mitigating vulnerabilities, incident response detected in networked equipment, updating devices with the latest releases of security software, and undertaking penetration testing

Knowledge specific to Performance Outcome	Skills specific to Performance Outcome
<p><i>Authentication, Authorisation and Auditing) and MAC, DAC, ABAC (Attribute Based Access Control) and RBAC</i></p> <p>Principles of cyber security including why cyber security matters and the importance to business and society including <i>understanding the need for the protection of personal data, the legal framework of the Data Protection Act 2018 and the rights of the individual. The relevance of the CIA model to assess the impact on security of systems</i></p> <p>Cyber security concepts applied to ICT infrastructure, including the fundamentals of architectures and common vulnerabilities in networks and systems</p>	

Performance Outcome 2: Explain, install, configure, test and manage both physical and virtual infrastructure

Knowledge specific to Performance Outcome	Skills specific to Performance Outcome
<p>An understanding of the principles of network and infrastructure design including resilience</p> <p>Principles associated with the transmission of digital information over copper, fibre cable and wireless networks and systems</p> <p>Infrastructure elements e.g:</p> <ul style="list-style-type: none"> • <i>network devices</i> <ul style="list-style-type: none"> ○ <i>e.g. Firewall, router, Switch, Hub, Bridge, Modems, Wireless access point, media converter, wireless range extender</i> • <i>end user devices</i> • <i>storage</i> • <i>wired and wireless technologies</i> 	<p>Explain, the fundamentals of networking, including:</p> <ul style="list-style-type: none"> • why, how, what, protocols, ports <p>Assess workplace risk and recognise the effect of his/her actions on themselves and others including the demonstration of application of Electro Static Discharge to meet appropriate health and safety standards when working with hardware</p> <p>Install, configure and test a physical and virtual network, including:</p> <ul style="list-style-type: none"> • server <ul style="list-style-type: none"> ○ types ○ operating systems ○ applications

Knowledge specific to Performance Outcome	Skills specific to Performance Outcome
<ul style="list-style-type: none"> • <i>antennas</i> • <i>test equipment</i> <p>Requirements when working with electro static sensitive equipment</p> <p>Health and safety as applied to the workplace including safe electrical waste disposal <i>e.g. the Waste Electrical and Electronic Equipment Directive</i></p> <p>Server types including physical, virtual and containers</p> <p>Operating systems their similarities, differences and benefits including: end user, mobile and servers</p> <p>Service functions e.g:</p> <ul style="list-style-type: none"> • DNS • DHCP directory services • applications such as databases and security utilities e.g. antivirus <p>Remote access, <i>such as use of Virtual Private Networks (VPN), how they protect data and setting up a simple VPN</i></p> <p>Principles of service management <i>including an overview of e.g. the ITIL framework</i></p> <p>Principles of business continuity and disaster recovery <i>including the difference between business continuity and disaster recovery in the context of infrastructure</i></p> <p>An understanding of solutions including:</p>	<ul style="list-style-type: none"> • firewall • load balancer • network devices • end user devices • network based services • scripting <p>Maintain the effective functioning of a physical or virtual network, including:</p> <ul style="list-style-type: none"> • server <ul style="list-style-type: none"> ○ types ○ operating systems ○ applications such as databases and security utilities e.g. antivirus • firewall • load balancer • network devices • network based services <ul style="list-style-type: none"> ○ DNS ○ DHCP • logging, monitoring and capacity management • performance optimisation • scripting <p>Make a cable e.g. straight through and cross over cable to required National and International standards</p> <p>Demonstrate continuous improvement <i>in maintaining the effective functioning of a range of contemporary or legacy hardware solutions and network in response to changes</i></p>

Knowledge specific to Performance Outcome	Skills specific to Performance Outcome
<ul style="list-style-type: none"> • the stages within the overall solution lifecycle • the aims and benefits of DevOps approaches including automation and the ideas behind continuous integration and monitoring • the principles of solution architecture including the importance of re-use and solution architecture as applied to hardware • concepts of virtualisation i.e. the creation of many virtual resources from one physical resource and the creation of one virtual resource from one or more physical resource in a variety of areas such as networking, storage, and hardware 	<p>Demonstrate the ability to work at any stage of the hardware solution lifecycle</p>

Performance Outcome 3: Discover, evaluate and apply reliable sources of knowledge

