

Vocational Qualifications Pathway (VQP) for Artificial Intelligence / Machine Learning

Job Area Job Level	Artificial Intelligence / Machine Learning
Master Level	<i>The ICT practitioners at this level mainly responsible for decision-making processes. They oversee the entire IT operations and strategic development direction in the organization. Professionals at this level require broad corporate perspective, good communication skills and great technology knowledge.</i>
Job Title	AI Business Director
Job Title	AI Senior Consultant
Specialist Level	<i>The ICT practitioners at this level mainly involve in managerial processes. They may associate with individual technical departments and manage those departments by applying their technical and managerial skills. The major tasks performed by the professionals at this level is to manage the individual activities and project segments to lead the project towards completion within the assigned budget and stipulated deadline.</i>
Job Title	AI/ML Engineer
Job Title	AI/ML Solution Architect
Job Title	AI/ML Business Analyst
Job Title	AI/ML Developer
Practitioner Level	<i>The ICT practitioners at this level manage certain parts of technical processes depending on their subject matter expertise. Many different profiles are served by professionals at this level who maybe fresh sub-degree graduates or those who possess certain experience in their field.</i>
Job Title	Junior AI/ML Engineer
Job Title	Junior AI/ML Developer
Support Level	<i>The ICT practitioners at this level provide basic technical support depending on their subject matter expertise. Many different profiles are served by the practitioners at this level who maybe S6 graduates with relevant ICT skills and knowledge or those who possess little experience in their field.</i>
Job Title	Computer Operator
Job Title	User Support Staff
Job Title	Technical Support Services Staff
Job Title	Help Desk Operator
Job Title	Field technician

Proposed Competency Requirements (AI/ML - Master Level)

Relevant Job Titles:

- AI/ML Business Director / AI/ML Senior Consultant

Area of Work / Cluster Name	Major Task	Competency Requirements	Units of Competency (UoCs) Number	Relevant Qualification for fulfilling Competency Requirements
Business strategies and policies for AI/ML application	1. Develop an AI/ML roadmap aligned to the organization's needs and vision.	<ul style="list-style-type: none"> ▪ Formulate business strategies and policies ▪ Formulate IT strategies and policies ▪ Identify and evaluate information technologies that support the objectives of an organisation ▪ Review the emerging technologies and cross-functional strategies ▪ Understand Systems Development Life Cycle (SDLC) and software development process 	<p>111201L6</p> <p>ITSWSM603A</p> <p>111202L6</p> <p>111207L6</p> <p>ITSWG619A</p>	Obtain qualification via training programmes (QF Level 6)
	2. Work closely with key stakeholders in other departments of the organization to identify, develop, prioritize and implement AI/ML solutions to satisfy key organization business needs	<ul style="list-style-type: none"> ▪ Review, design and re-engineer business processes to form a new business architecture ▪ Define metrics to ensure that a technology architecture meets the business goals 	<p>111125L6</p> <p>111127L5</p>	

Area of Work / Cluster Name	Major Task	Competency Requirements	Units of Competency (UoCs) Number	Relevant Qualification for fulfilling Competency Requirements
Business strategies and policies for AI/ML application (continued)	3. Ensure best practices are established and maintained for all key AI/ML and data management procedures, architecture, and standards	<ul style="list-style-type: none"> ▪ Review and comply with organisational policies and procedures, relevant laws and regulatory requirements ▪ Set policy to control data security and privacy ▪ Review the ethical and social issues for IT applications 	<p style="text-align: center;">111205L6</p> <p style="text-align: center;">111206L6</p> <p style="text-align: center;">111208L6</p>	(Continued) Obtain qualification via training programmes (QF Level 6)

Proposed Competency Requirements (AI/ML - Specialist Level)

Relevant Job Titles:

- AI/ML Engineer / AI/ML Solution Architect / AI/ML Business Analyst / AI/ML Developer

Area of Work / Cluster Name	Major Task	Competency Requirements	Units of Competency (UoCs) Number	Relevant Qualification for fulfilling Competency Requirements
Analysis of business needs for AI/ML technology	1. Analyze and associate AI/ML principles into reasoning and uncertainty in any perspective environment. Identify development needs in order to improve and streamline business operations.	<ul style="list-style-type: none"> ▪ Model technology architecture ▪ Formulate IT plan ▪ Perform statistical analysis and refine the operational decision-making process 	<p style="text-align: center;">111129L5</p> <p style="text-align: center;">111210L5</p> <p style="text-align: center;">111158L5</p>	Obtain qualification via training programmes (QF Level 5)
	2. Perform research to acquire new AI/ML knowledge necessary to perform assigned tasks and maintain a process of technological evolution.	<ul style="list-style-type: none"> ▪ Review the emerging technologies and cross-functional strategies ▪ Conduct solicitation process in project outsourcing 	<p style="text-align: center;">111207L6</p> <p style="text-align: center;">111196L5</p>	

Area of Work / Cluster Name	Major Task	Competency Requirements	Units of Competency (UoCs) Number	Relevant Qualification for fulfilling Competency Requirements
Application of AI/ML technology	3. Applying AI/ML techniques for business process analysis and reconstruction.	<ul style="list-style-type: none"> ▪ Develop programme modules of the software based on its design documents ▪ Develop data analysis programmes in enterprise intelligence systems ▪ Establish and develop the project team ▪ Manage project team 	<p>ITSWDM504A</p> <p>111156L5</p> <p>ITSWPM513A</p> <p>ITSWPM514A</p>	(Continued) Obtain qualification via training programmes (QF Level 5)
	4. Evaluate and improve the performance of applications in AI/ML domains	<ul style="list-style-type: none"> ▪ Project the potential costs, benefits and ROI of IT project ▪ Develop test plans for various levels of testing ▪ Conduct project performance reporting 	<p>111211L5</p> <p>ITSWDM507A</p> <p>ITSWPM517A</p>	

Proposed Competency Requirements (AI/ML - Practitioner Level)

Relevant Job Titles:

- Junior AI/ML Engineer / Junior AI/ML Developer

Area of Work / Cluster Name	Major Task	Competency Requirements	Units of Competency (UoCs) Number	Relevant Qualification for fulfilling Competency Requirements
Development of AI/ML application	1. Develop AI/ML applications according to requirements	<ul style="list-style-type: none"> ▪ Apply diagnostic and troubleshooting skills to solve hardware, software and networking related issues. ▪ Perform statistical analysis and refine the operational decision-making process ▪ Implement algorithms and methods of image processing 	<p>111121L4</p> <p>111158L5</p> <p>111112L5</p>	Obtain qualification via training programmes (QF Level 4)
	2. Be conversant on the AI/ML developments, practices and principles	<ul style="list-style-type: none"> ▪ Analyze the available solutions from IT service providers 	111199L4	
Project Management for AI/ML project	3. Coordinate with other business units of the organization to ensure optimized hardware/software/resource utilization	<ul style="list-style-type: none"> ▪ Prepare system operation documentation ▪ Verify and validate that the deployed / migrated software and the existing software 	<p>111200L4</p> <p>111159L4</p>	

		<p>are functioning properly</p> <ul style="list-style-type: none">▪ Manage organization resources for implementation across multiple processing environment▪ Define user requirements	<p>111163L4</p> <p>111162L4</p>	
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Proposed Competency Requirements (AI/ML - Support Level)

Relevant Job Titles:

- Computer operator / User support staff / Technical support services staff (TSS) / Help desk operator / Field technician

Area of Work / Cluster Name	Major Task	Competency Requirements	Units of Competency (UoCs) Number	Relevant Qualification for fulfilling Competency Requirements
Network Support	1. Network Support	<ul style="list-style-type: none"> Install and configure client/server application Configure WAN connection Troubleshoot network issues 	<p>107882L3</p> <p>107883L3</p> <p>107884L3</p>	Obtain qualifications via training programmes (QF Level 3) Or RPL Mechanism (QF Level 3 RPL Cluster: TOS010L3)
Network Security Support (Technical Support)	2. Network Security Support	<ul style="list-style-type: none"> Administer basic network security Administer basic website security Administer perimeter firewall Strengthen workstation protection 	<p>107887L3</p> <p>107889L3</p> <p>107890L3</p> <p>107891L3</p>	Obtain qualifications via training programmes (QF Level 3) Or RPL Mechanism (QF Level 3 RPL Cluster: ITOS011L3)
User Support	3. User Support	<ul style="list-style-type: none"> Provide support to mobile device users Troubleshoot client device hardware issues Perform remote support 	<p>107904L3</p> <p>107905L3</p> <p>107907L3</p>	Obtain qualifications via training programmes (QF Level 3) Or RPL Mechanism (QF Level 3 RPL Cluster: ITOS012L3)
System Security Support	4. System Security Support	<ul style="list-style-type: none"> Create and maintain user accounts on server Configure user access control on server Administer system security 	<p>107885L2</p> <p>107886L3</p> <p>107888L3</p>	Obtain qualifications via training programmes (QF Level 3) Or RPL Mechanism (QF Level 3 RPL Cluster: ITOS009L3)

Area of Work / Cluster Name	Major Task	Competency Requirements	Units of Competency (UoCs) Number	Relevant Qualification for fulfilling Competency Requirements
Web Support	5. Web Support	<ul style="list-style-type: none"> ▪ Troubleshoot web browser and connection issues ▪ Maintain website performance ▪ Build simple web site using content management systems ▪ Maintain website 	<p>107909L3</p> <p>107910L3</p> <p>107911L3</p> <p>107912L3</p>	<p>Obtain qualifications via training programmes (QF Level 3)</p> <p>Or</p> <p>RPL Mechanism (QF Level 3 RPL Cluster: ITOS013L3)</p>
Network and Security Support	6. Network and Security Support	<ul style="list-style-type: none"> ▪ Build a small wireless LAN ▪ Install and configure network components/devices ▪ Install and configure client/server application ▪ Strengthen workstation protection ▪ Troubleshoot web browser and connection issues 	<p>107879L2</p> <p>107880L2</p> <p>107882L3</p> <p>107891L3</p> <p>107909L3</p>	<p>Obtain qualifications via training programmes (QF Level 3)</p> <p>Or</p> <p>RPL Mechanism (QF Level 3 RPL Cluster: ITOS016L3)</p>

Specification of Competency Standards for ICT Operation and Support

Unit of Competency

Functional Area: Network Support

Title	Build a small wireless LAN
Code	107879L2
Range	This unit of competency applies to junior IT personnel who are involved with construction of the organisation's network infrastructure. The main duties include installing, configuring of small wireless local area network (LAN) as well as performing user training on the use of the wireless LAN. However, during the planning and network design and sourcing of equipment for the wireless LAN he/she may be required to provide advice and assistance.
Level	2
Credit	3
Competency	<p>Performance Requirements</p> <ol style="list-style-type: none"> 1. Knowledge to build a small wireless LAN: <ul style="list-style-type: none"> • Possess good communication and interpersonal skills • Possess good knowledge of basic training skills • Possess good knowledge of different network and wireless security risks • Possess good knowledge of wireless LAN components and their functions • Possess good knowledge of how to acquire technical manuals on wireless LAN equipment • Understand the network needs of users and the organisation • Possess good knowledge on use of network testing software 2. Building a small wireless LAN <ul style="list-style-type: none"> • Comprehend and assess the wireless LAN design diagram. Confirm and raise any concerns or suggestions with the designer or supervisor before purchase of equipment or install work. Area where he/she may assist include but not limited to the following: <ul style="list-style-type: none"> • Evaluate and/or selection of wireless equipment • Advice on any blind spots that affect the wireless signal • Site survey • Prepare for installation of wireless LAN <ul style="list-style-type: none"> • Identify the location of wireless router/Access Point and can be connected to the wired local network or to Internet service provider • Verify power availability for the wireless router • Verify Access Point (AP) has mounting space and signal are not obstructed that reduced transmission efficiency • Acquired network settings • All required equipment have been checked, verified working, and installation manuals are available • Install and configure the wireless router • Perform a wireless coverage test. Install wireless extension device to increase network coverage and remove blind spots, if needed • Configure security settings that conform to the network design and the organisation security policies • Install and configure wireless LAN cards on personal computers or join mobile client and smartphone to the wireless LAN then perform the following tests: <ul style="list-style-type: none"> • Test connection of the wireless network with user equipment to ensure general compatibility and access • Perform speed tests to ensure client connection is of expected performance • Perform security tests to ensure only authorised clients can connect to the wireless network • Label all wireless LAN equipment in accordance with the designed infrastructure plan/diagram • Provide instructions sessions and/or tutoring to users on use of wireless network, topics include: <ul style="list-style-type: none"> • Pairing with designated Service Set Identifier (SSID)

