BCS Digital Industries Apprenticeship

Standard Specific Guidance for Training Providers

Level 3 Infrastructure Technician Apprenticeship

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Digital Industries Apprenticeship: Standard Specific Guidance for Training Providers – Infrastructure Technician

Change History

Any changes made to the project shall be clearly documented with a change history log. This shall include the latest version number, date of the amendment and changes made. The purpose is to identify quickly what changes have been made.

Version Number and Date	Changes Made
V1.0 March 2017	Document Created
V1.1 March 2017	Example text removed from Summative Portfolio Declaration Page 74
V1.2 September 2017	Removal of some work activities across the competencies
V1.3 October 2017	Updates to the competency statements

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Purpose of this Document

The purpose of this document is to provide useful information and suggested supporting documentation specific to the Infrastructure Technician Apprenticeship. It should be read in conjunction with the BCS General Guidance for Apprentices, Employers and Training Providers document and is designed to give training providers some tools to help them build their own programme from training plan through to end-point assessment.

This guide will provide:

- supporting information around how to help the infrastructure technician apprentice to meet and go beyond the standard;
- a number of useful documents to support the training provider in meeting their responsibilities in managing the apprenticeship from training plan through to the end-point assessment;
- evidence checklists to help the training provider support the apprentice in completing their summative portfolio;
- a template for completing the employer reference.

Introduction

The BCS Level 3 Infrastructure Technician Apprenticeship is one of the suite of Digital Industries Apprenticeships that have been designed by the industry to address skills shortages and meet the ever-changing needs of UK employers.

The General Guidance for Apprentices, Employers and Training Providers provides the broad view on how to run an apprenticeship programme to the BCS Digital Industries Standard. The collection of tables and templates contained within this document has been designed to give training providers the tools to build their programme and to assist them in helping apprentices and employers towards the successful completion of each element of the end-point assessment.

The areas where a training provider should be involved in ensuring a successful outcome to the apprenticeship are:

- mapping and assessing work against the standard;
- advising the employer and the apprentice on which knowledge modules, vendor or professional certificates and other relevant training and activities are most appropriate for their requirements, and agree a suitable training plan;
- assisting the apprentice with applying knowledge in the workplace;
- acting as an advisor to the apprentice and the employer to ensure the programme remains on track and any concerns are addressed;
- helping the apprentice to select evidence for their summative portfolio;
- supporting the apprentice through the synoptic project;
- confirming the apprentice's readiness for the end-point assessment.

The following series of checklists can be used by the training provider to help manage the process through to completion. Training providers may substitute their own processes and documentation as they see fit in order to effectively manage their key areas of responsibility as set out above.

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The Infrastructure Technician Apprentice

The primary roles of an infrastructure technician are to:

- provide support to internal and external customers, helping them to be productive when using technology to do their own jobs;
- use tools to problem solve and troubleshoot non-routine problems;
- set people up on systems and provide support when they need it;
- rectify issues to maintain the organisation's productivity.

Job titles may be different across different organisations so the role may also be referred to as Help Desk Technician, First or Second Line Support, Network Support or Systems Support Technician.

Business Proficiencies

The proficiencies that should be demonstrated by an apprentice infrastructure technician are listed below.

Business skills

The apprentice can:

- demonstrate an analytical and systematic approach to issue resolution;
- works independently and takes responsibility;
- demonstrate effective communication skills;
- contribute fully to the work of teams;
- explores all known options to resolve problems;
- appreciate the wider business context, and how their role relates to other roles and to the business of the employer or client.

Complexity

The apprentice can:

- perform a range of work, sometimes complex and non-routine, in a variety of environments;
- apply a methodical approach to issue definition and resolution.

Autonomy

The apprentice can:

- operate under general direction;
- use discretion in identifying and responding to complex issues and assignments;
- actively works with others and leads by example;
- determine when issues should be escalated to a higher level.

Influence

The apprentice:

- has working-level contact with customers, suppliers and partners;
- works externally with customers, suppliers and partners in a variety of situations.

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Knowledge Standards, Technical Competence and Behaviour and Relationship Standards

Tables 1, 2 and 3 contain details of the topics that the training provider may decide to cover in their development plans and scheduled work activities in order to stretch the apprentice.

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Table 1 – Infrastructure Technician – Knowledge Standards

The knowledge standards define learning that must take place during the apprenticeship, **both through the activities and the apprentice's own independent learning**. The additional learning outcomes detailed in the table show how a training provider can stretch the apprentice's learning beyond the requirement as set out in the occupational brief. However, it is important to remember that stretching the apprentice in this way will only have a bearing on their final grading if the impact is demonstrated through their competence in the end-point assessment. These knowledge standards, therefore, show the additional learning that may support the apprentice in improving their overall competence. Technical knowledge and understanding is assessed throughout the apprenticeship through a combination of Ofqual regulated knowledge modules and specified vendor and professional qualifications. These must be passed before the end-point assessment can take place.

Knowledge standard	Expected requirement	Suggested learning outcomes to meet the standard and stretch the apprentice to exceed the minimum requirement
Working knowledge of: a range of cabling and connectivity, the various types of antennas and wireless systems and IT test equipment.	• understand and identify Ethernet, co-axial, fibre-optic and RJ45 connectors; • understand and identify a range of Cat 1-6 cables; • understand and identify directional, omnidirectional, point-to-point, point-to-multipoint and mobile antennas; • understand the types of wireless systems; • understand the relevant test equipment associated with each element of the above.	Relate and apply the components, attributes and uses of cables and connectors: • copper cable classes and categories including twisted pair Cat 1-4, Cat 5-7 UTP/STP and co-axial; • copper connectors including, but not limited to, registered jack, for example RJ11, RJ12 and RJ45; co-axial, for example BNC; fibre-optic cable classes including OM3, OM4, SM1 and SM2; • fibre connectors including but not limited to, SC, ST and LC; • attributes of copper cables and fibre-optic cables including, but not limited to, physical construction; transmission speed; bandwidth and distance; electromagnetic radiation and security. Define and demonstrate key considerations for using wireless systems: • wireless standards and technology: IEEE standard networks including, but not limited to, 802.11 and 802.15; Bluetooth, RFID and NFC; cellular including the 3GPP family of standards; • wireless security: WiFi authentication and encryption including SSID, WEP, WPA and WPA2; authentication including IEEE 802.1x. Show the function and purpose of different types of antenna and choose appropriate antennas to optimise wireless network connectivity including, but not limited to: • radio transmission theory: antenna types including omnidirectional and directional; • the decibel and RF link budgets;

		• wireless network coverage and connectivity. Demonstrate the purpose and best use of test equipment and tools including, but not limited to: • using command line tools, such as ping, netstat, traceroute, strace; • testing of copper cables to applicable standards including, but not limited to, pre-test setting up, continuity testing, wire mapping and channel and permanent link measurements; • testing of fibre-optics to applicable standards including, but not limited to, pre-test setting up, use of fibrescopes and Tier 1 and Tier 2 testing; • testing of wireless networks to applicable standards including, but not limited to, pre-test setting up and radio surveys.
Understands maintenance processes and applies them in working practices.	• understand the requirements for managing maintenance work-order records; • understand how to respond to real-time system down times for maintenance order requests; • understand how to undertake short-notice tasking requests; • understand how to record all maintenance tasking through a job card system of control; • understand maintenance tools; • understand, configure and manage updates; • understand how to manage local storage;	Employ a range of common maintenance tools and explain how to: • carry out diagnostic checks using, for example, cable testers, protocol analysers, process explorer, process monitor/top, scandisk, memtest and checkdisk; • interrogate systems using, for example: Top/HTop/IOTop, VMstat, TCPdump, netstat, SNMP, Iostat and system centre; • monitor system performance using, for example: task manager/monitor, perfmon, sysmon, activity monitor, Iostat and collectl. Prepare a range of maintenance record types and recording methods, and explain their purpose: • proactive/predictive maintenance: record types including, but not limited to, fault logging, asset log, worksheets and acceptance tests; recording methods, for example, database, spreadsheet and job cards; maintenance tools to configure and maintain updates, manage local storage and monitor system performance; • reactive/corrective maintenance: managing maintenance work-order records; know how to respond to system down times for maintenance order requests; able to react when undertaking short-notice tasking requests; works order and job cards. Apply the processes for making and fulfilling maintenance requests, including appreciation of organisation processes and relevant SLAs: • physical maintenance checks: hardware and peripherals; cabling and connectivity; • pro-active maintenance: controlled release of packages; configure and manage updates;

	• understand how to monitor system performance.	• reactive maintenance: mean time to failure (MTTF), mean time between failures (MTBF) and mean time to restore service (MTTR).
Understands the similarities, differences and benefits of up-to-date hardware available.	• understand the comparisons of hardware; • understand comparisons of different computer systems; • understand the latest hardware and its similarities; • understand how to evaluate hardware readiness and compatibility; • understand how to configure/support devices and device drivers; • understand access control to local hardware and applications.	Describe the function, features, performance and benefits of the hardware components used in digital networks: • computers including desktop, laptop, tablet and server; • network equipment including switches, routers, repeaters, hubs, modems and WAPs; • connectivity components including patch panels and patch leads; • peripherals including printers, phones and multi-functional devices; • the impact on device performance of memory, CPU, storage and network cards. Relate hardware readiness and compatibility for business use. • identify system requirements to ensure correct choice of specifications (minimum/recommended) and security; • test compatibility including upgrading hardware and software and using sandbox environments; • select network devices to ensure connectivity, features and performance. Describe configuration and support of devices and their drivers: • build OS image; • install and configure drivers and applications; • connect peripherals, such as display units, printers, scanners, keyboard/mouse, projectors, external/internal storage devices, graphics cards and network cards. Describe considerations for implementing access control to local hardware and applications including policy formulation and enforcement, physical security and biometrics. Describe resources and mechanisms that contribute to IT business systems: • resources including, but not limited to, servers, operating systems, applications, databases, middleware and cloud services; • mechanisms including, but not limited to, networking, security and services.