Knowledge specific to Performance Outcome	Skills specific to Performance Outcome
<p>Sources of knowledge:</p> <ul style="list-style-type: none"> • reliable and unreliable <p>e.g. internet and search engines, academic papers and peers</p> <p>Evaluation techniques e.g. <i>objective ways of evaluation such as gap analysis, maturity assessments</i></p> <p>Communication methods including <i>sharing knowledge via digital service and project management tools, appropriate enterprise social media, knowledge bases, wikis, blogs and community forums</i></p>	<p>Identify (up to three) sources, <i>such as Google, stack overflow, Wikipedia</i>, and assess their reliability</p> <p>Demonstrate the validity and appropriateness of the information and its legitimate use</p> <p>Corroborate across multiple sources e.g. <i>cross referencing</i></p> <p>Search for information relevant to a topic or scenarios e.g. explore the future of the digital economy, identify trends in Big Data and key digital action initiatives using various future scenarios, to establish the scope of digital opportunities, a variety of digital channels</p>

Knowledge specific to Performance Outcome

Skills specific to Performance Outcome

Select and use techniques and tools to aid evaluation e.g. formative, summative, observation, user diaries, conclusions, and recommendations

Compare options, appraise and recommend actions to ensure reliability of source

Identify and understand bias *e.g. materials written by a particular developer such as Microsoft in the context of software development and operating systems*

Demonstrate critical thinking e.g. triangulation /evaluation of sources to make the best use of digital technologies

Occupational Specialism: Network cabling

Performance Outcome 1: Apply procedures and controls to maintain the digital security of an organisation and its data

Knowledge specific to Performance Outcome	Skills specific to Performance Outcome
<p>Business control techniques (physical and administrative)</p> <p>Including an understanding of:</p> <ul style="list-style-type: none"> • preventative e.g. <i>Fencing/gate/cage, Separation of duties</i> • detective e.g. <i>CCTV, Logs, audit</i> • corrective e.g. <i>Fire suppression, Standard operating procedure</i> • deterrent e.g. <i>security guards, employment contracts</i> • directive e.g. <i>sign, Agreement types, general security policies</i> • compensating e.g. <i>air conditioning, Role-based awareness training</i> • recovery e.g. <i>backups, business continuity</i> <p>An understanding of impact and risk management for the mitigation of threats and vulnerabilities</p> <p>Impact:</p> <ul style="list-style-type: none"> • types e.g. <i>Life, Property, Safety, finance, reputation</i> • privacy e.g. <i>breaches to business data which could compromise company confidential information</i> • measures e.g. <i>RTO/RPO, MTBF, MTTR</i> • identification of critical systems e.g. <i>single point of failure, mission essential functions</i> <p>Risk management:</p> <ul style="list-style-type: none"> • threat assessment e.g. <i>Environmental, Manmade, Internal vs. external</i> 	<p>Apply and maintain procedures and security controls in the installation and maintenance of network cabling to ensure confidentiality, integrity and availability, such as:</p> <ul style="list-style-type: none"> • implement security controls in a small business environment according to NCSC cyber essentials • manage physical documents in line with the GDPR • set up a simple network and apply access controls <p>Protect personal, physical and environmental security in accordance with procedures, controls and policies</p> <p>Explain organisational and departmental procedures in respect of adherence to security</p> <p>Undertake a security risk assessment for a simple system such as local area network cabling</p> <p>Demonstrate continuous improvement such as mitigating vulnerabilities, incident response in network cabling and the placement of devices such as firewalls</p>

Knowledge specific to Performance Outcome	Skills specific to Performance Outcome
<ul style="list-style-type: none"> • risk assessment <i>e.g. Asset value, Likelihood of occurrence, Supply chain assessment</i> • an understanding of Qualitative and Quantitative approaches using tools <i>such as Fault Tree Analysis, Failure Mode Effect Critical Analysis, Annualised Loss Expectancy and /or CCTA Risk Analysis and Management Methodology</i> • testing <i>e.g. Penetration testing authorisation, Vulnerability testing authorisation</i> • risk response <i>e.g. Accept, transfer, avoid, mitigate</i> <p>Design and execution of risk mitigation techniques that are appropriate to the perceived business risk including:</p> <ul style="list-style-type: none"> • technical security controls <i>using e.g. the 5 Cyber Essentials controls</i> • encryption <i>using industry standard tools e.g. Windows 10, Apple macOS, for Full Disk Encryption or File encryption and TLS and SSL for data in transit. Knowing when each would be applicable</i> • Backups • <i>Policies including the relationships of organisation policies and procedures in risk mitigation</i> <p>Industry, international standards and regulatory compliance <i>e.g. Cyber Essentials, 10 steps to cyber security, ISO27001 and GDPR/DPA 2018</i></p> <p>Principles of network security <i>including the general principles of CIA, role-based access and the IAAA model (Identification, Authentication, Authorisation and Auditing) and MAC, DAC, ABAC (Attribute Based Access Control) and RBAC</i></p>	