	<ul style="list-style-type: none"> • Logon arrangements • Use of wireless LAN equipment • Document all installation activities and record configuration and security settings details in accordance with the organisation's guidelines and procedures <p>3. Exhibit professionalism</p> <ul style="list-style-type: none"> • All installation activities and preparation of documents were performed in accordance with organisation guidelines and standards • Always protect the organisation against unauthorised wireless connection and apply industry network security best practices • Follow the organisation's occupational health and safety guidelines and procedures when installing with network equipment
Assessment Criteria	<p>The integrated outcome requirements of this UoC are the abilities to:</p> <ul style="list-style-type: none"> • Perform the necessary preparations before the installation of wireless LAN • Install, configure and test the wireless LAN and equipment in accordance with the organisation's requirements and standards • Provide sufficient and satisfactory training to users that enable them to access the organisation network resources
Remark	

Specification of Competency Standards for ICT Operation and Support

Unit of Competency

Functional Area: Network Support

Title	Install and configure network components/devices
Code	107880L2
Range	This unit of competency applies to support personnel who install and configure network components or devices in a small internal Local Area Network (LAN) environment. A small network would comprise of Internet connection with wireless and wired Internetworking devices such as switches, routers, wireless LAN Access Points (AP).
Level	2
Credit	3
Competency	<p>Performance Requirements</p> <ol style="list-style-type: none"> 1. Knowledge for installing and configuring network components/devices: <ul style="list-style-type: none"> • Possess basic network troubleshooting skills • Possess good knowledge of system and network monitoring equipment • Possess good knowledge of internetworking devices • Possess good knowledge of network concepts, such as: <ul style="list-style-type: none"> • Network types • Types of cables and distance limits • Wireless LAN • Possess good knowledge of the TCP/IP protocol • Possess basic knowledge of procedures for handling electrical devices 2. Installing and configuring network components/devices <ul style="list-style-type: none"> • Comprehend the installation requirements including: <ul style="list-style-type: none"> • Types of network component/device • Verify location is suitable for the installation work • Prepare for installation work <ul style="list-style-type: none"> • Assess network component/device power and cabling needs • Verify location is suitable for the installation • Acquire the network component/device • Acquire technical manuals and comprehend the installation and configuration instructions • Acquire network configuration information for the network component/device • Perform the installation of network component/device complying to the organisation and manufacturer's procedures • Configure and test the network component/device to ensure it complies with the organisation's network requirement • Clean installation site and return equipment to appropriate location • Document the installation and configuration according to the organisation guidelines and standards 3. Exhibit professionalism <ul style="list-style-type: none"> • Adhere to the organisation's occupational safety procedure • Well converse with industry's networking best practices
Assessment Criteria	<p>The integrated outcome requirements of this UoC are the abilities to:</p> <ul style="list-style-type: none"> • Be well prepared for the installation work • Follow the work order and install the network component/device according to the manufacturer and the organisation procedures • Perform post installation procedures satisfactorily and well document the configuration details and installation work according to the organisation standard procedures
Remark	

Specification of Competency Standards for ICT Operation and Support

Unit of Competency

Functional Area: Network Support

Title	Install and configure client/server application
Code	107882L3
Range	This unit of competency applies to support personnel who install and configure client/server application at workplace. The installation may be for a fresh deployment of the organisation wide client/server application or re-installation when client/server application is having issues. The type of client/server application this UoC refers to is of "tightly coupled" type like POS (Point Of Sales) systems rather than "loosly coupled" type like web browser to web server (any). Also it is installed in an internal network.
Level	3
Credit	6
Competency	<p>Performance Requirements</p> <ol style="list-style-type: none"> 1. Knowledge for installing and configuring client/server application <ul style="list-style-type: none"> • Possess basic literacy skills to comprehend work orders and technical documents • Possess basic knowledge of networking concept • Possess good knowledge of client and server concept in particular • Possess good knowledge of common operating systems (server and client) • Possess good knowledge of testing and troubleshooting client/server applications 2. Install and configure client/server application <ul style="list-style-type: none"> • Develop installation plan for the client/server application requirements including but not limited to the following: <ul style="list-style-type: none"> • Identify what installation options are required from work order • Identify hardware requirement (i.e. server and client side) • Identify software requirement (i.e. database, middle ware, etc.) • Identify network requirements • Identify security requirements • Identify what data migration is required, if any • Preparing for installation <ul style="list-style-type: none"> • Upgrade hardware of server and client device, if required • Acquire the client/server application installation media • Familiarised with the client/server application installation instructions from vendor documents • Acquire associated settings for the client/server application, such as: <ul style="list-style-type: none"> • IP address of the server and client • Network settings • Authorised access account settings • Acquire all necessary technical manuals • Backup the server and client systems • Install and configure network protocol, middleware, database, if required • Install and configure the server side of the client/server application as required by the work order <ul style="list-style-type: none"> • Configure security and access settings to allow client to connect • Undertake restore or migration of data, if required • Perform appropriate tests • Install and configure client side of the client/server application as required by the work order <ul style="list-style-type: none"> • Configure security setting to enable access to the server side • Configure appropriate functions of the application • Perform tests to ensure client side is forming as required • Perform post installation procedures <ul style="list-style-type: none"> • Clean up work area and remove temporary work files and objects from the server and client device

	<ul style="list-style-type: none"> • Perform backup image of the server and client for system restore, when and if required • Return and store installation media in secure place as instructed by the organisation's guideline • Document the installation and configuration according to the organisation guidelines and standards <p>3. Exhibit professionalism</p> <ul style="list-style-type: none"> • Adhere to the organisation's occupational safety procedure • Well converse with industry's best work practices for installing client/server applications
Assessment Criteria	<p>The integrated outcome requirements of this UoC are the abilities to:</p> <ul style="list-style-type: none"> • Perform the pre-installation activities and being well prepared to ensure the installation of the client/server application without any delay • Ensure the installation process was carried out efficiently without affecting other applications and/or services on the server and clients side • Perform post installation procedures that complied with the organisation guidelines and procedures
Remark	