Understands and applies the basic elements and architecture of computer systems and business IT architecture.	• understand the basic architecture of 'computer systems'; • understand business IT architecture, taking into account the full range of devices, OS, applications, databases, servers, networking, security and services.	Choose a relevant operating system that meets given criteria: • costs including, but not limited to, initial purchase, licences, maintenance and support; • compatibility considerations, for example, independent software vendor, original equipment manufacturers, value-added resellers and open systems; • intended use requirements, for example, portable devices, bring your own device (BYOD), business dependant software and the job description of the user. Select different operating and hardware systems for appropriate business requirements: • server functions including, but not limited to, email, file storage, database, web services, DNS, directory services; • desktop functions including, but not limited to, graphics and data processing. Test operating systems and hardware readiness and prove compatibility for business use: • sandbox testing; • compatibility with legacy systems and software; • preparation of systems for distribution.
Understands where to apply the relevant numerical skills e.g. binary.	• understand internet protocol (IP) addresses and how they work; • understand how computers see IP addresses; • understand and be able to use binary arithmetic and create large numbers from groups of binary units or bits.	Understand and explore practical applications of numerical skills within ICT: • interpret common units used in computing including, but not limited to, bit (b), byte (B), kilobyte (kB), megabyte (MB), gigabyte (GB) and terabyte (TB); • recognise different number bases including binary, octal, decimal and hexadecimal and apply them to MAC and IP addressing in computer networks; • identify and apply numerical skills to develop IPv4 and IPv6 address plans.
Understands the relevant networking skills necessary to maintain a secure network.	• understand platforms and data communications;	Interpret the relationship between ISO 7-layer model and the TCP/IP model, explain the purpose of the layered approach and configure network components and devices used to deliver secure data networks: • physical layer including electrical, optical, wireless, hubs and repeaters;

	• understand the requirements to configure IP settings; • understand how to deploy and configure a DNS service; • understand how to create and configure virtual networks; • understand how to configure/support networking settings and connectivity; • understand how to configure/support and maintain network security; • understand how to configure/support remote management systems; • understand why and how to install domain controllers; • understand the need for creating and managing Active Directory users and computers; • understand how to create and manage Active Directory groups and organisational units (OUs).	• data link layer including network interface cards, bridges and switches; • network layer including routers and layer 3 switches; • computers, servers and storage including user and group permissions. Identify common network topologies and explain the function of the protocols used within the layered models to deliver secure data networks: • identify topologies including star, bus, ring and mesh; • describe standards bodies including, but not limited to, IEEE, IIETF and W3C; • explain the purpose and features of Ethernet including but not limited to, MAC address, maximum transmission unit (MTU), header format, fragmentation and error checking: • explain the purpose and features of IPv4 including, but not limited to, IP address format, subnet masking, default gateways, IP header format, public and private ranges, network address translation; • explain the benefits and features of IPv6 including, but not limited to, extended address space, IP address format, extended features and IPSec authentication; • explain the advantages of dynamic routing and describe the function of common types of routing protocols including distance vector, link state and balanced hybrid; • explain the purpose and features of Transport Layer protocols such as TCP and UDP including, but not limited to, header format, ports, flow control, sequencing and error checking. • explain the operation of protocols and services used to facilitate the operation of the layers including, but not limited to, ARP, DHCP, DNS and IPSec; • explain the common Application Layer protocols including, but not limited to, HTTP, SMTP and FTP; • identify commonly used port numbers. Describe the importance of access control when maintaining network security: • physical control methods; • logical control methods including, but not limited to, authorisation, authentication, user and user groups, permissions, and object data. Relate the nature and application of virtual networks including: • VLAN – VLAN tagging, static and dynamic configuration; • VPN – configuration and encryption.

		Configuration of remote management systems to enable remote access to a network using a range of methods including RDP, VNC, SSH and PowerShell.
Understands the similarities, differences and benefits of the current operating systems available.	• understand different platforms and operating systems; • understand the process for constructing PCs with applied software utilised; • understand and apply knowledge to various operating systems with installations required for end-to-end testing; • understand native applications and tools; • understand security principles associated with different platforms and operating systems.	Illustrate an overview of the different platforms and the differences between embedded and non-embedded systems when deployed in digital systems including, but not limited to, client–server model, peer-to-peer model, desktops, mobiles (tablets and smartphones), cloud (virtualised platforms) and the internet of things (IoT). Describe and apply the required processes for constructing and deploying computing devices to ensure the function and interaction between system components including, but not limited to, OS installation options, firmware, boot processes, software and applications, whilst observing all health and safety requirements. Select the correct processes and requirements for end-to-end testing of systems, ensuring readiness, for example: • patching, hardening/penetration testing, legacy software, system upgrades, organisation culture, deployment risks and training; • test selection, plan and execution including platform configuration, network configuration, mobile configuration, recording results and taking corrective action. Use the built-in applications and tools including, but not limited to, browser, Text Editor and command-line/terminal to carry out tasks, for example: system configuration, troubleshooting, management and accessibility. Demonstrate and apply the security capabilities of the different platforms and operating systems to ensure: • confidentiality, integrity and availability; • authentication, authorisation and accounting; • policy enforcement of users and groups, permissions and rights, passwords and account security; • use of security tools including, but not limited to, antivirus, anti-malware and anti-spyware programmes and software firewalls to control protocols, services and ports; • application of OS hardening procedures; • use of encryption methods including, but not limited to, public/private keys, key chains and digital certificates.

Understands how to operate remotely and how to deploy and securely integrate mobile devices.	• undertake a data network deployment exercise to implement and deploy remote and mobile communications technology;
	• understand secure communications interfaces for mobile connectivity;
	• understand mobility;
	• understand remote management and assistance;
	• understand security in mobile devices;
	• understand configuration for:
	  ○ support remote access/connections;
	  ○ support mobility options;
	  ○ support security for mobile devices;
		Apply recognised processes to plan, select, implement and deploy remote and mobile communications technology taking account of:
		• mobile technologies and topologies;
		• network setup;
		• wireless/direct cable;
		• limitations of mobile access;
		• private and public networks;
		• trusted versus untrusted connections;
		• roaming;
		• security considerations when using virtual private networks (VPNs), IPSec and SSL.
		
		Describe considerations for secure communications interfaces for mobile connectivity in order to:
		• configure and deploy technology for confidentiality using encryption and decryption in personal and enterprise environments.
		• configure and deploy authentication and authorisation mechanisms to meet policies including, but not limited to, authentication, authorisation, passwords/PINs, biometric approaches, multi-factor authentication, application restrictions and user limitations;
		• mitigate threats and vulnerabilities affecting mobile platforms.
		
		Apply recognised methods for remote management and assistance with respect to:
		• service delivery, including good practice etiquette when delivering a service helpdesk and tiered support;
		• company and client policies including, but not limited to, security, data access, acceptable use, disaster recovery, remote access, remote wipe and managed BYOD (bring your own device);
		• assisting a home worker by using, for example, remote find, remote access, and location-based services in conjunction with private WiFi, public hotspots, VPNs and tethering;
		• remote access protocols including, but not limited to, KVM based (RDP and VNC) and command-line based (SSH);
		• using cloud services, for example, virtual desktop integration (VDI).

Understanding and working knowledge of cloud and cloud services.	• understand how to create and configure virtual machines; • understand hosted applications, such as: email, server, storage, desktops; • understand and explain provision tenants; • understand how to configure secure passwords and management of passwords; • understand how to manage user and security groups and/or cloud identities and their importance; • understand how to configure DNS records for services; • understand how to enable client connectivity to cloud services.	Identify and explain cloud deployment, service models and provision tenants: • cloud characteristics including, but not limited to, availability, flexibility, scalability, chargeability, accessibility, data security, privacy, sovereignty, resource pooling and rapid elasticity; • connectivity and broadband network access options including, but not limited to, pay-as-you-go, measured service and on-demand self-service; • cloud deployment models, for example, private cloud, community cloud, public cloud and hybrid cloud; • legislation (international and country specific) including, but not limited to, Data Protection Act, Patriot Act, Privacy Shield; • standards including, but not limited to, ISO SC38, ISO 27001, PCI DSS; • cloud service models, for example, Software as a Service (SaaS), Platform as a Service (PaaS), Infrastructure as a Service (IaaS) and Anything as a Service (XaaS); • on-premise versus off-premise provision including, but not limited to, subscription types, EULAs, SLAs, tenant provisioning and configuration and service termination. Explore how to create and configure virtual machines including, but not limited to: • type I and type II hypervisors; • proprietary versus open-source feature set comparisons; • create a virtual machine, allocate resources, import and export virtual machine templates (OVF/OVA formats), install guest tools, perform snapshots and clone disks; • create and configure virtual networking components, for example, virtual network adapters, virtual switches and virtual LANs. Demonstrate how to manage secure passwords and manage user/security groups and or cloud identities: • managing user identity using AAA best practices including account creation templates for single and bulk account creation, password complexity and expiration, licence management, multi-factor authentication and account deactivation; • managing different types of group, including email groups, security groups and role-based groups. Identify DNS service records in the context of troubleshooting:

		• record types and their uses including, but not limited to, A, MX, CNAME, TXT and SRV records; • DNS lookups and resolvers, including Forward Lookup and Reverse Lookup; • command-line tools including, but not limited to, whois, dig, nslookup, ipconfig, ifconfig, traceroute and tracert. Explain how to enable a client for connection to a cloud service: • establishing client readiness; • determining system requirements; • choosing deployment methods, for example, manual, central and self-provision.
Understands the importance of disaster recovery, how a disaster recovery plan works and their role within it.	• understand backup and recovery methods; • understand what a disaster recovery plan is and where it can be found; • understand their role within the disaster recovery plan; • understand what should be in a disaster recovery plan; • understand how and when a disaster recovery plan should be practiced or tested; • understand how to implement and configure system recovery; • understand how to configure file recovery.	Explore and apply various backup and recovery methods: • backup policies and data retention plan; • backup storage and location; • backup media, for example, disk, optical media, tape, removable media; • backup methods, including full, incremental and differential options and virtual server snapshots; • operating system similarities and differences when backing up and restoring; • system monitoring, configuring and adjusting backup schedules, checking and remediating error logs; • backup and restore best practices including, but not limited to, labelling, integrity verification, test backup restorability, tape rotation and retention; • cloud backup provisions within SLA including, but not limited to, data recovery and deletion, recovery time, liability, and indemnity. Identify and understand their role within a disaster recovery plan: • Disaster Recovery (DR) team roles including, but not limited to, recovery team lead, DR planning lead, business unit stakeholders, service desk, network and infrastructure, IT systems and services, support staff, trainers, and writers. Demonstrate what should be in a cloud-based business continuity and disaster recovery plan (BCDR) and SLA/OLA: • Scoping BCDR plan including, but not limited to, business impact analysis (BIA), contractual risk assessment, service prioritisation and preventative measures; • testing the BCDR plan;

		• maintaining the BCDR plan; • recovery strategies including, but not limited to, business processes, IT systems, files and data; • transfer of services.
Understands the similarities and differences between a range of coding and logic.	• understand working/scripting at command line, particularly when supporting any server work; • understand and recognise different coding and language; • understand application life cycle management; • understand algorithms and data structures; • understand web page development.	Demonstrate an understanding of scripting concepts by explaining what they are and identifying their uses in context: • using the command line interface (CLI) and its advantages; • different operating system implementations of CLI; Unix/Linux terminal and MS Windows command prompt; • remote access methods, for example: insecure methods including, but not limited to, Telnet; secure methods including, but not limited to, SSH (Secure Shell) and VPN; • commands, switches, mandatory and optional parameters, help facilities including, but not limited to, the man command; • command-line uses including, but not limited to, file and directory operations; changing file and directory permissions and ownership; running diagnostics; file systems, networking, processes and security; mapping network folders and resources; • user accounts and user groups (creation, changing properties, deleting, changing rights) and security policies; • background processes, daemons (starting, prioritising, stopping) and scheduled tasks and processes, for example cron jobs; • login scripts; • compressing and decompressing files; • installing utilities and applications; • updating operating systems and applications; • configuring operating systems and applications; .ini, .cfg files, Windows registry; • batch operations and scripting engines. Identify a range of programming languages, demonstrating their uses and benefits in different contexts: • different types of programming languages, for example, procedural, object-oriented and web-oriented; • compiled versus interpreted languages;