Knowledge specific to Performance Outcome	Skills specific to Performance Outcome
<p>Principles of cyber security including why cyber security matters and the importance to business and society including <i>understanding the need for the protection of personal data, the legal framework of the Data Protection Act 2018 and the rights of the individual. The relevance of the CIA model to assess the impact on security of systems</i></p> <p>Cyber security concepts applied to ICT infrastructure including the fundamentals of architectures and common vulnerabilities in networks and systems</p>	

Performance Outcome 2: Install and test cabling in line with technical and security requirements

Knowledge specific to Performance Outcome	Skills specific to Performance Outcome
<p>An understanding of network cabling principles including design specifications, the structure of network, architecture and documentation :</p> <ul style="list-style-type: none"> • principles of light propagation • fundamental knowledge of attenuation within the fibre channel • recognition of where losses can occur through poor handling and installation techniques <p>An understanding of :</p> <ul style="list-style-type: none"> • the main categories of Media types, such as: <ul style="list-style-type: none"> ○ Copper e.g. UTP, STP, Coaxial ○ Fiber e.g. <i>Single-mode, Multimode</i> • the advantages of plenum fire resistant rated cable versus less expensive non plenum cable (PVC) 	<p>Design, analyse and interpret plans, identify issues with equipment types, quantity, and location</p> <p>Determine the appropriate placement of networking devices on a network and install/configure them e.g. <i>Firewall, Router Switch, Hub, Bridge, Modems, Wireless access point, Media converter, Wireless range extender, VoIP endpoints, CCTV</i></p> <p>Terminate a single and multimode fibre cable to required standards</p> <p>Use appropriate networking tools e.g. <i>Crimper, Cable stripper, Multimeter, Tone generator and probe, Cable tester, Loopback plug, Punchdown tool, OTDR, light meter, Spectrum analyser</i></p>

Knowledge specific to Performance Outcome

- features of Connector types including the ease of connection, mating type, durability and insulation between pins such as:
 - Copper e.g. RJ-45, RJ-11, BNC, DB-9, DB-25, F-type
 - Fiber e.g. LC, ST, SC (APC, UPC), MTRJ
- Transceivers that are combined and share common circuitry or a single housing such as:
 - SFP, GBIC, SFP+, QSFP
 - Characteristics of fiber transceivers e.g. Bidirectional, Duplex
- Termination points, the last point of service rendered by a carrier and such as:
 - 66 block as used to connect sets of wires in a telephone system
 - 110 block as used to terminate runs of on-premises wiring in a structured cabling system
 - Patch panel as used to accommodate Ethernet cables in an enterprise network and Fiber distribution panel

An understanding of cabling design and installation, wiring and deployment standards :

- Copper cable standards e.g. Cat 3, Cat 5, Cat 5e, Cat 6, Cat 6a, Cat 7, RG-6, RG-59
- Copper termination standards e.g. TIA/EIA 568a, TIA/EIA 568b, Crossover, Straight-through
- Ethernet deployment standards e.g. 100BaseT, 1000BaseT, 1000BaseLX, 1000BaseSX, 10GBaseT

Skills specific to Performance Outcome

- Prepare, construct and install telecommunications equipment cabinets, either pre-built or from flat-pack. Arrange and install fixtures and fittings appropriate for the intended use
- Carry out testing of copper cabling and fibre optic cabling using an optical loss test set (Tier 1), an optical time domain reflectometer (Tier 2) and fibre inspection tool in accordance with equipment manufacturer's procedures, and compliant to industry standards
- Analyse and interpret copper and fiber test results
- Work at height in a safe manner; use Mobile Equipment Work Platforms (MEWPs); assemble, dismantle, use and inspect prefabricated low-level access towers
- Reduce the danger of working in confined spaces by implementing appropriate health and safety procedures e.g. *the Health and Safety at Work Act 1974*, using and maintaining personal protective equipment
- Explain the actions to be taken if Asbestos Containing Materials (ACM) are identified whilst installation work is being carried out

Knowledge specific to Performance Outcome

Skills specific to Performance Outcome

An understanding of maintenance processes in order to keep a network up and running including:

- troubleshooting network problems
- hardware and software installation/configuration
- monitoring and improving network performance

Troubleshooting common wired connectivity and performance issues, such as Attenuation, Latency, Jitter, Crosstalk, EMI, Open/short, Incorrect pin-out, Incorrect cable type, Bad port, Transceiver mismatch, TX/RX reverse, Duplex/speed mismatch, Damaged cables, Bent pins, Bottlenecks, VLAN mismatch, Network connection LED status indicators

The principles associated with the transmission of digital information over copper and fibre cable, including the requirement for the segregation of data cables from electrical cables in accordance with BSEN 50174

How to identify media supporting other data services e.g. telephone, security, alarms and AV systems and the precautions to be taken to prevent interference or damage to systems

The status and scope of, and the requirements to comply with, current National and International standards, and manufacturers' best-practice guidelines including:

- *the Electricity at Work Regulations* which require precautions to be taken against the risk of death or personal injury from electricity in work activities
- *the Health and Safety at Work Act 1974*
- *the Work at Height Regulations* which are aimed to prevent death and injury caused by a fall from height and individual responsibilities within this context

Knowledge specific to Performance Outcome	Skills specific to Performance Outcome
<p>The actions to be taken if Asbestos Containing Materials (ACM) are identified whilst installation work is being carried out</p> <p>The criteria against which the cabling will be inspected and consequences of failing to meet the required quality standards, including a fundamental knowledge of Ohm's law and the impact of poor-quality workmanship</p>	

Performance Outcome 3: Discover, evaluate and apply reliable sources of knowledge

Knowledge specific to Performance Outcome	Skills specific to Performance Outcome
<p>Sources of knowledge:</p> <ul style="list-style-type: none"> reliable and unreliable e.g. internet and search engines, academic papers and peers. <p>Evaluation techniques e.g. <i>objective ways of evaluation such as gap analysis, maturity assessments</i></p> <p>Communication methods including <i>sharing knowledge via digital service and project management tools, appropriate enterprise social media, knowledge bases, wikis, blogs and community forums</i></p>	<p>Identify (up to three) sources, <i>such as Google, stack overflow, Wikipedia</i>, and assess their reliability</p> <p>Demonstrate the validity and appropriateness of the information and its legitimate use</p> <p>Corroborate across multiple sources <i>e.g. cross referencing</i></p> <p>Search for information relevant to a topic or scenarios e.g. explore the future of the digital economy, identify trends in Big Data and key digital action initiatives using various future scenarios, to establish the scope of digital opportunities, a variety of digital channels</p> <p>Select and use techniques and tools to aid evaluation e.g. formative, summative, observation, user diaries, conclusions, and recommendations</p>

Knowledge specific to Performance Outcome

Skills specific to Performance Outcome

Compare options, appraise and recommend actions to ensure reliability of source

Identify and understand bias *e.g. specifications written by third-party manufacturers*

Demonstrate critical thinking e.g. triangulation /evaluation of sources to make the best use of digital technologies

Occupational Specialism: Unified Communications

Performance Outcome 1: Apply procedures and controls to maintain the digital security of an organisation and its data

Knowledge specific to Performance Outcome	Skills specific to Performance Outcome
<p>Business control techniques (physical and administrative)</p> <p>Including an understanding of:</p> <ul style="list-style-type: none"> • preventative e.g. <i>Fencing/gate/cage, Separation of duties</i> • detective e.g. <i>CCTV, Logs, audit</i> • corrective e.g. <i>Fire suppression, Standard operating procedure</i> • deterrent e.g. <i>security guards, employment contracts</i> • directive e.g. <i>sign, Agreement types, general security policies</i> • compensating e.g. <i>air conditioning, Role-based awareness training</i> • recovery, e.g. <i>backups, business continuity</i> <p>An understanding of impact and risk management for the mitigation of threats and vulnerabilities</p> <p>Impact:</p> <ul style="list-style-type: none"> • types e.g. <i>Life, Property, Safety, finance, reputation</i> • privacy e.g. <i>breaches to business data which could compromise company confidential information</i> • measures e.g. <i>RTO/RPO, MTBF, MTTR</i> • identification of critical systems e.g. <i>single point of failure, mission essential functions</i> <p>Risk management :</p> <ul style="list-style-type: none"> • threat assessment e.g. <i>Environmental, Manmade, Internal vs. external</i> 	<p>Apply and maintain procedures and security controls in the installation, configuration and support of physical and virtual communication systems to ensure confidentiality, integrity and availability, such as:</p> <ul style="list-style-type: none"> • <i>Set up a small Workgroups environment and apply groups and roles within directory services</i> • <i>Set up and apply a certificate authority</i> • <i>Implement security controls in a small business environment according to NCSC cyber essentials</i> • <i>Manage physical documents in line with the GDPR</i> • <i>Set up a simple network and apply access controls</i> <p>Protect personal, physical and environmental security in accordance with procedures, controls and policies</p> <p>Apply security controls to communication systems and end user devices to identify and mitigate vulnerabilities, including:</p> <ul style="list-style-type: none"> • <i>user security policy implementation</i> • <i>encryption</i> • <i>call type restriction</i> <p>Explain organisational and departmental procedures in respect of adherence to security</p> <p>Undertake a security risk assessment for a VoIP system</p>

Knowledge specific to Performance Outcome

- risk assessment *e.g. Asset value, Likelihood of occurrence, Supply chain assessment*
- an understanding of Qualitative and Quantitative approaches using tools *such as Fault Tree Analysis, Failure Mode Effect Critical Analysis, Annualised Loss Expectancy and /or CCTA Risk Analysis and Management Methodology*
- testing *e.g. Penetration testing authorisation, Vulnerability testing authorisation*
- risk response *e.g. Accept, transfer, avoid, mitigate*