Specification of Competency Standards for ICT Operation and Support

Unit of Competency

Functional Area: Network Support

Title	Configure WAN connection
Code	107883L3
Range	This unit of competency applies to IT support personnel who are responsible to configure the organisation's internal network to connect and communicate with the external Wide Area Network (WAN) or be connected to the Internet. The configuration will involve configuring the organisation's routers as well of internal hosts. Hosts in this UoC can be user client devices (PCs, mobile devices, tablets, wireless APs, etc.) or servers.
Level	3
Credit	3
Competency	<p>Performance Requirements</p> <ol style="list-style-type: none"> 1. Knowledge for configuring WAN connection: <ul style="list-style-type: none"> • Possess good literacy skills to interpret network diagram/plan, technical documents, equipment manuals and specifications • Possess basic network installation and configuration skills • Possess good knowledge of internetworking devices • Possess detailed knowledge of the TCP/IP protocol • Possess good problem solving skill • Possess basic knowledge of organisation guideline and safety procedures for handling electrical devices 2. Configure WAN connection <ul style="list-style-type: none"> • Prepare the readiness of the internal network to connect with the WAN, including the following: <ul style="list-style-type: none"> • Comprehend the organisation network plan and architecture, including: <ul style="list-style-type: none"> • Number of internal subnets • Routing settings of each subnet • De-Militarised Zone (DMZ) information • Load balancing for multi WAN connections • Acquire and install router as per required by manufacturer • Acquire internal network settings from network administrator and configure into the router • Liaise with WAN service provider to confirm switch-over date and WAN connection to be installed • Determine connection type (static IP or DHCP assigned) and configure with reference to the organisation's network plan. For static IP address connection to the WAN, acquire the network setting from service provider • Configure and test router with the given WAN IP address • Test the internal and external connection to ensure traffic can flow on both directions • Configure and test host connections • Document the installation and configuration details according to the organisation guideline and standards 3. Exhibit professionalism <ul style="list-style-type: none"> • Adhere to the organisation's occupational safety procedure • Well converse with industry's networking best practices

Specification of Competency Standards for ICT Operation and Support

Unit of Competency

Functional Area: Network Support

Assessment Criteria	The integrated outcome requirements of this UoC are the abilities to: <ul style="list-style-type: none">• Liaise with WAN service providers to coordinate the cabling and installation of WAN modems into the premises that conform to the network diagram/plan• Configure and test router connection with the WAN connection• Configure all hosts of the internal network to enable them to communicate via the WAN connection
Remark	

Specification of Competency Standards for ICT Operation and Support

Unit of Competency

Functional Area: Network Support

Title	Troubleshoot network issues
Code	107884L3
Range	This unit of competency applies to junior IT personnel who are involved with troubleshooting network issues while in a network supporting role. These junior IT personnel is expected to troubleshoot operational wireless and wired network problems, such as device connection issues, software configuration issues, and network component failure issues. For this UoC devices could be: personal computers, notebooks, tablets, smartphones, internetworking components such as routers, switches, etc.
Level	3
Credit	3
Competency	<p>Performance Requirements</p> <p>1. Knowledge to troubleshoot network issues:</p> <ul style="list-style-type: none">• Possess good communication and interpersonal skills• Possess good network troubleshooting skills• Possess basic knowledge of different network technologies• Have good understanding of network components and their functions• Possess good knowledge of how to acquire technical information from manuals, colleagues and Internet• Possess good knowledge in operating network testing equipment

Specification of Competency Standards for ICT Operation and Support

Unit of Competency

Functional Area: Network Support

Competency	<p>2. Troubleshooting network issues</p> <ul style="list-style-type: none"> • Acquire details of network issues from problem reports or by communicating with users to understand symptoms of network issues • Attempt to reproduce the network issues on user's client device or network component, if possible • For wired network connection issues <ul style="list-style-type: none"> • Inspect for loose cabling on the network devices, network clients, and network components. Reconnect and secure cables • Use cable testing equipment to test cable to ensure it is still functioning • For wireless connection issues <ul style="list-style-type: none"> • Determine where the issues lie, at wireless client or Access Point side <ul style="list-style-type: none"> • Verify the wireless access point is functioning using other devices or clients • Verify the wireless connection setting and the correct password is used at the client side • For software configuration issues <ul style="list-style-type: none"> • Acquire network settings from network administrator • Verify the software configuration setting matched the network settings. Reconfigure if necessary • For network component issues <ul style="list-style-type: none"> • Verify the device is receiving power <ul style="list-style-type: none"> • Perform visual check if power cable is connected • Verify power adapter of the device is working and securely connected • Verify the device's power is on • Verify the device configuration setting is correct • Verify the device is transmitting and receiving signals • Document all troubleshooting activities and record all findings. Also complete problem report in accordance with the organisation's guidelines and procedures <p>3. Exhibit professionalism</p> <ul style="list-style-type: none"> • All troubleshooting activities and preparation of documents were performed in accordance with organisation guidelines and standards • Follow the organisation's occupational health and safety guidelines and procedures when working with network equipment
Assessment Criteria	<p>The integrated outcome requirements of this UoC are the abilities to:</p> <ul style="list-style-type: none"> • Prepare sufficiently for the troubleshooting job • Systematically perform troubleshoot tasks and find the network issues • Follow procedures and be able to prepare documents and complete problem reporting in accordance with organisation standard
Remark	

Specification of Competency Standards for ICT Operation and Support

Unit of Competency

Functional Area: Security Support

Title	Create and maintain user accounts on server
Code	107885L2
Range	This unit of competency applies to support personnel who administer the organisation's servers. A very important task for the administrator or the support personnel of servers is to create accounts of users that are allowed to access the system's resource. This UoC assumes servers are standalone and not in directory service environment
Level	2
Credit	3
Competency	<p>Performance Requirements</p> <ol style="list-style-type: none">1. Knowledge for creating and maintaining user accounts on server<ul style="list-style-type: none">• Possess system troubleshooting skills• Possess good knowledge of system logs• Possess good knowledge of common server operating systems• Possess good knowledge of operating system's access control• Possess basic knowledge of information security• Possess knowledge of the organisation's user security procedures and guidelines