		• uses of different programming languages including, but not limited to: CGI concepts; client side – JavaScript, Oracle Java; server-side – PHP, Microsoft Classic ASP/ASP .net, Oracle JSP; server scripting; Bash, Perl, Microsoft Windows PowerShell, Python and Ruby. Explain the main features of languages and be able to recognise and use common number systems used in programming and IT: • common number systems including denary (base 10), binary (base 2), octal (base 8) and hexadecimal (base 16); • base 64 and Multipurpose Internet Mail Extensions (MIME); • base conversion methods; • basic arithmetic on binary and hexadecimal including: division, multiplication, addition, subtraction; • uses of binary including, but not limited to, Boolean logic, flags, internal data representation, American Standard Code for Information Interchange (ASCII) characters; • uses of octal including, but not limited to, Unix/Linux, CHMOD access permissions, escape strings, Unicode Transformation Format (UTF)-8; • uses of hexadecimal including, but not limited to, media access control (MAC) physical addresses, operating system/device/application error codes, uniform resource identifier (URI), random access memory (RAM) address notation and 8-bit per channel red green blue (RGB) colours; • uses of dotted decimal notation and binary equivalents for IP addresses, subnet masks and classless inter-domain routing (CIDR); • reserved words; identifiers; data types (Boolean, integer, floating point, character, string); operators (assignment, arithmetic, relational, logical, bitwise, ternary) and regular expressions; • input/output techniques, for example, screen, keyboard and log file; • system classes, objects, methods and properties; • constructs including, but not limited to, sequence, selection (Simple IF, IF, ELSE, SWITCH/CASE), iteration, pre-conditioned (FOR/FOR EACH, WHILE, REPEAT) and post-conditioned (DO...WHILE); • modularity including, but not limited to, coupling and cohesion, functions, procedures, parameters (formal/actual, by value/by reference), first and third-party libraries; • exception handling;

		• data files including, but not limited to, text file formats (ASCII, comma-separated value (CSV), eXtensible Markup Language (XML)) and binary (non-ASCII) formats; • differences in file types between operating systems; • translation methods, for example, interpretation, compilation and architecture neutral code. Understand the wider programming concepts: • integrated development environments (IDE) debug techniques; • good coding practices; security, self-documentation, naming conventions; • deployment and installation techniques and packages, for example, first or third-party installers, compressed files (ZIP, GZIP, TAR) and executables. Describe the main phases and characteristics of the application life cycle and appreciate the different application development methodologies: • investigate and understand problem; • design specification; • implementation, including prototype and full solution; • debug and testing, including use of White box and Black box methods; • documentation; • deployment; • maintenance and review; • system degradation. Explain the purpose of common algorithms in relation to the work of an IT infrastructure technician: • using common algorithms for searching (linear, binary), sorting, pattern matching including regular expressions, hashing, encryption/decryption, statistics and trend analysis. Describe a range of data structures with examples of their uses: • static versus dynamic data (memory allocation; stack, heap); • arrays (one-dimensional, two-dimensional, multi-dimensional); • records, classes and objects (properties and methods); • linked lists, trees and sets;

		• stacks (LIFO) and queues (FIFO); • data files (different types); • relational databases (database, records, fields, relationships); • types of data files and practical uses of different data structures. Identify and apply the key factors in the development of web pages: • concept of web hosting and serving; • web server, including role, functions, installation (including virtual hosts and optional modules), logging, securing; • web clients, including role, functions, installation, securing, plug-ins; user agents; • web technologies and standards including, but not limited to, World Wide Web Consortium (W3C), Internet Engineering Task Force (IETF), HyperText Markup Language (HTML), Cascading Style Sheets (CSS), XML, asynchronous JavaScript and XML (AJAX) and Web Services Description Language (WSDL); • protocols and services including, but not limited to, Hypertext Transfer Protocol (HTTP), Hypertext Transfer Protocol Secure (HTTPS), File Transfer Protocol (FTP), Domain Name Server (DNS) and Simple Object Access Protocol (SOAP). • static versus dynamic web content; • local (cookies) and session data storage; • Document Object Model (DOM) and events; • HTTP GET, POST requests; • create and modify static content to current standards; • create and modify dynamic content to current standards; • relational database management system types, for example, Oracle, MS SQL Server, MySQL and PostgreSQL; • relational database commands including, but not limited to, Structured Query Language (SQL), Data Definition Language (DDL), Data Manipulation Language (DML), Data Control Language (DCL) and Transaction Control Language (TCL); • web interfaces and clients; • cross-platform drivers and libraries; Tabular Data Stream (TDS); • Model-View-Controller (MVC) frameworks; • vulnerabilities; SQL injection, session hijacking, cross-site scripting (XSS); OWASP; • responsive websites for different user agents; mobile devices.

Understands and complies with business processes.	• understand security operating procedures; • understand and be able to work confidentially; • understand how to work within the company operating procedures; • understand and be able to comply with data protection.	Describe the fundamentals of industry standard IT security standards and laws including, but not limited to, ISO 27001, Computer misuse act 1990, RIPA. Explain how to operate safely in the work place and describe their responsibilities as an employee: • compliance with legislation including, but not limited to, Health & Safety at Work Act 1974 and Electricity at Work Act 1989; • compliance with COSHH regulations; • completion of a risk assessment of a basic work task. Describe how to work within their company operating procedures: • explain WEEE regulations from a business perspective; • demonstrate working within service level agreements (SLAs). Demonstrate an understanding of data protection regulations and how they impact a business and its IT systems: • EU Data Protection Act 1998; • non-signatory countries e.g. USA Patriot Act and replacement of Safe Harbor by EU-US Privacy Shield; • Brexit implications for UK. Explain the importance of business continuity and disaster recovery (BCDR) and IT contingency plans in a hybrid service provision environment, including how and when they should be practised: • contingency planning policy; • data availability, security and sovereignty; • business impact analysis (BIA) including contractual risk assessment with internal and external customers and service providers and prioritisation of business restoration; • preventative measures; • testing the BCDR plan; • maintaining the BCDR plan; • recovery strategies including business processes, IT systems, files and data; • transfer of services.

Working knowledge of business IT skills relevant to the organisation.	• understand company IT requirements; • understand company IT systems and platforms; • understand company IT business required skills; • understand software life cycles; • understand desktop applications, messaging systems, document management.	Demonstrate an understanding of their organisation's IT requirements and how they relate to business strategy: • explain IT strategy documents and their link to business strategy. Demonstrate an understanding of their organisation's IT systems and platforms: • explain network and topology diagrams; • describe the importance of accurate records including, but not limited to, asset registers, incident logs, recycle/disposal logs; • apply configuration management and change control. Describe how to maintain their IT skills and knowledge: • undertake training relevant to job role and business needs; • obtain professional-body recognition including, but not limited to, BCS, ISACA. Demonstrate an understanding of IT life cycles: • software (SDLC); • hardware (ITAM); • licencing; • legacy.

These expected requirements are met through the delivery of the BCS Ofqual regulated knowledge modules and vendor training courses, details of which are contained in the course syllabi.

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Table 2 – Infrastructure Technician – Technical Competency Standards

The competency standards have been defined to demonstrate that the knowledge learnt has been applied in real work tasks, activities and projects in a business environment.

Competencies are assessed throughout the apprenticeship through a combination of the employer reference, the synoptic project and a summative portfolio completed by apprentices from records of the work activities in which they have been involved.

The training provider should assist the employer to identify suitable work tasks, activities and projects within the scope of their normal business activities for the apprentice to practice what they have learnt and to demonstrate the competencies below.

The BCS apprenticeship is mapped to an internationally recognised skills framework and to work activities in which an infrastructure technician apprentice would be involved.

The following table sets out these competencies and the expected requirements against the work activities that might be demonstrated at and beyond the minimum expectation. The format is explained below:

Competency standard	**Expected requirement**	**Work activities demonstrating the minimum expected level of competence**	**Work activities demonstrating competence beyond the minimum expected**
This column contains the competency as it is listed in the apprenticeship standard.	*This column shows the expected requirements listed in the occupational brief for a successful outcome.*	*This column shows recognised work activities that demonstrate that the apprentice is meeting the expected requirement.* *The apprentice should be able to demonstrate all of these activities.*	*This column shows recognised work activities that demonstrate that the apprentice exceeds the expected requirement.* *These activities are additional to the expected activities and it is not required that an apprentice will demonstrate competence at this level in every activity.*

The infrastructure technician competency standard, requirements and activities demonstrating competence follow:

Competency standard	Expected requirement	Work activities demonstrating expected level of competence	Work activities demonstrating competence beyond the minimum expected
IT Security Demonstrates the necessary skills and behaviours to securely operate across all platforms and areas of responsibility in line with organisational guidance, legislation.	The apprentice must demonstrate how they comply with organisational security processes and how they would recognise and escalate issues. The apprentice must be able to locate and follow policies and legislation.	Ensures that relevant technical infrastructure strategies, policies, standards and practices are applied correctly. Installs or removes infrastructure hardware and/or software, using supplied installation instructions and tools; follows agreed standards, including those for electrical work. Agrees the timing of the work with those affected, e.g. users, operations management, including, where appropriate, hand-over to client. Conducts tests of the infrastructure hardware and/or software affected using supplied test procedures and diagnostic tools. Helps to resolve problems and faults, and corrects malfunctions, calling on help from more experienced colleagues if required. Documents results in accordance with agreed procedures.	Assists in providing advice on technical infrastructure aspects of system development and integration, including the operational and maintenance aspects of systems under development, and proposed system recovery procedures. Ensures that relevant technical strategies, policies, standards and practices are applied correctly. Installs or removes infrastructure hardware and/or software, using supplied installation instructions and tools within established procedures and quality systems, including, where appropriate, hand-over to client. Organises the disposal of decommissioned hardware in an environmentally secure manner. Follows agreed standards, including, where appropriate, those for electrical work. Ensures that network management systems and appropriate performance analysis equipment and diagnostic tools are used to test the hardware and/or software affected, and quantify and qualify changes made.

Competency standard	Expected requirement	Work activities demonstrating expected level of competence	Work activities demonstrating competence beyond the minimum expected
Remote Infrastructure Effectively operates a range of mobile devices and securely adds them to a network in accordance with organisation's policies and procedures.	The apprentice must demonstrate how to securely connect a minimum of two different types of devices (e.g. laptop/mobile) to access the organisation's network services (e.g. email, files, applications).	Carries out simple assignments related to the infrastructure technical specialism, either alone or as part of a team. Ensures that relevant technical infrastructure strategies, policies, standards and practices are applied correctly. Configures the hardware/software environment as required by the system being integrated. Assists in the configuration of operating system software and infrastructure equipment for the systems testing of platform-specific versions of one or more products. Contributes to preparation of software implementation procedures with fall-back contingency plans. Installs, tests and evaluates new versions of system software. Carries out routine monitoring, logging and reporting tasks, taking defined action on simple problems. Reports unforeseen or exceptional events to supervisor. Carries out	Carries out specific assignments related to the infrastructure technical specialism, either alone or as part of a team. Assists in providing advice on technical infrastructure aspects of system development and integration, including the operational and maintenance aspects of systems under development, and proposed system recovery procedures. Ensures that relevant technical strategies, policies, standards and practices are applied correctly. Identifies and documents system integration components which will be held in the configuration management system. Participates in the configuration of operating system software and infrastructure equipment for systems testing of platform-specific versions of one or more products with minimum supervision. Reviews releases, upgrades and fixes available from system software suppliers and identifies those which merit action. Maintains awareness of existing and emerging software and hardware solutions and develops upgrade plans. Carries out required monitoring, logging and reporting tasks. Takes action on known errors and documented workarounds, logging such

Competency standard	Expected requirement	Work activities demonstrating expected level of competence	Work activities demonstrating competence beyond the minimum expected
		and observes all associated administrative and clerical procedures.	actions and advising supervisor or specialists when management or specialist attention is required. Uses network management systems tools to collect routine network load and model performance statistics.