Design and execution of risk mitigation techniques that are appropriate to the perceived business risk including:

- technical security controls *using e.g. the 5 Cyber Essentials controls*
- encryption *using industry standard tools e.g. Windows 10, Apple macOS, for Full Disk Encryption or File encryption and TLS and SSL for data in transit. Knowing when each would be applicable*
- Backups
- *Policies including the relationships of organisation policies and procedures in risk mitigation*

Industry, international standards and regulatory compliance *e.g. Cyber Essentials, 10 steps to cyber security, ISO27001 and GDPR/DPA 2018*

Principles of network security *including the general principles of CIA, role-based access and the IAAA model (Identification, Authentication, Authorisation and Auditing) and MAC, DAC, ABAC (Attribute Based Access Control) and RBAC*

Skills specific to Performance Outcome

Demonstrate continuous improvement such as mitigating vulnerabilities by applying regular OS updates, monitoring user adherence to security policy, and undertaking penetration testing

Knowledge specific to Performance Outcome	Skills specific to Performance Outcome
<p>Principles of cyber security including why cyber security matters and the importance to business and society including <i>understanding the need for the protection of personal data, the legal framework of the Data Protection Act 2018 and the rights of the individual. The relevance of the CIA model to assess the impact on security of systems</i></p> <p>Cyber security concepts applied to ICT infrastructure including the fundamentals of architectures and common vulnerabilities in networks and systems</p>	

Performance Outcome 2: Implement, configure and manage communications applications

Knowledge specific to Performance Outcome	Skills specific to Performance Outcome
<p>An understanding of the purpose of digital communication technologies</p> <p>Principles of design including technical specifications and the need to maintain accurate records</p> <p>An understanding of how to undertake hardware or software upgrades</p> <p>Communication protocols and systems e.g:</p> <ul style="list-style-type: none"> • Streaming/ rtsp / rtp • SIP • QoS • Codecs <p>Applications including VVoIP, conferencing, collaboration, PBX</p>	<p>Identify the basic elements of unified communication technologies</p> <p>Interpret design and set up and manage a virtual and physical communication system e.g. <i>a dial plan, voice and video soft phones</i></p> <p>Install and work with a variety of digital communications mediums</p> <p>Assessing risk e.g. risk to existing legacy/ other live services</p> <p>Undertake upgrades in hardware or software</p> <p>Select the appropriate diagnostic tools to monitor, test and react to network performance</p>

Knowledge specific to Performance Outcome	Skills specific to Performance Outcome
<p>An understanding of physical infrastructure:</p> <ul style="list-style-type: none"> • the distinction between speed and bandwidth including standard telephone service and high-speed digital communication lines • gateways • telephony technology that can read a combination of touch tone and voice input (IVR systems) • a wide range of telecommunications hardware and software including automated phone systems capable of answering incoming phone calls and performing outbound autodialling (call centre technology) <p>An understanding of voice and video artefacts which can be used to solve problems such as:</p> <ul style="list-style-type: none"> • <i>delays in transmission (Latency)</i> • <i>time variation between when packets leave one system and reach another (Jitter)</i> • <i>the failure of one or more transmitted packets to arrive at their destination (Packet Loss)</i> 	<p>Analyse and fix, by selecting the most appropriate solution, using relevant logistical support, problems <i>e.g. in voice and video</i> and know when to escalate to a higher level where necessary</p> <p>Cable or connect equipment in line with technical requirements</p> <p>Document tasks in line with agreed procedures</p>

Performance Outcome 3: Discover, evaluate and apply reliable sources of knowledge

Knowledge specific to Performance Outcome	Skills specific to Performance Outcome
<p>Sources of knowledge:</p> <ul style="list-style-type: none"> • reliable and unreliable e.g. internet and search engines, academic papers and peers <p>Evaluation techniques e.g. <i>objective ways of evaluation such as gap analysis, maturity assessments</i></p>	<p>Identify (up to three) sources, <i>such as Google, stack overflow, Wikipedia</i>, and assess their reliability</p> <p>Demonstrate the validity and appropriateness of the information and its legitimate use</p>

Knowledge specific to Performance Outcome

Skills specific to Performance Outcome

Communication methods including *sharing knowledge via digital service and project management tools, appropriate enterprise social media, knowledge bases, wikis, blogs and community forums*