Specification of Competency Standards for ICT Operation and Support

Unit of Competency

Functional Area: Security Support

Competency	<p>2. Create and maintain user accounts on server</p> <ul style="list-style-type: none">• Determine the needs of the accounts on server, such as:<ul style="list-style-type: none">• The role of the user (user, administrator, operator, etc.)• Which server, if there are more than one• Personal folder for the user• Access to server resources• Application settings• Access rights• Login to server with administrative account to create the new account and follow the organisation guidelines to setup security settings for the account based on the role of the user. Settings include but not limited to the following:<ul style="list-style-type: none">• Security role of the account• Directory and file permissions• Password length• Change password requirements and duration• Set temporary password and set user must-change-password on first login• Inform the user of new account details• Regularly use system tools or third party tools to determine security and usage of accounts, such as but not limited to the following:<ul style="list-style-type: none">• Accounts involved with unusual activities• Attempt to access unauthorised resources• Accounts locked out• Unused accounts• Handle unusual account activities in accordance to the organisation guideline, such as escalating to supervisor• Verify unused accounts and follow the organisation procedures to perform clean-up activities, such as remove account, revoke permission, etc.• Document and record all actions performed on user account in accordance with the organisation guidelines <p>3. Exhibit professionalism</p> <ul style="list-style-type: none">• Apply system administrator ethics and exercise due diligence when administering user accounts on servers• Exhibit security attitude but balance the needs of users with the organisation security needs when administering system user accounts, as well as securing the server
Assessment Criteria	<p>The integrated outcome requirements of this UoC are the abilities to:</p> <ul style="list-style-type: none">• Understand the needs for creating new accounts• Use appropriate system tools to create accounts, perform correct configurations, setup correct access rights to server resources and provide sufficient details and guidance to user that enabling him/her to access the server• Monitor account usage and account irregular activities and take corrective actions to maintain accounts current and secured on the server
Remark	

Specification of Competency Standards for ICT Operation and Support

Unit of Competency

Functional Area: Security Support

Title	Configure user access control on server
Code	107886L3
Range	This unit of competency applies to support personnel who administer the organisation's servers. To access resources on a server the user will need appropriate access rights which administrator will need to configure. Access control in modern servers has pre-configured access control in form of different roles or via traditional access rights.
Level	3
Credit	3
Competency	<p>Performance Requirements</p> <ol style="list-style-type: none"> 1. Knowledge for configuring user access control on server <ul style="list-style-type: none"> • Possess system troubleshooting skills • Possess good knowledge of system logs • Possess good knowledge of common server operating systems • Possess good knowledge of operating system's access control • Possess basic knowledge of information security • Possess knowledge of the organisation's user security procedures and guidelines 2. Configure user access control on server <ul style="list-style-type: none"> • Determine what role the user is allocated by the organisation, for example: <ul style="list-style-type: none"> • Administrator • Backup operator • Application administrator • Read only analyst • Use server management tools to assign the role to the user's account • Determine resource access permitted for the user, such as but not limited to the following: <ul style="list-style-type: none"> • Local logon • Internet access • Remote logon • Use server tool to configure user accounts with allowed access • Create a check list of access control setting for each shared resources and/or object, such as but not limited to the following: <ul style="list-style-type: none"> • Printers • Folders • Files • Applications • Configure the allowed access and level of access (Read, Write, Execute, etc.) to each object and shared resource • Document and record all user access setting and configuration for reference 3. Exhibit professionalism <ul style="list-style-type: none"> • Comply system administrator ethics and exercise due diligence when administering user accounts and access control on servers • Exhibit security attitude but balance the needs of users with the organisation security needs when setting user access control as well as protecting the server

Specification of Competency Standards for ICT Operation and Support

Unit of Competency

Functional Area: Security Support

Assessment Criteria	The integrated outcome requirements of this UoC are the abilities to: <ul style="list-style-type: none">• Determine and setup the role of the user that matches his/her access on the server• Identify all the individual objects, shared resources on the server which the user requires access to• Setup and configure correctly the user's access control on the server
Remark	

Specification of Competency Standards for ICT Operation and Support

Unit of Competency

Functional Area: Security Support

Title	Administer basic network security
Code	107887L3
Range	This unit of competency applies to support personnel who administer the organisation's network security on their regular day to day duties. The duties include supporting users request for network access and ensuring the network is protected in accordance with the organisation's requirements. The organisation network infrastructure, in this context, is a small or simple type which may consists of one perimeter firewall, WAN Internet router, wireless LAN Access Point (AP) for mobile clients, one central switch and a number of group switches with hosts (workstations or servers) connected. Network services may include: file service, network printing, Virtual Private Network (VPN) or remote access, etc.
Level	3
Credit	3
Competency	<p>Performance Requirements</p> <p>1. Knowledge for administering basic network security:</p> <ul style="list-style-type: none">• Possess good communication and interpersonal skills• Possess network troubleshooting skills• Understand system and network monitoring equipment logs• Able to operate the organisation network devices• Possess broad knowledge network function and features of network devices• Possess knowledge of threats and the importance of network security• Possess knowledge of the organisation's network security procedures and guidelines

Specification of Competency Standards for ICT Operation and Support

Unit of Competency

Functional Area: Security Support

Competency	<p>2. Administer basic network security</p> <ul style="list-style-type: none"> • Comprehend the organisation's network infrastructure, daily activities list and security policies • Determine the network security status including but not limited to the following: <ul style="list-style-type: none"> • Network devices are operating normally via visual check, including: power lights are on, cables are not loose • Review monitoring and system logs and audit reports to ensure no unauthorised access or irregularities • Ensure Internet security (antivirus, anti-spyware) filtering/detection systems are still effective and up to date • When irregularities are detected, analyse, evaluate and handle irregularities in accordance with the organisation's procedures, seek assistance if necessary. Actions may include: <ul style="list-style-type: none"> • Adjust firewall rules, • Change wireless AP security passwords. • Segregate guest mobile users, if necessary • Train users on network security functions • Adjust access control on network resources • Report irregularities to supervisor • Facilitate user's request to define and configure suitable level of network access on network controlling devices but ensure it conformed to the organisation security specifications • Regularly perform security patches and updates of network devices when required • Regularly review and evaluate the network security to ensure it is well protected and conforms to the organisation needs and complied with regulatory requirement, if any • Document actions/changes to the network in accordance with the organisation's procedures. Consult with colleagues and supervisors when required <p>3. Exhibit professionalism</p> <ul style="list-style-type: none"> • Ensure network security complied with the organisation and regulatory requirements • Exhibit security attitude but balancing the need of users with the security need when administering the network security • Well converse with industry network security best practices and keep updated with trends of network security
Assessment Criteria	<p>The integrated outcome requirements of this UoC are the abilities to:</p> <ul style="list-style-type: none"> • Analyse security logs and reports to determine security irregularities • Handle and rectify network security irregularities in accordance with the organisation procedures • Set the correct level of network access for users in accordance with the organisation procedure
Remark	