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Competency standard	Expected requirement	Work activities demonstrating expected level of competence	Work activities demonstrating competence beyond the minimum expected
Data Effectively records, analyses and communicates data at the appropriate level using the organisation's standard tools and processes and to all stakeholders within the responsibility of the position.	The apprentice must be able to select and securely use three appropriate tools when working with and analysing data.	Carries out simple assignments related to the infrastructure technical specialism, either alone or as part of a team. Collects performance data to monitor system efficiency against published service level agreements. Monitors both resource usage and failure rates of installed systems and provides feedback to management. Produces reports on infrastructure defect/problem reporting data (e.g. data extracted from the configuration management system/known error database). Takes agreed actions relating to infrastructure defect/problem.	Carries out specific assignments related to the infrastructure technical specialism, either alone or as part of a team. In the event of system software failure, collects critical information, adhering to agreed procedures. Analyses all documentation, storage dumps and logs relating to system software failures to identify the failing component. Isolates failures and recommends actions to circumvent problems and enable the restoration of services. Liaises with suppliers to obtain corrective code, installing and testing the code to ensure a permanent resolution. Produces reports and registers on defect/problem reporting data (e.g. data extracted from the incident management/configuration management system/known error database). Takes agreed actions relating to problem investigation and resolution within the allotted timescales.

Competency standard	Expected requirement	Work activities demonstrating expected level of competence	Work activities demonstrating competence beyond the minimum expected
Problem solving Applies structured techniques to common and non-routine problems, testing methodologies and troubleshooting, and analyses problems by selecting the digital appropriate tools and techniques in line with organisation guidance and to obtain the relevant logistical support as required.	The apprentice must be able to select and use three appropriate tools for testing, troubleshooting and analysing problems. The apprentice must be able to demonstrate compliance with organisational guidance. The apprentice should demonstrate processes and practices for obtaining logistical support.	Conducts tests of the infrastructure hardware and/or software affected using supplied test procedures and diagnostic tools. Helps to resolve problems and faults, and corrects malfunctions, calling on help from more experienced colleagues if required. Documents results in accordance with agreed procedures. Provides assistance to users in a professional manner following agreed procedures for further help or escalation of request. Maintains accurate records of user requests, contact details and outcome. Provides feedback to users. Investigates potential and actual service problems and recommends solutions. Analyses change and system requests. Follows formal procedures to plan and test proposed solutions. Responds to simple calls and enquiries from users, specialists and others and takes appropriate action within defined limits of responsibility or area of specialism to deal with processing priorities. Accepts escalations and initiates	Ensures that network management systems and appropriate performance analysis equipment and diagnostic tools are used to test the hardware and/or software affected, and quantify and qualify changes made. Provides specialist guidance and some supervision to less experienced colleagues. Analyses work in progress, takes action to ensure targets are met within safety and quality procedures, including hand-over to client where appropriate. Tailors system software to ensure that the functionality of installed hardware is fully exploited. Prepares software implementation procedures with fall-back contingency plans. Installs and tests new versions of system software. Uses available monitoring tools, including network management systems tools, to maintain awareness and control of the network load and to model performance statistics. Identifies and rectifies a broad range of operational exceptions and error conditions and deals sensibly and responsibly with unexpected or extraordinary events or incidents. Where these actions necessitate modification, restriction or complete removal of resources or services available, communicates with users, specialists and others, using appropriate methods (e.g. single point of

Competency standard	Expected requirement	Work activities demonstrating expected level of competence	Work activities demonstrating competence beyond the minimum expected
		first-level support action, personally resolving the majority of referred problems. Investigates, diagnoses and resolves low-impact network problems within service level agreement tolerances, referring to network users, other staff and suppliers, as necessary. Initiates action to resolve problems in infrastructure components. Documents such incidents and problems within the configuration management defect/problem reporting system. Matches unresolved infrastructure incidents against existing problems, known errors and other incidents (including parent incidents). Assists with the implementation of agreed infrastructure remedies and preventative measures, in close liaison with the service desk, incident management, change management, configuration management and asset management functions. Produces reports on infrastructure defect/problem reporting data (e.g.	contact such as service desk), to inform and escalate if necessary. Creates reports and proposals for improvement. Responds to enquiries by users, specialists or others and is able to deal effectively with a broad range of problems of moderate complexity, only escalating those which need specialist or management attention. Initiates speedy and permanent resolution to problems in infrastructure components by coordinating the efforts of the resolution team or teams. Documents such incidents and problems within the configuration management defect/problem reporting system. Matches unresolved incidents against existing problems, known errors and other incidents. Initiates the implementation of agreed infrastructure remedies, in close liaison with the service desk, incident management, change management, configuration management and asset management functions. Initiates preventative measures, such as identifying and investigating suspect operating system software and other infrastructure components. Ensures that existing problems and known errors in infrastructure components being brought into operation are understood and managed in the same way as those

Competency standard	Expected requirement	Work activities demonstrating expected level of competence	Work activities demonstrating competence beyond the minimum expected
		data extracted from the configuration management system/known error database). Takes agreed actions relating to infrastructure defect/problem	arising from operational incidents. Supports service level management in monitoring the impact of infrastructure problems on agreed service levels, and initiates any appropriate improvement actions.

Competency standard	Expected requirement	Work activities demonstrating expected level of competence	Work activities demonstrating competence beyond the minimum expected
Workflow management Works flexibly and demonstrates the ability to work under pressure to progress allocated tasks in accordance with the organisation's reporting and quality systems.	The apprentice must be able to demonstrate the ability to prioritise workflow and manage allocated tasks. The apprentice must be able to record tasks and comply with organisation's quality processes.	Installs or removes infrastructure hardware and/or software, using supplied installation instructions and tools; follows agreed standards, including those for electrical work. Agrees the timing of the work with those affected, e.g. users, operations management, including, where appropriate, hand-over to client. Accepts data, media, consumables and other items required for the processing of work and takes responsibility for the movement, storage and dispatch of such items as required, and for other routine functions associated with data management.	Installs or removes infrastructure hardware and/or software, using supplied installation instructions and tools within established procedures and quality systems, including, where appropriate, hand-over to client. Organises the disposal of decommissioned hardware in an environmentally secure manner. Follows agreed standards, including, where appropriate, those for electrical work. Ensures that all tasks and procedures are carried out effectively and efficiently to agreed levels of service or specific requirements of Service or Operational Level Agreements. Gathers and records service level information. Produces statistics for use in measuring key performance indicators (KPIs).

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Competency standard	Expected requirement	Work activities demonstrating expected level of competence	Work activities demonstrating competence beyond the minimum expected
Health and Safety Interprets and follows IT legislation to securely and professionally work productively in the work environment. Understands and applies health & safety policies to every day work.	The apprentice must be able to demonstrate their interpretation and secure working practices in accordance with IT legislation. The apprentice must demonstrate an understanding and apply health & safety policies to everyday work.	Assists in producing simple infrastructure designs and specifications, complying with known standards and good practices (e.g. IEEE standards). Provides guidance and assistance to less experienced colleagues in the execution of routine tasks and ensures that all safety, security, clerical and administrative procedures are completed correctly.	Performs simple infrastructure design work while complying with known standards and good practices (e.g. IEEE standards). Takes account of factors that can affect integration of components (e.g. environmental, security, usability, interoperability etc.). Helps to resolve problems (e.g. poor performance) and faults (e.g. system failure) occurring in the operation of infrastructure hardware and software – especially those requiring greater installation expertise.

Competency standard	Expected requirement	Work activities demonstrating expected level of competence	Work activities demonstrating competence beyond the minimum expected
Performance Optimises the performance of hardware, software and network systems and services in line with business requirement.	The apprentice must be able to demonstrate how to configure a minimum of three pieces of hardware and configure three different types of software in line with business requirements.	Carries out required collection of information and records, including using network management systems and appropriate performance analysis equipment to monitor installation performance against agreed service levels. Takes action on known or moderately complex infrastructure problems, escalating to superiors and specialists only when their action is required. Contributes, as required, to the development of installation procedures and standards. Gathers performance statistics from the IT platforms to enable recommendations for the tuning of system software. Applies system software parameters to maximise throughput and efficiency. Accepts data, media, consumables and other items required for the processing of work and takes responsibility for the movement, storage and dispatch of such items as required, and for other routine functions associated with data management.	Corrects infrastructure malfunctions, calling on other experienced colleagues and external resources if required, and initiates action to ensure best use is made of available infrastructure assets. Initiates action to maintain or improve installation/decommissioning procedures and standards within area of authority, recognising issues that need to be escalated. Collects performance data to monitor system efficiency against published service level agreements. Monitors both resource usage and failure rates of installed systems and provides feedback to management. Ensures that all tasks and procedures are carried out effectively and efficiently to agreed levels of service or specific requirements of service or operational level agreements. Gathers and records service level information. Produces statistics for use in measuring key performance indicators (KPIs). Assists with the planning of infrastructure developments.

Competency standard	Expected requirement	Work activities demonstrating expected level of competence	Work activities demonstrating competence beyond the minimum expected
		Assists with the planning of relatively simple infrastructure developments.	

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Competency standard	Expected requirement	Work activities demonstrating expected level of competence	Work activities demonstrating competence beyond the minimum expected
Environment Understands and responds to the correct processes associated with WEEE (the Waste Electrical and Electronic Equipment Directive).	The apprentice must be able to explain how to comply when required with WEEE and the implications of data protection during disposal.	Ensures that relevant technical infrastructure strategies, policies, standards and practices are applied correctly. Assists in producing simple infrastructure designs and specifications, complying with known standards and good practices (e.g. IEEE standards). Installs or removes infrastructure hardware and/or software, using supplied installation instructions and tools; follows agreed standards, including those for electrical work. Agrees the timing of the work with those affected, e.g. users, operations management, including, where appropriate, hand-over to client.	Assists in providing advice on technical infrastructure aspects of system development and integration, including the operational and maintenance aspects of systems under development, and proposed system recovery procedures. Ensures that relevant technical strategies, policies, standards and practices are applied correctly. Performs simple infrastructure design work while complying with known standards and good practices (e.g. IEEE standards). Takes account of factors that can affect integration of components (e.g. environmental, security, usability, interoperability etc.). Installs or removes infrastructure hardware and/or software, using supplied installation instructions and tools within established procedures and quality systems, including, where appropriate, hand-over to client. Organises the disposal of decommissioned hardware in an environmentally secure manner. Follows agreed standards, including, where appropriate, those for electrical work.

Table 3 – Generic Behaviour and Relationship Standards

The behaviour and relationship standards have been defined to demonstrate that the apprentice applies the good behaviours and interpersonal skills that are needed in a business environment. Behaviours and business relationship skills are assessed throughout the apprenticeship through a combination of the employer reference, the synoptic project and a summative portfolio, which is completed by apprentices from records of the work activities in which they have been involved. The training provider could assist the apprentice by offering some additional soft skills training over and above their apprenticeship. The apprenticeship standard sets out the attributes required within the occupation brief, which can be accessed via the Apprenticeship section of www.bcs.org.