- Corroborate across multiple sources *e.g. cross referencing*
- Search for information relevant to a topic or scenarios e.g. explore the future of the digital economy, identify trends in Big Data and key digital action initiatives using various future scenarios, to establish the scope of digital opportunities, a variety of digital channels
- Select and use techniques and tools to aid evaluation e.g. formative, summative, observation, user diaries, conclusions, and recommendations
- Compare options, appraise and recommend actions to ensure reliability of source
- Identify and understand bias *e.g. solutions marketed by hosted-service providers*
- Demonstrate critical thinking e.g. triangulation /evaluation of sources to make the best use of digital technologies

Occupational Specialism: Digital Support

Performance Outcome 1: Apply procedures and controls to maintain the digital security of an organisation and its data

Knowledge specific to Performance Outcome	Skills specific to Performance Outcome
<p>Business control techniques (physical and administrative)</p> <p>Including an understanding of:</p> <ul style="list-style-type: none"> • preventative e.g. <i>Fencing/gate/cage, Separation of duties</i> • detective e.g. <i>CCTV, Logs, audit</i> • corrective e.g. <i>Fire suppression, Standard operating procedure</i> • deterrent e.g. <i>security guards, employment contracts</i> • directive e.g. <i>signage, Agreement types, general security policies</i> • compensating e.g. <i>air conditioning, Role-based awareness training</i> • recovery e.g. <i>backups, business continuity</i> <p>An understanding of impact and risk management for the mitigation of threats and vulnerabilities</p> <p>Impact:</p> <ul style="list-style-type: none"> • types e.g. <i>Life, Property, Safety, finance, reputation</i> • privacy e.g. <i>breaches to business data which could compromise company confidential information</i> • measures e.g. <i>RTO/RPO, MTBF, MTTR</i> • identification of critical systems e.g. <i>single point of failure, mission essential functions</i> <p>Risk management :</p> <ul style="list-style-type: none"> • threat assessment e.g. <i>Environmental, Manmade, Internal vs. external</i> 	<p>Apply and maintain procedures and security controls in the installation, configuration and support of end-user services to ensure confidentiality, integrity and availability, such as:</p> <ul style="list-style-type: none"> • <i>Set up a small Workgroups environment and apply groups and roles within directory services</i> • <i>Set up and apply a certificate authority</i> • <i>Implement security controls in a small business environment according to NCSC cyber essentials</i> • <i>Manage physical documents in line with the GDPR</i> • <i>Set up a simple network and apply access controls</i> <p>Protect personal, physical and environmental security in accordance with procedures, controls and policies</p> <ul style="list-style-type: none"> • <i>Install software for end user devices to identify and mitigate vulnerabilities, including:</i> • <i>vulnerability scanning</i> • <i>anti-malware</i> • <i>device hardening</i> <p>Explain organisational and departmental operational procedures in respect of adherence to security</p> <p>Undertake a security risk assessment for a simple system such as a user's own device for corporate use (BYOD: Bring your own Device)</p> <p>Demonstrate continuous improvement such as mitigating vulnerabilities detected in end user equipment and services, and evaluating trends in incidents to identify underlying problems</p>

Knowledge specific to Performance Outcome

- risk assessment *e.g. Asset value, Likelihood of occurrence, Supply chain assessment*
- an understanding of Qualitative and Quantitative approaches using tools *such as Fault Tree Analysis, Failure Mode Effect Critical Analysis, Annualised Loss Expectancy and /or CCTA Risk Analysis and Management Methodology*
- testing *e.g. Penetration testing authorisation, Vulnerability testing authorisation*
- risk response *e.g. accept, transfer, avoid, mitigate*

Design and execution of risk mitigation techniques that are appropriate to the perceived business risk including:

- technical security controls *using e.g. the 5 Cyber Essentials controls*
- encryption *using industry standard tools e.g. Windows 10, Apple macOS, for Full Disk Encryption or File encryption and TLS and SSL for data in transit. Knowing when each would be applicable*
- backups
- *policies including the relationships of organisation policies and procedures in risk mitigation*

Industry, international standards and regulatory compliance *e.g. Cyber Essentials, 10 steps to cyber security, ISO27001 and GDPR/DPA 2018*

Principles of network security *including the general principles of CIA, role-based access and the IAAA model (Identification, Authentication, Authorisation and Auditing) and MAC, DAC, ABAC (Attribute Based Access Control) and RBAC*

Skills specific to Performance Outcome

Operate data systems effectively, appropriately and securely to meet business requirements

Knowledge specific to Performance Outcome	Skills specific to Performance Outcome
<p>Principles of cyber security including why cyber security matters and the importance to business and society including <i>understanding the need for the protection of personal data, the legal framework of the Data Protection Act 2018 and the rights of the individual. The relevance of the CIA model to assess the impact on security of systems</i></p> <p>Cyber security concepts applied to ICT infrastructure including the fundamentals of architectures and common vulnerabilities in networks and systems</p>	

Performance Outcome 2: Install, configure and support software applications and operating systems