Specification of Competency Standards for ICT Operation and Support

Unit of Competency

Functional Area: Security Support

Title	Administer system security
Code	107888L3
Range	This unit of competency applies to support personnel who administer the organisation's system security on client devices. The duties of support personnel includes installing various security applications, performing various system configuration and setting to protect the system from loss of information (user and organisation) and different network security risks. Client devices mainly refer to personal computers, notebooks and business tablets
Level	3
Credit	3
Competency	<p>Performance Requirements</p> <ol style="list-style-type: none"> 1. Knowledge for administering system security <ul style="list-style-type: none"> • Possess good communication and interpersonal skills • Possess system troubleshooting skills • Possess good knowledge of system and network logs • Possess good knowledge of common operating systems • Possess broad knowledge on functions and features of network devices • Understand network security and system security risks • Possess knowledge of the organisation's security procedures and guidelines 2. Administer system security <ul style="list-style-type: none"> • Comprehend the organisation's system security requirements and system security plan, including but not limited to the following: <ul style="list-style-type: none"> • List of authorised personnel/users that can access the system • Level of access/tiered access, or what each user is allowed and not allowed to do on the system • Access control methods, or how users will access the system (user ID/password, digital card, biometrics) • System setting and application needed to strengthen the system and how weaknesses are handled • Which system required system backup and what type of backup procedure to apply • Network security settings and configurations • Install the required security application, such as: <ul style="list-style-type: none"> • Antivirus and spyware protection applications • Personal firewall • Malware protect application • Configure and set remote access and support function according to the organisation guideline and procedure • Configure network and firewal • according to the organisation's guideline • Create and setup user accounts in accordance with organisation security requirements • Review files security settings and modify access and read/write permissions to match user's role. • Regularly perform backups, system security checks, system updates • Monitor and record security checks • Document and record details of installed applications, configurations, settings, risks for system audit, maintenance and support purpose 3. Exhibit professionalism <ul style="list-style-type: none"> • Exhibit security attitude but balance the need of users with the organisation security need when administering system security

Specification of Competency Standards for ICT Operation and Support

Unit of Competency

Functional Area: Security Support

Assessment Criteria	The integrated outcome requirements of this UoC are the abilities to: <ul style="list-style-type: none">• Comprehend the system security plan• Install the required security applications, correctly configure and perform appropriate setting that complied with the security plan• Perform scheduled system security checks, system update and document system changes in accordance with the organisation's guidelines and procedures
Remark	

Specification of Competency Standards for ICT Operation and Support

Unit of Competency

Functional Area: Security Support

Title	Administer basic website security
Code	107889L3
Range	This unit of competency applies to support personnel who are responsible to administer security of the organisation's website under the direction of supervisor. The server on which the website resides on, either locally or remote hosted should be protected from hackers, virus, unauthorised access, hijacked. Monitor and validate the web page, scripts, SQL commands used does not have vulnerabilities for malicious attacks which can affect the organisation's network or systems or theft of the organisation's business data.
Level	3
Credit	6
Competency	<p>Performance Requirements</p> <ol style="list-style-type: none"> 1. Knowledge for administer basic website security <ul style="list-style-type: none"> • Knowledge of different website security risks and the importance of website security protection • Understand the use of website security audit tools • Possess a broad knowledge of server and network security • Possess good knowledge of the organisation's security requirements and policies • Possess good knowledge of website protection technologies and trends • Possess good knowledge of installing and configuring hardware and software 2. Administer basic website security <ul style="list-style-type: none"> • Work with the supervisor to identify the security needs of the organisation's website, including but not limited to the following: <ul style="list-style-type: none"> • Website functionality • Access requirement of transactions, visitors and users • Operating Systems weaknesses • Secure the server of the website with installation of site certificate, regular system patches and updates, antivirus, anti-spyware protection and updates • Configure web server securely with required functionality and features only • Secure website transactions with encryptions • Set access control of server and database to those needed access only • Work with website content development team to ensure scripts and web applications are vulnerabilities free • Regularly use monitoring and audit tools to test and monitor vulnerabilities of the website • Perform regular offline backup of the website • Continue to develop or help to secure procedure to secure the organisation's website that comply with the organisation security requirements 3. Exhibit professionalism <ul style="list-style-type: none"> • Committed to protect the organisation's assets • Exhibit security attitude but balance the business needs against the security need when administering the website security • Well versed with industry network security best practices
Assessment Criteria	<p>The integrated outcome requirements of this UoC are the abilities to:</p> <ul style="list-style-type: none"> • Secure the organisation's website that complied with the organisation's requirement • Use audit and monitoring tools to reduce the website vulnerabilities • Set the correct level of network access for users in accordance with the organisation procedure
Remark	

Specification of Competency Standards for ICT Operation and Support

Unit of Competency

Functional Area: Security Support

Title	Administer perimeter firewall
Code	107890L3
Range	This unit of competency applies to IT personnel who administer the organisation's network security; particularly the perimeter firewall which protects the organisation internal network from the external network. The administering tasks of these IT personnel include but not limited to: maintain firewall filtering rules, monitor security logs, perform maintenance of the firewall, ensure the firewall is always on, etc.
Level	3
Credit	3
Competency	<p>Performance Requirements</p> <ol style="list-style-type: none"> 1. Knowledge for administering perimeter firewall: <ul style="list-style-type: none"> • Possess good communication and interpersonal skills • Possess detailed knowledge of network security and different risks • Possess detailed knowledge of firewall concept • Possess good knowledge of operating firewall and monitoring equipment • Understand the organisation's network security requirements and policies • Well updated with network security threats, technologies and trends 2. Administer perimeter firewall <ul style="list-style-type: none"> • Perform regular monitoring of perimeter firewall to ensure it is fully functioning. • Perform reconfiguration of settings when required. Configuration settings that affect security of the network must follow the organisation guideline and procedures before action • Manage firewall filtering rules to match the organisation's and process users needs, including: <ul style="list-style-type: none"> • Create new rules • Amend existing rules • Remove redundant and conflicted rules • Regularly review the list of filtration rules to verify rules still effective and are being used. Cleanup unused rules to maintain efficiency and performance of the firewall • Regularly monitor and review access logs to ensure no security breach or any irregularities. When irregularities found, escalate to supervisor and investigate • Assist supervisor to review operation procedures, such as "filtration rule change" requests • Perform backup of firewall database after any change of settings or filtering rules • Document all changes (configuration, rules) and actions performed on the firewall in accordance to the organisation standards 3. Exhibit professionalism <ul style="list-style-type: none"> • Ensure perimeter protection complied with the organisation guideline • Exhibit security attitude but balancing the need of users with the security need when administering the perimeter security • Well converse with industry network security best practices
Assessment Criteria	<p>The integrated outcome requirements of this UoC are the abilities to:</p> <ul style="list-style-type: none"> • Set up the firewall that matches the organisation business requirements and securely protect the internal network from external environment • Use the firewall monitoring facilities or security log to monitor irregular activities • Follow the organisation's procedures to document all changes and actions made on the firewall
Remark	