Behaviour and relationship standard	Expected requirement
Apprentices can demonstrate how they contribute to the wider business objectives and show an understanding of the wider business environment.	Understands the goals, vision and values of the organisation. Aware of the commercial objectives of the tasks/ projects they are working on. Understands their role in meeting or exceeding customers' requirements and expectations. Is in tune with the organisation's culture.
Apprentices can manage relationships with work colleagues, including those in more senior roles, customers/clients and other stakeholders, internal or external, and as appropriate to their roles, so as to gain their confidence, keep them involved and maintain their support for the task/project in hand. Apprentices can establish and maintain productive working relationships, and can use a range of different techniques for doing so.	Managing relationships: • understands the value and importance of good relationships; • acknowledges other people's accomplishments and strengths; • understands how to deal with conflict; • promotes teamwork by participating. Customer/client relationships: • understands their requirements, including constraints and limiting factors; • sets reasonable expectations; • understands how to communicate with them in decisions and actions; • interacts positively with them; • provides a complete answer in response to queries (transparency, full disclosure).

Behaviour and relationship standard	Expected requirement
	Stakeholders: • understands who they are and what their 'stake' is; • prioritises stakeholders in terms of their importance, power to affect the task and interest in it; • agrees objectives.
Communication Apprentices should work both independently and as part of a team and follow the organisation's standards; competently demonstrating an ability to communicate both in writing and orally at all levels, using a range of tools, and demonstrating strong interpersonal skills and cultural awareness when dealing with colleagues, customers and clients during all tasks.	The apprentice should be able to use a minimum of three tools to communicate: • oral; • face-to-face; • remote; • diagrammatic. The apprentice should be able to demonstrate and compile three different forms of written professional correspondence. The apprentice must be able to explain three types of communication styles to ensure cultural awareness and appropriateness for customer is taken into account.
Apprentices should communicate effectively with a range of people at work, one-to-one and in groups, in different situations and using a variety of methods. Apprentices should demonstrate various methods of communication, with an understanding of the strengths, weaknesses and limitations of these, the factors that may disrupt it, and the importance of checking other people's understanding.	The apprentice should: • understand the purpose of communicating in a particular situation or circumstance (e.g. inform, instruct, suggest, discuss, negotiate etc.); • check that the person/people with whom one is communicating also understand the purpose; • be sensitive to the dynamics of the situation; • be aware of anything that might disrupt the effectiveness of the communication (e.g. status, past history).

Behaviour and relationship standard	Expected requirement

	• Method:
	  ○ understand the most appropriate method for the situation;
	  ○ be aware of the limitations of the chosen method, and the possible risks of miscommunication (e.g. ambiguity);
	  ○ take account of the affective dimensions of the method (e.g. body language, tone of voice, eye contact, facial expression etc.).
	
	• Execution:
	  ○ express self clearly and succinctly, but not over-simplifying;
	  ○ check that the other person/people understand what is being expressed;
	  ○ take account of the potential barriers to understanding (e.g. filtering, selective perception, information overload);
	  ○ modify the purpose and methods of communication during a situation in response to cues from the other person/people.

These attributes are difficult to measure and are subjective in nature so cannot actually guarantee that any greater level of competence or proficiency is being demonstrated. The BCS apprenticeship is mapped to the Skills Framework for the Information Age (SFIA), an internationally recognised skills framework, and to observable activities that an infrastructure technician apprentice working to the level of responsibility appropriate for the role should demonstrate. Accordingly, the proficiencies that should be demonstrated by an apprentice infrastructure technician are shown below.

Proficiency standard	Work activities demonstrating expected level of proficiency	Work activities demonstrating competence beyond the minimum expected
Business skills	Demonstrates an analytical and systematic approach to issue resolution. Takes the initiative in identifying and negotiating appropriate personal development opportunities. Demonstrates effective communication skills. Contributes fully to the work of teams. Plans, schedules and monitors own work (and that of others where applicable) competently, within limited deadlines and according to relevant legislation, standards and procedures. Appreciates the wider business context, and how their role relates to other roles and to the business of the employer or client.	Selects appropriately from applicable standards, methods, tools and applications. Maintains an awareness of developing technologies and their application and takes some responsibility for driving their personal development. Communicates fluently, orally and in writing, and can present complex information to both technical and non-technical audiences. Facilitates collaboration between stakeholders who share common objectives. Plans, schedules and monitors work to meet time and quality targets. Rapidly absorbs new information and applies it effectively.
Complexity	Performs a range of work, sometimes complex and non-routine, in a variety of environments. Applies a methodical approach to issue definition and resolution.	Work includes a broad range of complex technical or professional activities, in a variety of contexts. Investigates, defines and resolves complex issues.
Influence	Interacts with and influences colleagues. Has working level contact with customers, suppliers and partners. May supervise others or make decisions that impact the work assigned to individuals or phases of projects.	Influences customers, suppliers and partners at account level. May have some responsibility for the work of others and for the allocation of resources. Participates in external activities related to their specialism. Makes decisions that influence the success of projects and team objectives.

Proficiency standard	Work activities demonstrating expected level of proficiency	Work activities demonstrating competence beyond the minimum expected
Autonomy	Works under general direction. Uses discretion in identifying and responding to complex issues and assignments. Usually receives specific instructions and has work reviewed at frequent milestones. Determines when issues should be escalated to a higher level.	Works under general direction within a clear framework of accountability. Exercises substantial personal responsibility and autonomy. Plans their work to meet given objectives and processes.

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Infrastructure Technician Apprentice Templates

The following templates are designed to support the training provider, and will take them from training and development planning, through to the end-point assessment readiness check. As with the tables above they can be used by the training provider to help them manage the process through to completion, although training providers may also substitute their own processes and documentation as they see fit in order to effectively manage their programme.

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Infrastructure Technician Template 1 – Training and Development Plan

Apprentice details

Name	
ULN number	

Employer details

Contact name	
Company name	
Company address	

Training provider details

Contact name	
Company name	
Company address	

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Role mapping against the infrastructure technician standard

For each area of technical and behavioural competence an overall evaluation should be provided on a three-point scale to show how often this competence is required during the normal work carried out by the employer:

- **critical** – this competence is applied most of the time;
- **desirable** – this competence is applied some of the time;
- **occasional** – this competence is rarely required.

This evaluation could form the basis of an ongoing review with the apprentice on a regular basis.

Workplace competence map

The template shows the type of activities that are identified in the apprenticeship standard for infrastructure technicians as demonstrating the required competencies being applied in the workplace.

It is recognised that there are differences between the types of work carried out by different employers so this template provides the opportunity to include any other activity that demonstrates the apprentice's competence during their normal duties.

The tables below could be used to make an evaluation of the apprentice's work environment and detail the work activities that a competent apprentice should be able undertake. This activity should then lead to a discussion to identify any gaps with the employer and make a plan to redress the balance.

In the normal course of work, is the apprentice required to:	**Critical**	**Desirable**	**Occasional**
Demonstrate the necessary skills and behaviours to securely operate across all platforms and areas of responsibility in line with organisational guidance and legislation?	☐	☐	☐
Effectively operate a range of mobile devices and securely add them to a network in accordance with organisation's policies and procedures?	☐	☐	☐
Effectively record, analyse and communicate data at the appropriate level using the organisation's standard tools and processes and to all stakeholders within the responsibility of the position?	☐	☐	☐
Apply structured techniques to common and non-routine problems, testing methodologies and troubleshooting, and analyse problems by selecting the digital appropriate tools and techniques in line with organisation guidance and to obtain the relevant logistical support as required?	☐	☐	☐

Work flexibly and demonstrate the ability to work under pressure to progress allocated tasks in accordance with the organisation's reporting and quality systems?	☐	☐	☐
Interpret and follow IT legislation to securely and professionally work productively in the work environment. Understand and apply health & safety policies to everyday work?	☐	☐	☐
Optimise the performance of hardware, software and network systems and services in line with business requirement?	☐	☐	☐
Understand and respond to the correct processes associated with WEEE (the Waste Electrical and Electronic Equipment Directive)?	☐	☐	☐
Please add any other activities you think demonstrate the apprentice's competence in this area.	☐	☐	☐

What is your overall evaluation of the apprentice's opportunity to demonstrate the technical competencies in the employer's normal workplace environment?

Please continue on a separate sheet if required.

Knowledge module training plan

The knowledge standards define learning that should take place during the apprenticeship, **both through the training provider activities and the apprentice's independent learning**. The training provider should work with the employer to identify appropriate training for the apprentice to meet the requirements of the standard and the employer should identify opportunities within the scope of their normal business activities for the apprentice to demonstrate what they have learnt.

Knowledge and understanding will be delivered by a combination of BCS qualifications and vendor certifications in accordance with the infrastructure technician standard.

One recognised vendor or professional certification must be passed, which may be used to exempt one of the knowledge modules. Details of these, and the knowledge module that can be exempted, are contained in the standard. The training provider and the employer should agree which is best suited to their requirements.

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Training plan – knowledge

BCS qualification	Selected Y/N	Vendor certification alternative chosen
BCS Level 3 Award in Networking and Infrastructure		CCNA 1 MTA Network Fundamentals Network + A + CIW Network Technology Associate
BCS Level 3 Award in Mobile and Operating Systems		CCNA Security MCP Managing and Maintaining Windows 8 * MCP Configuring Windows 8 * MTA Mobility and Devices Fundamentals Security + Mobile + CIW – Internet Business Associate CIW – Mobile Application Development
BCS Level 3 Award in Cloud Services		MTA Server Admin * Enabling Office 365 Services Enabling Office 365 Identities and Requirements MTA Cloud Fundamentals Install Configure Windows Server 2012 * Administration of Windows Server 2012 * Configure Advanced Windows Server 2012 Services *
BCS Level 3 Award in Coding and Logic		MTA Software Development Fundamentals App Development
BCS Level 3 Award in Business Processes		CIW – Internet Business Associate ITIL Foundation Level

*Or their direct replacements.

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Technical competence development plan

The following template may be used to describe how to ensure that the apprentice will be given the opportunity to demonstrate each of the required technical competencies stated in the infrastructure technician standard.

Competency requirement to meet the standard	How will this be ensured?	Responsibility (employer or training provider)?
IT Security Demonstrates the necessary skills and behaviours to securely operate across all platforms and areas of responsibility in line with organisational guidance, legislation.		
Remote Infrastructure Effectively operates a range of mobile devices and securely adds them to a network in accordance with organisation's policies and procedures.		
Data Effectively records, analyses and communicates data at the appropriate level using the organisation's standard tools and processes, and to all stakeholders within the responsibility of the position.		
Problem solving Applies structured techniques to common and non-routine problems, testing methodologies and troubleshooting, and analyses problems by selecting the digital appropriate tools and techniques in line with organisation guidance and to obtain the relevant logistical support as required.		
Workflow management Works flexibly and demonstrates the ability to work under pressure to progress allocated tasks in accordance with the organisation's reporting and quality systems.		

Health and Safety Interprets and follows IT legislation to securely and professionally work productively in the work environment. Understands and applies health & safety policies to every day work.		
Performance Optimises the performance of hardware, software and network systems and services in line with business requirement.		
Environment Understands and responds to the correct processes associated with WEEE (the Waste Electrical and Electronic Equipment Directive).		

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Professional development activities plan

BCS has defined a number of professional development activities that support wider professional and career development. These activities have been associated with the various levels of responsibility, and the activities listed in the table below represent those that are appropriate for an infrastructure technician apprentice.