Knowledge specific to Performance Outcome	Skills specific to Performance Outcome
<p>An understanding of agile methodologies and work practices, continuous innovation and continuous development</p> <p>An understanding of how organisations incorporate digital technologies into key business functions such as, finance, sales and marketing, operations and HR and the implications for digital support roles</p> <p>An understanding of the processes and principles of content management systems to identify and resolve users' digital problems including:</p> <ul style="list-style-type: none"> • Types of end user systems, including: <ul style="list-style-type: none"> ○ desktop (<i>including thick/thin clients</i>) ○ cloud work spaces ○ mobile devices <i>e.g. tablets, smartphones, wearable technology devices, e-readers</i> 	<p>Install and configure sophisticated digital technologies including software onto end user devices, including: operating systems and applications <i>e.g. Workgroup vs. Domain setup, Time/date/region/language settings, Driver installation, software and Windows updates, Properly formatted boot drive with the correct partitions/format</i></p> <p>Monitor and operate complex information systems such as one made up of five components: hardware, software, database, network and people which integrate to perform input, process, output, feedback and control</p> <p>Solve problems as they arise by selecting and applying appropriate methods</p>

Knowledge specific to Performance Outcome

- laptop
- peripherals e.g. *printers/ scanner, monitors, VR Headset, mouse, keyboard, pen/stylus, touchpad, webcam, microphone, speakers, projector, KVM, storage drives, magnetic reader/chip reader, NFC/tap pay device, smart card reader*
- IoT e.g. *smart buildings and smart devices*
- Operating systems, including:
 - end user (Windows, MacOS, Linux)
 - mobile (iOS, Android)
 - servers (Windows, Linux)

Application types and deployment methods including:

- Application Types :
 - productivity software e.g. *Word processing software, Spreadsheet software, Presentation software, Web browser, Visual diagramming software*
 - collaboration software e.g. *Email client, Conferencing software, VoIP, Instant messaging software, Online workspace, Document sharing*
 - business software e.g. *Database software, Project management software, Business-specific applications (bespoke), Accounting software, CRM*
 - development software e.g. *CADs and IDE*
- Application installation and configuration concepts :
 - system requirements e.g. *Drive space, RAM, Compatibility*
 - permissions e.g. *Folder/file access for installation, user authorisation*

Skills specific to Performance Outcome

- Demonstrate deployment of software applications and operating systems remotely
- Configure accessories and ports of mobile devices for network connectivity e.g. *Wireless/cellular data network Hotspot, Tethering, Airplane mode, Bluetooth*
- Explain best use of digital systems, productivity tools, and digital technologies to access information, services or products and conduct transactions
- Operate a range of digital information systems and tools to maintain information and to support service delivery

Knowledge specific to Performance Outcome

Skills specific to Performance Outcome

- security considerations e.g. Impact to device, Impact to network
- advantages and disadvantages of different types of hardware configurations

- OS Deployment considerations :
 - methods of installation and deployment *e.g. Local (CD/USB), Network-based, Virtualised, cloud-based*
 - boot methods *e.g. USB, DVD, PXE, Solid state/flash drives, Netboot, External/hot-swappable drive, Internal hard drive*
 - partitioning: Dynamic, Basic, Primary, Extended, Logical, GPT
 - file system types/formatting: ExFAT, FAT32, NTFS, ReFS, CDFS, NFS, ext3, ext4, HFS, Swap partition, Quick format vs. full format

- Deployment Methods including unattended installation, In-place upgrade, Clean install, Repair installation, Multiboot, remote network installation

An understanding of

- image deployment
- how to recover and restore systems

Corporate and ISP email configuration *e.g. POP3, IMAP, Port and SSL settings, S/MIME*

Integrated commercial provider email configuration *e.g. iCloud, Google/Gmail, Exchange Online, Yahoo*

Knowledge specific to Performance Outcome	Skills specific to Performance Outcome
<p>Remote access, <i>such as use of Virtual Private Networks (VPN), how they protect data and setting up a simple VPN</i></p> <p>Support processes e.g. password management, access control, connection to remote resources</p> <p>Version management, including patching:</p> <ul style="list-style-type: none"> • system updates (OS updates) • driver/firmware updates • antivirus/Anti-malware update • apply updates • roll back updates • roll back devices drivers • OS updates failures • deploying updates using network tools e.g. group policy <p>Mobile device management including segregation of private and business use <i>e.g. Screen locks, Remote Wipe, Locator applications, Remote backup applications, Failed login attempts restrictions, Full device encryption, Multifactor authentication Authenticator applications</i></p> <p>An understanding of how to train others to make best use of digital systems and technologies, including technology based tools</p>	

Performance Outcome 3: Discover, evaluate and apply reliable sources of knowledge