Specification of Competency Standards for ICT Operation and Support

Unit of Competency

Functional Area: Security Support

Title	Strengthen workstation protection
Code	107891L3
Range	This unit of competency applies to support personnel who are responsible for securing client workstation. Workstations are vulnerable to local and external threats, they need to be protected from as much as these threats as possible. Most organisation will have different protection procedures which support personnel need to setup before allowing user to access the workstation. This UoC illustrates some of the protection tasks and it is by no means exhaustive.
Level	3
Credit	3
Competency	<p>Performance Requirements</p> <p>1. Knowledge for strengthening workstation protection</p> <ul style="list-style-type: none">• Possess system troubleshooting skills• Possess detailed knowledge of security features and functions of the organisation's operating systems• Possess good knowledge of system security concepts• Possess good knowledge of computer hardware and system software• Possess knowledge of the organisation's security procedures and guidelines

Specification of Competency Standards for ICT Operation and Support

Unit of Competency

Functional Area: Security Support

Competency	<p>2. Strengthen workstation protection</p> <ul style="list-style-type: none"> • Comprehend the organisation’s guideline for workstations protection to configure the user’s workstation. Systematically setup and configure protection features on the workstation • Setup physical security protection, including but not limited to the following: <ul style="list-style-type: none"> • Lock the CPU unit to prevent opening of the case • Affix a chain lock (Kensington lock) to secure position for notebooks • Setup password protection (hardware-level) for access to machine’s BIOS • Eliminate or disable unnecessary services. For example: remote access, Internet sharing, etc. • Remove unnecessary executables and registry entries to prevent attacker invoking disabled programs • Set user account to <ul style="list-style-type: none"> • “non-administrator” account, to prevent uncontrolled change of system settings • Avoid multi-user sharing same machine, if possible • Set system account policies <ul style="list-style-type: none"> • Minimum length of account password • Force change password • Set re-used policy • Setup screen save to turn off screen and power off system after a predefined period of no user activities • For systems holding confidential information, setup file encryption and access permission • Install and setup anti-virus, anti-spyware and anti-malware scanning and handling, such as: <ul style="list-style-type: none"> • Auto and scheduled update of virus definitions • Scheduled daily scan • Real time protection • Anti-virus application which starts on system boot • When virus or malware found, clean first (high risk) and quarantine second • Setup firewall protections • Setup auto and scheduled system updates • Create a backup image of the workstation before allowing user to use the machine • Document the system settings and configurations for internal record <p>3. Exhibit professionalism</p> <ul style="list-style-type: none"> • Exhibit security ethics and balance the need of users with the organisation security needs when setting and configuring security protection of user’s workstations
Assessment Criteria	<p>The integrated outcome requirements of this UoC are the abilities to:</p> <ul style="list-style-type: none"> • Comprehend the organisation’s workstation protection guidelines and able to configure and setup required security protections • Complete documents of the security settings and configuration in accordance with the organisation’s procedures
Remark	

Specification of Competency Standards for ICT Operation and Support

Unit of Competency

Functional Area: System and Hardware Support

Title	Provide support to mobile device users
Code	107904L3
Range	This unit of competency applies to IT support personnel who are responsible for mobile device support to users. As organisations are joining the Bring Your Own Device (BYOD) bandwagon, users will need supporting in the work environment; IT support staff will need to have the necessary skills to support and educate users using mobile devices to access the organisation resources. This UoC concerned on area of general support including but not limited to: setup brand new devices to access organisation resources, assist logon and use of Mobile Device Management (MDM) system, protection of corporate information in event of loss of mobile devices, remote support access and support, change configuration and settings, etc.
Level	3
Credit	6
Competency	<p>Performance Requirements</p> <p>1. Knowledge to perform remote support:</p> <ul style="list-style-type: none">• Possess good communication, listening and interpersonal skills• Possess remote support skills capable to perform troubleshooting, provide instructions systematically and remote problem solving• Possess good knowledge of functions and features of the organisation's MDM system• Possess good knowledge of mobile device supported applications• Possess good knowledge of common mobile device platforms such as IOS, Android, Blackberry, Windows Phone, etc.• Well conversed with the organisation's BYOD guidelines and procedures• Possess good knowledge of virtual desktop technology and Virtual Desktop Infrastructure (VDI) for mobile device

Specification of Competency Standards for ICT Operation and Support

Unit of Competency

Functional Area: System and Hardware Support

Competency	<p>2. Perform remote support</p> <ul style="list-style-type: none">• Listen attentively and patiently to understand the user's reported issues• Refer to the Trouble Ticket System (TTS)/problem reporting system to determine if similar issues and/or solutions exist• For brand new BYOD mobile devices, follow the organisation guidelines to perform some but not limited to the following tasks:<ul style="list-style-type: none">• Ensure user understand, agree and accept the organisation policies, particularly when device is misplaced/lost• Install organisation MDM apps and organisation's standard apps• Install mobile support apps, such as: Teamviewer for mobile, Remoty, GotoAssist, etc.• Configure network access setting such as VPN• Backup device• Turn on remote wipe function of the device• Install anti-virus/malware/spyware app• Create new access accounts on MDM server and test connectivity and accessibility to ensure device is function as expected• For troubleshooting or remote support, mobile support application or MDM apps should be used to remote access to the mobile device, to view and change setting, screen capture, direct communicating with user to provide instructions to resolve the issue• For misplaced/lost device, evaluate the risk of data loss and assist the user to use "find my phone/device/mobile" function or use MDM apps to trace, lock or wipe the device• Provide instructions and/or training to users on mobile devices usage and mobile security to protect organisation data• Create a new or update Trouble Ticket (TT)/problem report to record the activities transacted during the support session <p>3. Exhibit professionalism</p> <ul style="list-style-type: none">• Possess customer service oriented attitude• Apply industry best practices for mobile support and being up-to-date with mobile technology trends
Assessment Criteria	<p>The integrated outcome requirements of this UoC are the abilities to:</p> <ul style="list-style-type: none">• Set up the users' mobile devices to conform with the organisation's mobile device policies• Use appropriate tools to troubleshoot mobile devices, resolve users experience issues and assist or advice users with correct solutions to resolve issues for providing effective support to users and protect the organisation data in the event of user loss• Take correct actions to protect the organisation's data in the event where users have lost mobile devices• Provide sufficient instruction or training to users on use of mobile devices that conform with the organisation policy
Remark	