Training providers may wish to engage in assisting the apprentice in some of these activities as they can contribute towards the portfolio of evidence. The recommended activities include those shown below.

Professional development activities	**Appropriate to the role**	**Agreed with apprentice and employer**
Participating in group activities inside or outside the working environment that can assist with the development of interpersonal skills.	☐	☐
Undertaking unpaid activities that can help to develop professional skills or offer additional insight into, or understanding of, their working role.	☐	☐
Undertaking learning in subjects relevant to, but not directly related to, their role (e.g. mentoring skills, cultural awareness and diversity training), perhaps through self-study or evening classes.	☐	☐
Gaining basic knowledge of the employing organisation, its business, structure, culture, products/services, operations and terminology.	☐	☐
Gaining knowledge of IT activities in the employing organisation external to their function.	☐	☐
Exploring a topic that is not part of their normal responsibilities, and presenting findings to colleagues and/or management.	☐	☐
Attending meetings, seminars and workshops organised by a professional body, and reading published material such as journals and web content.	☐	☐
Undertaking learning and practice in the techniques of team and collaborative working. Gaining an understanding of the underlying concepts.	☐	☐
Undertaking learning and practice in oral and written communications, including report writing and presentations.	☐	☐

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Infrastructure Technician Template 2 – Weekly Diary

Week number	Activities completed	Competencies displayed	Supporting evidence

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Infrastructure Technician Template 3 – Periodic Workplace Competence Assessment and Remedial Action Plan

This template can be used to track the competencies being applied in the workplace on a continual/periodic basis. The training provider can then discuss any gaps with the employer and make a plan to redress the balance.

Competence assessment

In the normal course of work, is the apprentice demonstrating these competencies?	**Sufficiently applied to meet minimum competence standard**	**Start/stop/continue – what should the apprentice start, stop or continue doing in order to develop this competence?**
IT Security Demonstrates the necessary skills and behaviours to securely operate across all platforms and areas of responsibility in line with organisational guidance, legislation.	☐	
Remote Infrastructure Effectively operates a range of mobile devices and securely adds them to a network in accordance with organisation's policies and procedures.	☐	
Data Effectively records, analyses and communicates data at the appropriate level using the organisation's standard tools and processes, and to all stakeholders within the responsibility of the position.	☐	
Problem solving Applies structured techniques to common and non-routine problems, testing methodologies and troubleshooting, and analyses problems by selecting the digital appropriate tools and techniques in line with organisation guidance and to obtain the relevant logistical support as required.	☐	

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Workflow management Works flexibly and demonstrates the ability to work under pressure to progress allocated tasks in accordance with the organisation's reporting and quality systems.	☐	
Health and Safety Interprets and follows IT legislation to securely and professionally work productively in the work environment. Understands and applies health & safety policies to everyday work.	☐	
Performance Optimises the performance of hardware, software and network systems and services in line with business requirement.	☐	
Environment Understands and responds to the correct processes associated with WEEE (the Waste Electrical and Electronic Equipment Directive).	☐	
Please add any other activities you think demonstrate the apprentice's competence in this area.	☐	

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Remedial action plan

An important function of the training provider is to act as an advisor to the apprentice and the employer to ensure that the programme remains on track and any concerns are addressed. The training provider should agree how best to provide ongoing assistance/advice throughout the apprenticeship, possibly as part of their contract/service agreement with the apprentice's employer.

If any remedial action is required, the table below could be used to record it.

Remedial action (if any) required to deliver the plan/SLA agreed with the employer and apprentice to demonstrate the technical competencies in the employer's normal workplace environment:
Please continue on a separate sheet as required.

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Infrastructure Technician – The Employer Reference Overview

This template and guidance will assist the training provider in supporting the employer when completing the employer reference, which forms a key part of the final end-point assessment.

This employer reference template should be used to record the employer's comments against the grading minimum standards, criteria and dimensions, as set out in the infrastructure technician standard.

For each area of technical competence and behavioural proficiency, the employer will be asked to provide an overall evaluation on a three-point scale:

- **met** – they have observed this behaviour in the apprentice most of the time;
- **exceeded** – they have observed this behaviour in the apprentice all of the time;
- **not met** – they have not observed this behaviour in the apprentice.

They should perform an evaluation using the checkboxes, and then provide an overall evaluation of the apprentice's competence or proficiency.

The template shows the type of activities that could demonstrate the required competencies and behaviours being applied in the workplace. There are always differences between individual employers and their requirements so there is the opportunity for the employer to include any other activity that they think demonstrates the apprentice's competence. It should be completed by a senior member of the team, who is able to comment directly on work activities.

Digital Industries Apprenticeship: Standard Specific Guidance for Training Providers – Infrastructure Technician

Infrastructure Technician Template 4 – The Employer Reference

Apprentice details

Name	
ULN number	

Training provider details

Contact name	
Company name	
Company address	

Employer details

Name	
Company address	
Signed by: Print name: Job title: Date:	

Digital Industries Apprenticeship: Standard Specific Guidance for Training Providers – Infrastructure Technician

Section 1
Technical competence evaluation

Please provide your evaluation of the technical competence of the apprentice using the tables below. Under each heading is a list of activities that a competent apprentice should be able to demonstrate.

Please indicate your assessment of each competence using the checkboxes, and then provide an overall evaluation of the apprentice's technical competence

Digital Industries Apprenticeship: Standard Specific Guidance for Training Providers – Infrastructure Technician

Competence – Communication

In your view, is the apprentice competent to:	The apprentice has MET this requirement	The apprentice has EXCEEDED this requirement	The apprentice has NOT MET this requirement
Work both independently and as part of a team and following the organisations standards; competently demonstrating an ability to communicate both in writing and orally at all levels, using a range of tools and demonstrating strong interpersonal skills and cultural awareness when dealing with colleagues, customers and clients during all tasks.	☐	☐	☐

- **Met** – you have observed this behaviour in the apprentice most of the time.
- **Exceeded** – you have observed this behaviour in the apprentice all of the time.
- **Not Met** – you have not observed this behaviour in the apprentice.

What is your overall evaluation of the apprentice's competence in Communication?

Please give reasons, together with supporting examples, why you think the apprentice has demonstrated this level of competence in this area. Please continue on a separate sheet if required.

Digital Industries Apprenticeship: Standard Specific Guidance for Training Providers – Infrastructure Technician

Competence – IT Security

In your view, is the apprentice competent to:	The apprentice has MET this requirement	The apprentice has EXCEEDED this requirement	The apprentice has NOT MET this requirement
Demonstrate the necessary skills and behaviours to securely operate across all platforms and areas of responsibility in line with organisational guidance and legislation?	☐	☐	☐

- **Met** – you have observed this behaviour in the apprentice most of the time.
- **Exceeded** – you have observed this behaviour in the apprentice all of the time.
- **Not Met** – you have not observed this behaviour in the apprentice.

What is your overall evaluation of the apprentice's competence in IT Security?

Please give reasons, together with supporting examples, why you think the apprentice has demonstrated this level of competence in this area. Please continue on a separate sheet if required.

Digital Industries Apprenticeship: Standard Specific Guidance for Training Providers – Infrastructure Technician

Competence – Remote Infrastructure

In your view, is the apprentice competent to:	The apprentice has MET this requirement	The apprentice has EXCEEDED this requirement	The apprentice has NOT MET this requirement
Effectively operate a range of mobile devices and securely add them to a network in accordance with organisation's policies and procedures?	☐	☐	☐

- **Met** – you have observed this behaviour in the apprentice most of the time.
- **Exceeded** – you have observed this behaviour in the apprentice all of the time.
- **Not Met** – you have not observed this behaviour in the apprentice.

What is your overall evaluation of the apprentice's competence in Remote Infrastructure?

Please give reasons, together with supporting examples, why you think the apprentice has demonstrated this level of competence in this area. Please continue on a separate sheet if required.

Digital Industries Apprenticeship: Standard Specific Guidance for Training Providers – Infrastructure Technician

Competence – Data

In your view, is the apprentice competent to:	The apprentice has MET this requirement	The apprentice has EXCEEDED this requirement	The apprentice has NOT MET this requirement
Effectively record, analyse and communicate data at the appropriate level using the organisation's standard tools and processes, and to all stakeholders within the responsibility of the position?	☐	☐	☐

- **Met** – you have observed this behaviour in the apprentice most of the time.
- **Exceeded** – you have observed this behaviour in the apprentice all of the time
- **Not Met** – you have not observed this behaviour in the apprentice.

What is your overall evaluation of the apprentice's competence in Data?

Please give reasons, together with supporting examples, why you think the apprentice has demonstrated this level of competence in this area. Please continue on a separate sheet if required.

Digital Industries Apprenticeship: Standard Specific Guidance for Training Providers – Infrastructure Technician

Competence – Problem Solving

In your view, is the apprentice competent to:	The apprentice has MET this requirement	The apprentice has EXCEEDED this requirement	The apprentice has NOT MET this requirement
Apply structured techniques to common and non-routine problems, testing methodologies and troubleshooting, and analyse problems by selecting the digital appropriate tools and techniques in line with organisation guidance and to obtain the relevant logistical support as required?	☐	☐	☐

- **Met** – you have observed this behaviour in the apprentice most of the time.
- **Exceeded** – you have observed this behaviour in the apprentice all of the time.
- **Not Met** – you have not observed this behaviour in the apprentice.

What is your overall evaluation of the apprentice's competence in Problem Solving?

Please give reasons, together with supporting examples, why you think the apprentice has demonstrated this level of competence in this area. Please continue on a separate sheet if required.

Digital Industries Apprenticeship: Standard Specific Guidance for Training Providers – Infrastructure Technician

Competence – Workflow Management

In your view, is the apprentice competent to:	The apprentice has MET this requirement	The apprentice has EXCEEDED this requirement	The apprentice has NOT MET this requirement
Work flexibly and demonstrate the ability to work under pressure to progress allocated tasks in accordance with the organisation's reporting and quality systems?	☐	☐	☐

- **Met** – you have observed this behaviour in the apprentice most of the time.
- **Exceeded** – you have observed this behaviour in the apprentice all of the time.
- **Not Met** – you have not observed this behaviour in the apprentice.

What is your overall evaluation of the apprentice's competence in Workflow Management?

Please give reasons, together with supporting examples, why you think the apprentice has demonstrated this level of competence in this area. Please continue on a separate sheet if required.

Digital Industries Apprenticeship: Standard Specific Guidance for Training Providers – Infrastructure Technician

Competence – Health and Safety

In your view, is the apprentice competent to:	The apprentice has MET this requirement	The apprentice has EXCEEDED this requirement	The apprentice has NOT MET this requirement
Interpret and follow IT legislation to securely and professionally work productively in the work environment?	☐	☐	☐

- **Met** – you have observed this behaviour in the apprentice most of the time.
- **Exceeded** – you have observed this behaviour in the apprentice all of the time.
- **Not Met** – you have not observed this behaviour in the apprentice.

What is your overall evaluation of the apprentice's competence in Health and Safety?

Please give reasons, together with supporting examples, why you think the apprentice has demonstrated this level of competence in this area. Please continue on a separate sheet if required.