Knowledge specific to Performance Outcome	Skills specific to Performance Outcome
<p>Sources of knowledge:</p> <ul style="list-style-type: none"> • reliable and unreliable <p>e.g. internet and search engines, academic papers and peers</p> <p>Evaluation techniques e.g. <i>objective ways of evaluation such as gap analysis, maturity assessments</i></p> <p>Communication methods including the use of incident and request management systems to record requirements and progress, and <i>sharing knowledge via appropriate enterprise social media, knowledge bases, wikis, blogs and community forums</i></p>	<p>Identify (up to three) sources, <i>such as Google, stack overflow, Wikipedia</i>, and assess their reliability</p> <p>Demonstrate the validity and appropriateness of the information and its legitimate use</p> <p>Corroborate across multiple sources e.g. <i>cross referencing</i></p> <p>Search for information relevant to a topic or scenarios e.g. explore the future of the digital economy, identify trends in Big Data and key digital action initiatives using various future scenarios, to establish the scope of digital opportunities, a variety of digital channels</p> <p>Select and use techniques and tools to aid evaluation e.g. formative, summative, observation, user diaries, conclusions, and recommendations</p> <p>Compare options, appraise and recommend actions to ensure reliability of source</p> <p>Identify and understand bias e.g. <i>materials written by a particular developer such as Microsoft in the context of software and operating systems</i></p> <p>Demonstrate critical thinking e.g. triangulation /evaluation of sources to make the best use of digital technologies.</p>

Integrating maths, English and digital skills

Maths

The completion of a level 2 mathematics qualification (GCSE mathematics or Functional Skills) is a minimum exit requirement for all T Levels. This will ensure that all students have demonstrated fluency and competence in mathematics, and are able to recognise the importance of mathematics in their own lives, in work and to society. Achievement of a level 2 mathematics qualification will also provide the foundation to access mathematics at a higher level, if required.

Technical Qualifications should contain sufficient and appropriate maths to help students reach the required minimum competence in their chosen specialism(s). The following General Maths Competencies (GMCs) have been developed with input from the Royal Society Advisory Committee on Maths Education (ACME), and awarding organisations will need to embed these, and the underpinning maths, into the specifications and assessments being developed as part of the Technical Qualification.

The GMCs below are relevant to this particular Technical Qualification:

- Communicate using mathematics
- Estimate, calculate and error-spot
- Optimise work processes
- Process data
- Represent with mathematical diagrams
- Understand data
- Use rules and formulae
- Work with proportion.

Awarding organisations that are awarded an exclusive licence will need to integrate these into the Technical Qualification specification and assessments, drawing upon a more detailed framework of maths that underpins the GMCs, currently being developed in association with the Royal Society ACME.

English

The completion of a level 2 English qualification (English language GCSE or Functional Skills) is a minimum exit requirement for all T Levels. This will ensure that all students have demonstrated that they can read fluently, communicate and write effectively, and demonstrate a confident control of Standard English.

The specification for a Technical Qualification should ensure that students acquire the technical vocabulary, and gain the practical communication skills (written and oral), needed to achieve competence in their chosen occupational specialism(s).

The assessments for Technical Qualifications should ensure that students:

- Know the correct technical vocabulary and use it appropriately
- Apply their communication skills (written and oral) appropriately, using Standard English
- Use accurate spelling, punctuation and grammar.

Digital

Technical Qualifications should contain sufficient and appropriate digital skills to help students reach competence in their chosen specialism(s).

This Technical Qualification should support students to develop the digital knowledge and skills needed in order to:

- Act safely and responsibly in digital environments
- Develop and project a positive digital identity and manage digital reputation
- Adopt professional approaches to using digital communications and social media
- Be aware of information security and the security controls that can be used to mitigate security threats within solutions and services
- Boolean and set operations (AND OR and NOT)
- Follow licensing guidelines, using only approved and licensed software applications
- Choose devices, applications, software and systems relevant to different tasks, having assessed their benefits and constraints
- Collate, manage, access and use digital data in spreadsheets, databases and other formats, and interpret data by running queries, data analyses and reports
- Qualify information sources, evaluating their reliability and suitability for a purpose
- Share information securely
- Understand and apply appropriate accessibility requirements e.g. W3C
- Understand digital media as a social, political and educational tool, and of digital media production as a technical practice
- Understand digital research methods and data analysis tools and techniques
- Understand how data is used in professional and public life
- Understand innovation, enterprise and project management in digital settings
- Understand the benefits and risks involved in digital participation
- Understand the rules of copyright and open alternatives e.g. creative commons, and reference digital works appropriately in digital contexts
- Use business etiquette when communicating
- Use digital evidence to solve problems and answer questions
- Using rules and formulae (Boolean search criteria).

Awarding organisations that are awarded an exclusive licence will need to integrate these into the Technical Qualification specification and assessments.