Digital Industries Apprenticeship: Standard Specific Guidance for Training Providers – Infrastructure Technician

Competence – Performance

In your view, is the apprentice competent to:	The apprentice has MET this requirement	The apprentice has EXCEEDED this requirement	The apprentice has NOT MET this requirement
Optimise the performance of hardware, software and Network Systems and services in line with business requirements?	☐	☐	☐

- **Met** – you have observed this behaviour in the apprentice most of the time.
- **Exceeded** – you have observed this behaviour in the apprentice all of the time
- **Not Met** – you have not observed this behaviour in the apprentice.

What is your overall evaluation of the apprentice's competence in Performance?

Please give reasons, together with supporting examples, why you think the apprentice has demonstrated this level of competence in this area. Please continue on a separate sheet if required.

Digital Industries Apprenticeship: Standard Specific Guidance for Training Providers – Infrastructure Technician

Competence – Environment

In your view, is the apprentice competent to:	The apprentice has MET this requirement	The apprentice has EXCEEDED this requirement	The apprentice has NOT MET this requirement
Explain the correct processes associated with WEEE (the Waste Electrical and Electronic Equipment Directive)?	☐	☐	☐

- **Met** – you have observed this behaviour in the apprentice most of the time.
- **Exceeded** – you have observed this behaviour in the apprentice all of the time.
- **Not Met** – you have not observed this behaviour in the apprentice.

What is your overall evaluation of the apprentice's competence in Environment?

Please give reasons, together with supporting examples, why you think the apprentice has demonstrated this level of competence in this area. Please continue on a separate sheet if required.

Digital Industries Apprenticeship: Standard Specific Guidance for Training Providers – Infrastructure Technician

Section 2
Behaviours, business skills and level of responsibility evaluation

Please provide an evaluation as to the level of responsibility of the apprentice you are providing a reference for using the tables below. Under each heading is a list of proficiencies that a competent apprentice should display. Please indicate your assessment of the apprentice's proficiency using the checkboxes, and then provide an overall evaluation of the apprentice's proficiency.

Digital Industries Apprenticeship: Standard Specific Guidance for Training Providers – Infrastructure Technician

Proficiency – Business Skills

In your view, is the apprentice proficient at:	**The apprentice has MET this requirement**	**The apprentice has EXCEEDED this requirement**	**The apprentice has NOT MET this requirement**
Demonstrating an analytical and systematic approach to issue resolution?	☐	☐	☐
Works independently and takes responsibility?	☐	☐	☐
Demonstrating effective communication skills and contributing fully to the work of teams?	☐	☐	☐
Explores all known options to resolve problems?	☐	☐	☐
Appreciating the wider business context, and how their role relates to other roles and to the business of the employer or client?	☐	☐	☐

- **Met** – you have observed this behaviour in the apprentice most of the time.
- **Exceeded** – you have observed this behaviour in the apprentice all of the time.
- **Not Met** – you have not observed this behaviour in the apprentice.

What is your overall evaluation of the apprentice's business skills?

Please give reasons, together with supporting examples, why you think the apprentice has demonstrated this level of proficiency in this area. Please continue on a separate sheet if required.

Digital Industries Apprenticeship: Standard Specific Guidance for Training Providers – Infrastructure Technician

Proficiency – Complexity

In your view, is the apprentice proficient at:	The apprentice has MET this requirement	The apprentice has EXCEEDED this requirement	The apprentice has NOT MET this requirement
Performing a range of work, sometimes complex and non-routine, in a variety of environments?	☐	☐	☐
Applying methodical approaches to issue definition and resolution?	☐	☐	☐

- **Met** – you have observed this behaviour in the apprentice most of the time.
- **Exceeded** – you have observed this behaviour in the apprentice all of the time.
- **Not Met** – you have not observed this behaviour in the apprentice.

What is your overall evaluation of the apprentice's proficiency at handing complexity?

Please give reasons, together with supporting examples, why you think the apprentice has demonstrated this level of proficiency in this area. Please continue on a separate sheet if required.

Digital Industries Apprenticeship: Standard Specific Guidance for Training Providers – Infrastructure Technician

Proficiency – Autonomy

In your view, is the apprentice proficient at:	The apprentice has MET this requirement	The apprentice has EXCEEDED this requirement	The apprentice has NOT MET this requirement
Working under general direction?	☐	☐	☐
Determining when issues should be escalated to a higher level?	☐	☐	☐

- **Met** – you have observed this behaviour in the apprentice most of the time.
- **Exceeded** – you have observed this behaviour in the apprentice all of the time.
- **Not Met** – you have not observed this behaviour in the apprentice.

What is your overall evaluation of the apprentice's proficiency to work autonomously?

Please give reasons, together with supporting examples, why you think the apprentice has demonstrated this level of proficiency in this area. Please continue on a separate sheet if required.

Digital Industries Apprenticeship: Standard Specific Guidance for Training Providers – Infrastructure Technician

Proficiency – Influence

In your view, is the apprentice proficient at:	The apprentice has MET this requirement	The apprentice has EXCEEDED this requirement	The apprentice has NOT MET this requirement
Having working level contact with customers, suppliers and partners?	☐	☐	☐
Externally working with customers, suppliers and partners in a variety of situations?	☐	☐	☐

- **Met** – you have observed this behaviour in the apprentice most of the time.
- **Exceeded** – you have observed this behaviour in the apprentice all of the time.
- **Not Met** – you have not observed this behaviour in the apprentice.

What is your overall evaluation of the apprentice's ability to influence?

Please give reasons, together with supporting examples, why you think the apprentice has demonstrated this level of proficiency in this area. Please continue on a separate sheet if required.

Digital Industries Apprenticeship: Standard Specific Guidance for Training Providers – Infrastructure Technician

Section 3
Professional development

A number of professional development activities have been identified as part of the SFIA***plus*** framework to help career development. These activities have been associated with the various levels of responsibility, and the activities listed in the table below represent those that are appropriate for an infrastructure technician apprentice.

In your view, is the apprentice undertaking any of the following professional development activities:	**The apprentice is demonstrably undertaking this activity**	**The apprentice is NOT demonstrably undertaking this activity**
Participating in group activities inside or outside the working environment that can assist with the development of interpersonal skills?	☐	☐
Undertaking pro bono (unpaid) activities that can help to develop professional skills or offer additional insight into, or understanding of, their working role?	☐	☐
Undertaking learning in subjects relevant to, but not directly related to, their role (e.g. foreign language courses, mentoring skills, cultural awareness and diversity training), perhaps through self-study or evening classes?	☐	☐
Gaining basic knowledge of the employing organisation, its business, structure, culture, products/services, operations and terminology?	☐	☐
Gaining knowledge of IT activities in the employing organisation external to their function?	☐	☐
Exploring a topic that is not part of their normal responsibilities, and presenting findings to colleagues and/or management?	☐	☐
Attending meetings, seminars and workshops organised by a professional body and reading published material such as journals and web content?	☐	☐
Undertaking learning and practice in the techniques of team and collaborative working. Gaining an understanding of the underlying concepts?	☐	☐
Undertaking learning and practice in oral and written communications, including report writing and presentations?	☐	☐

What is your overall evaluation of the apprentice's ability to undertake wider professional development?

Please continue on a separate sheet if required.

Digital Industries Apprenticeship: Standard Specific Guidance for Training Providers – Infrastructure Technician

Overall impressions and constructive feedback

This section is an opportunity for you to provide written feedback outside the rigid competency structure.

It is a free text field to allow you to share general thoughts on the apprentice's performance in case you were unable to say everything you wanted to say using the structured template. For example, you may want to highlight some of the areas where you have not been able to give the apprentice the exposure they would have liked.

We would welcome any general constructive development advice you may wish to give.

Please continue on a separate sheet if required.

Digital Industries Apprenticeship: Standard Specific Guidance for Training Providers – Infrastructure Technician

Infrastructure Technician Template 5 – Declaration and Evidence Checklists for the Completion of the Summative Portfolio

These templates are provided to support the training provider in working with the apprentice and employer to ensure the successful completion of the summative portfolio.

The checklists can be used by training providers to help them manage the process through to completion, although training providers may also substitute their own processes and documentation as they see fit.

The key responsibilities of the apprentice in producing their summative portfolio can be found in the General Guidance for Apprentices, Employers and Training Providers, as can generic guidance on how to select evidence to compile the summative portfolio.

The apprentice should gather artefacts and record information that can evidence their activities undertaken in the workplace. The portfolio of evidence should demonstrate the full range of competencies, as shown in this template, which are required by the standard to show that the apprentice can fulfil the role of an infrastructure technician.

Digital Industries Apprenticeship: Standard Specific Guidance for Training Providers – Infrastructure Technician

Summative Portfolio Declaration

Apprentice declaration

Name	
ULN	
Declaration	I confirm that all the evidence submitted is my own work and it has been completed as specified.
Signature	
Date	

Line manager declaration (employer)

Name	
Company	
Declaration	I confirm that the work contained within this portfolio has, to the best of my knowledge, been completed solely by _____
Signature	
Date	

Training provider declaration (training provider)

Name	
Company	
Declaration	I confirm that the work contained within this portfolio has, to the best of my knowledge, been completed solely by _____
Signature	
Date	

Digital Industries Apprenticeship: Standard Specific Guidance for Training Providers – Infrastructure Technician

Infrastructure Technician competencies evidence checklist

The defined competence areas and associated typical evidence are listed in this table. Not all employer businesses are identical so there will always be variation in the types of activity that will be carried out in the course of each apprentice's daily work; however, each infrastructure technician apprentice must be able to demonstrate evidence of every competence.

Acceptable evidence format
The intention is to allow flexibility in the format that evidence can take in order to reflect the type of records that an apprentice could realistically be expected to have access to. This includes, but is not limited to: • photographic or video evidence of activity; • witness statement; • observation reports; • annotated screenshots; • signed-off work records; • printed outputs of pre- and post-configuration settings; • peer reviews.

Competence	**Typical evidence**	
Communication Works both independently and as part of a team and following the organisations standards; competently demonstrating an ability to communicate both in writing and orally at all levels, using a range of tools and demonstrating strong interpersonal skills and cultural awareness when dealing with colleagues, customers and clients during all tasks.	Use a minimum of 3 tools to communicate: • oral; • face to face; • remote; • diagrammatic. Demonstrate and compile 3 different forms of written professional correspondence. Explain 3 types of communication styles to ensure cultural awareness and appropriateness for the customer.	
Minimum expected requirement	**List the evidence in the portfolio that fulfils this requirement**	**Reflections on applying knowledge learnt**

Evidence of 3 tools to communicate.		
Evidence of 3 different forms of written professional correspondence.		
Evidence of 3 types of communication style for cultural awareness and appropriateness for the customer.		

Competence	Typical evidence
IT Security Demonstrate the necessary skills and behaviours to securely operate across all platforms and areas of responsibility in line with organisational guidance and legislation**.**	Records of installing different elements required to implement a secure network including, but not limited to: • media (copper, fibre, wireless); • hardware devices; • software. Records of configuring different devices required to implement a secure network including, but not limited to: • switches and spanning tree; • routers and routing protocols; • network services including DNS, DHCP, VPN, PoE, VoIP, SSL/TSL, IPSec, NAT and PAT; • wireless access points; • storage – SAN and NAS. Records of configuring software required to implement a secure network including, but not limited to: • network operating system;

	• active directory/LDAP; • firewall rules and pinholes; • secure VPNs; • intrusion detection and intrusion prevention systems. Records of compliance with security policies including, but not limited to: • identifying and escalating security risks through appropriate channels; • working to company procedures.	
Minimum expected requirement	**List the evidence in the portfolio that fulfils this requirement**	**Reflections on applying knowledge learnt**
Evidence demonstrating compliance with organisational security processes.		
Evidence of recognising and escalating issues.		
Evidence of locating and following policies and legislation.		

Competence	Typical evidence	
Remote Infrastructure Effectively operate a range of mobile devices and securely add them to a network in accordance with organisation's policies and procedures.	Records and end-user plans showing the integration of end users' mobile devices into an existing network environment, in line with change control and release and deployment processes and procedures. Examples include: • developing network integration plans; • selecting and using methods of integration that meet the needs of the organisation; • checking logs and removal of devices that may interfere or conflict with agreed policies.	
Minimum expected requirement	**List the evidence in the portfolio that fulfils this requirement**	**Reflections on applying knowledge learnt**
Evidence of securely connecting a minimum of two different types of devices (e.g. laptop/mobile) to access the organisation's network services (e.g. email, files, applications).		

Competence	Typical evidence	
Data Effectively record, analyse and communicate data at the appropriate level using the organisation's standard tools and processes, and to all stakeholders within the responsibility of the position.	Records demonstrating diagnostic techniques and tools that are being used to interrogate and gather information regarding network performance, and using this information to enable network performance to be optimised whilst maintaining the security and performance of the network against known and standard threats. Examples include: • gathering information from log files including, but not limited to, operating system logs, application logs and security logs, using network monitoring tools and network analysers; • evidence of effectively communicating data at the appropriate level, such as, emails, meeting records and recordings of phone conversations (where applicable).	
Minimum expected requirement	**List the evidence in the portfolio that fulfils this requirement**	**Reflections on applying knowledge learnt**
Evidence of selecting and securely using 3 appropriate tools when working with and analysing data.		

Competence	Typical evidence	
Problem Solving Apply structured techniques to common and non-routine problems, testing methodologies and troubleshooting, and analyse problems by selecting the digital appropriate tools and techniques in line with organisation guidance, and to obtain the relevant logistical support as required.	Records showing the use of techniques to gather information and the use of tools to troubleshoot, isolate, repair or escalate faults. Examples include emails, logs, escalation evidence and ticket closures highlighting: • communication and recording of solutions in line with organisational procedures; • gathering of information regarding faults from appropriate sources including, but not limited to, end users, system logs, helpdesk software, diagnostic tools, CLI commands and replicating the fault; • selection of tools and how they were used to troubleshoot the problem; • review of key sources of information, known issues, identification of trends and suggestion of alternative solutions.	
Minimum expected requirement	**List the evidence in the portfolio that fulfils this requirement**	**Reflections on applying knowledge learnt**
Evidence of selecting and using three appropriate tools for testing, troubleshooting and analysing problems.		
Evidence demonstrating compliance with organisational guidance.		
Evidence demonstrating processes and practices for obtaining logistical support.		

Competence	Typical evidence	
Workflow Management Works flexibly and demonstrates the ability to work under pressure to progress allocated tasks in accordance with the organisation's reporting and quality systems.	Examples demonstrating high levels of communication, organisational and prioritisation skills when providing support to different types of users, for example: • following organisational protocols relating to IT service management; • meeting workflow distribution including deadlines; • escalating and prioritising service calls.	
Minimum expected requirement	**List the evidence in the portfolio that fulfils this requirement**	**Reflections on applying knowledge learnt**
Evidence demonstrating the ability to prioritise workflow and manage allocated tasks.		
Evidence of recording tasks and complying with organisation's quality processes.		

Competence	Typical evidence	
Health and Safety Interpret and follow IT legislation to securely and professionally work productively in the work environment. Understand and apply health and safety policies to everyday work.	Records showing the use of safe working practices. Examples include: • use of risk assessments and method statements; • use of safe working practices for hazardous substances; • health & safety training records and certificates.	
Minimum expected requirement	**List the evidence in the portfolio that fulfils this requirement**	**Reflections on applying knowledge learnt**
Evidence of interpretation and secure working practices in accordance with IT legislation.		
Evidence demonstrating an understanding and application of health and safety policies to everyday work.		

Digital Industries Apprenticeship: Standard Specific Guidance for Training Providers – Infrastructure Technician

Competence	Typical evidence	
Performance Optimise the performance of hardware, software and network systems and services in line with business requirement.	Records of work tasks, activities and projects demonstrating how network performance can be optimised to meet business expectations, for example: • showing whether the requirement is to optimise technical performance, optimise operating cost or to achieve some compromise between several factors; • explaining how the optimisation implemented meets the business requirements and how it was achieved.	
Minimum expected requirement	**List the evidence in the portfolio that fulfils this requirement**	**Reflections on applying knowledge learnt**
Evidence showing configuration of a minimum of three pieces of hardware in line with business requirements.		
Evidence showing configuration of a minimum of three different types of software in line with business requirements.		

Competence	Typical evidence	
Environment Understand and respond to the correct processes associated with WEEE (the Waste Electrical and Electronic Equipment Directive).	Records showing compliance with environmental legislation. Examples include: • disposal registers; • organisational procedures.	
Minimum expected requirement	**List the evidence in the portfolio that fulfils this requirement**	**Reflections on applying knowledge learnt**
Evidence of compliance with WEEE legislation during disposal.		
Evidence demonstrating compliance with data protection during disposal.		

Digital Industries Apprenticeship: Standard Specific Guidance for Training Providers – Infrastructure Technician

Generic levels of responsibility evidence checklist

Areas of responsibility and associated typical evidence are shown below.

Proficiency	Typical evidence	
Business skills Demonstrates an analytical and systematic approach to issue resolution. Demonstrates effective communication skills. Contributes fully to the work of teams. Appreciates the wider business context, and how their role relates to other roles and to the business of the employer or client. Works independently and takes responsibility. Explores all known options to resolve problems	• emails and/or reports that can evidence issues that have arisen and how they have been resolved; • personal development plans; • continuous professional development records; • team meeting presentations and reports; • work planning documents; • job descriptions.	
Minimum expected requirement	**List the evidence in the portfolio that fulfils this requirement**	**Reflections on applying knowledge learnt**
Evidence that you can demonstrate an analytical and systematic approach to issue resolution.		
Evidence that you can demonstrate effective communication skills.		
Evidence that you can contribute fully to the work of teams.		

Evidence that you can appreciate the wider business context, and how your role relates to other roles and to the business of the employer or client.		
Evidence that you can work independently and takes responsibility.		
Evidence that you can explore all known options to resolve problems.		

Proficiency	Typical evidence	
Complexity Performs a range of work, sometimes complex and non-routine, in a variety of environments. Applies a methodical approach to issue definition and resolution.	• emails and/or reports that can evidence complex and/or non-routine issues that have arisen and how they have been addressed; • emails and/or reports from colleagues or managers demonstrating how non-routine issues have been addressed.	
Minimum expected requirement	**List the evidence in the portfolio that fulfils this requirement**	**Reflections on applying knowledge learnt**
Evidence that you can perform a range of work, sometimes complex and non-routine, in a variety of environments.		
Evidence that you can apply a methodical approach to issue definition and resolution.		

Proficiency	Typical evidence	
Autonomy Works under general direction. Determines when issues should be escalated to a higher level.	• summaries of meetings where work has been reviewed with colleagues or managers; • project plans and project documentation.	
Minimum expected requirement	**List the evidence in the portfolio that fulfils this requirement**	**Reflections on applying knowledge learnt**
Evidence that you can operate under general direction.		
Evidence that you can determine when issues should be escalated to a higher level.		

Proficiency	Typical evidence
Influence Has working level contact with customers, suppliers and partners. Externally working with customers, suppliers and partners in a variety of situations.	• emails and/or reports from colleagues or managers evidencing engagement with customers, suppliers and partners; • evidence of work assignments; • evidence of work assignments and interactions with customers, suppliers and partners.

Minimum expected requirement	List the evidence in the portfolio that fulfils this requirement	Reflections on applying knowledge learnt
Evidence that you can interact with and influences colleagues.		
Evidence that you have working level contact with customers, suppliers and partners.		

Digital Industries Apprenticeship: Standard Specific Guidance for Training Providers – Infrastructure Technician

Professional development activities evidence checklist

Areas of additional professional development activities that might be undertaken and associated typical evidence are shown below.

Professional development topic	Objectives	Typical evidence
Understanding organisation	Gaining basic knowledge of the employing organisation, its business, structure, culture, products/services, operations and terminology. Gaining knowledge of IT activities in the employing organisation external to their function.	• organisation charts; • company annual reports; • company website; • documents or reports from other areas of the business.
Additional business skills	Undertaking learning and practice in the techniques of team and collaborative working. Gaining an understanding of the underlying concepts. Undertaking learning and practice in oral and written communications, including report writing and presentations. Learning from experience and mistakes and applying the lessons as part of continuous improvement.	• presentations, reports or minutes of meetings that demonstrate communication skills, report writing abilities and collaborative activities; • evidence of reviewing their work and suggesting improvements or critically appraising what they did and what they learned from it.
External activities	Participating in group activities inside or outside the working environment that can assist with the development of interpersonal skills. Undertaking pro bono (unpaid) activities that can help to develop professional skills or offer additional insight into, or understanding of, their working role.	• evidence of meetings attended through continuous professional development records; • evidence of activities undertaken.

Additional learning	Undertaking learning in subjects relevant to, but not directly related to, their role (e.g. foreign language courses, mentoring skills, cultural awareness and diversity training), perhaps through self-study or evening classes. Exploring a topic that is not part of their normal responsibilities, and presenting findings to colleagues and/or management.	• evidence of learning undertaken from continuous professional development records; • evidence of presentations given to colleagues and/or management.
Professional networking	Attending meetings, seminars and workshops organised by a professional body and reading published material such as journals and web content.	• evidence of meetings attended through continuous professional development records; • written evidence summarising learning gained from reading.

Digital Industries Apprenticeship: Standard Specific Guidance for Training Providers – Infrastructure Technician

Infrastructure Technician Template 6 – End-Point Assessment Readiness Check

The training provider should assess whether the apprentice has met the criteria for the end-point assessment as defined in the standard.
The template below is a simple checklist that may be used.

Competence	Ready	Not ready	Comments
IT Security Demonstrates the necessary skills and behaviours to securely operate across all platforms and areas of responsibility in line with organisational guidance, legislation.	☐	☐	
Remote Infrastructure Effectively operates a range of mobile devices and securely adds them to a network in accordance with organisation's policies and procedures.	☐	☐	
Data Effectively records, analyses and communicates data at the appropriate level using the organisation's standard tools and processes, and to all stakeholders within the responsibility of the position.	☐	☐	
Problem solving Applies structured techniques to common and non-routine problems, testing methodologies and troubleshooting, and analyses problems by selecting the digital appropriate tools and techniques in line with organisation guidance and to obtain the relevant logistical support as required.	☐	☐	
Workflow management Works flexibly and demonstrates the ability to work under pressure to progress allocated tasks in accordance with the organisation's reporting and quality systems.	☐	☐	

Health and Safety Interprets and follows IT legislation to securely and professionally work productively in the work environment. Understands and applies health and safety policies to everyday work.	☐	☐	
Performance Optimises the performance of hardware, software and network systems and services in line with business requirement.	☐	☐	
Environment Understands and responds to the correct processes associated with WEEE (the Waste Electrical and Electronic Equipment Directive).	☐	☐	