Specification of Competency Standards for ICT Operation and Support

Unit of Competency

Functional Area: System and Hardware Support

Title	Troubleshoot client device hardware issues
Code	107905L3
Range	This unit of competency applies to IT support personnel who are responsible for providing support for client devices. Client devices ranging from personal computer to smart mobile device could experience hardware issues during its operation and support personnel are requested to fix the issues. This UoC concerns the identification of hardware issues before it can be fixed.
Level	3
Credit	3
Competency	<p>Performance Requirements</p> <ol style="list-style-type: none"> 1. Knowledge for troubleshooting client device hardware issues <ul style="list-style-type: none"> • Possess good troubleshooting and problem analysis skills • Possess good knowledge of operating client devices • Possess good literacy skills for reading technical manuals of client devices • Possess good knowledge of the organisation's procedures for troubleshooting client devices • Possess basic knowledge of hardware protection procedures, such as use anti-static straps, etc. • Possess basic knowledge of the organisation health and safety guideline 2. Troubleshoot client device hardware issues <ul style="list-style-type: none"> • Comprehend symptoms, if any, prior issues appeared from problem report and/or discussion with user. For example: <ul style="list-style-type: none"> • Nothing came on when power button pressed • Blank screen but CPU unit appears to be running • System running very slow and continuously rebooting or hanged • System not responding to mouse and keyboard • Review maintenance records of the device, to determine if maintenance work has contributed or caused the issues • Prepare for troubleshooting: <ul style="list-style-type: none"> • Acquire all necessary technical and user manuals • Acquire tools to open the client device and tools for troubleshooting • Acquire device components or spare parts • Analyse and formulate a troubleshooting plan • Without opening to inspect the inside of the client device, perform checks for loose connections, power sockets, battery, display device, etc. • View the BIOS error message display code or listen for the number beeps sounded and verify the given code with technical manuals to identify BIOS detected error. For example: <ul style="list-style-type: none"> • 1 = Loose memory module • 2 = CPU error repair/replace mother board • 3 = display memory error repair/replace display card • Next stage of checking is to verify connected components have not affected the functioning of client device, such as: <ul style="list-style-type: none"> • Keyboards/mouse (swap with a known working component) • Battery low power on mobile device (swap with a fully charged battery) • Hard disk failure (listen for unusual noise) • Power supply unit failure (verify cooling fan is functioning and/or system light is on) • For intermittent issues, such as "system hang" or "randomly rebooting" under heavy system work load, identify cause of issue using combination of techniques, including but not limited to the following: <ul style="list-style-type: none"> • System log messages • Reproduce the issues with monitoring tools • Incorrect BIOS settings

	<ul style="list-style-type: none"> • Overheating components • Purpose-built hardware analysis device • For mobile device, once verified it is not battery problem and still cannot be started, return the devices to vendor who will use manufacture's hardware problem analysis devices to identify the issues • Once the cause of issues have been identified, formulate a rectification action plan and clean the work area • Document and record the findings in accordance with the organisation procedures and standards <p>3. Exhibit professionalism</p> <ul style="list-style-type: none"> • Follow organisation safety guidelines and procedures when performing troubleshooting of client devices
Assessment Criteria	<p>The integrated outcome requirements of this UoC are the abilities to:</p> <ul style="list-style-type: none"> • Prepare well with troubleshooting work, having all the required tools and manuals for use during the troubleshooting process • Plan the troubleshoot work and systematically perform the troubleshooting to identify the issues or cause of issues • Follow the organisation safety procedures during the troubleshooting process
Remark	

Specification of Competency Standards for ICT Operation and Support

Unit of Competency

Functional Area: System and Hardware Support

Title	Perform remote support
Code	107907L3
Range	This unit of competency applies to support personnel who are responsible for providing remote support. In a structure support team this would be a Level 2 support personnel where Level 2 is normally the first point of escalation, provides guidance and instructions to Level 1. Level2 is where the support personnel take ownership of incidents where subject matter expertise and experience is required for diagnosis. However, this UoC concerned only remote support competencies and does not distinguish the organization level.
Level	3
Credit	3
Competency	<p>Performance Requirements</p> <p>1. Knowledge to perform remote support:</p> <ul style="list-style-type: none">• Possess good communication and interpersonal skills• Possess remote support skills capable of performing troubleshooting and providing systematic instructions for remote problem solving• Possess good knowledge and operating remote support applications• Understand committed Service Level Agreement (SLA) and standards• Possess good knowledge of problem escalation procedures and guidelines• Possess basic knowledge of the organisation computer hardware, Operating System (OS), applications and network equipment

Specification of Competency Standards for ICT Operation and Support

Unit of Competency

Functional Area: System and Hardware Support

Competency	<p>2. Performing remote support</p> <ul style="list-style-type: none">• Comprehend reported problem from Trouble Ticket system (TTS)/problem report system to understand symptoms and diagnostics from support desk colleague (level 1 support)• Search TTS/problem report system to determine if similar issues and/or solutions exist• Communicate with the customers/users to explain actions that will be performed to resolve the issue, such as:<ul style="list-style-type: none">• Need to collect more information related to the reported issue• Need to remote access to user's system• Will instruct the user to self-rectify the issue upon determination that the user is capable of self-rectification• If remote access/control is necessary, determine customer/user's comfort level to have remote access feature of the system turn on and installation of remote access software. To gain customer/user's support it is necessary to explain:<ul style="list-style-type: none">• How the remote access work compare with on-premise support• There are no security risks• Benefits of remote access/control• Perform troubleshoot and/or apply solution to correct the reported issue. If remote solution cannot fix the issue then offer to customer/user the on-premise support option• Confirm solution is acceptable with customer/user• Uninstall any application and/or reset configurations that were used for the remote support purpose and remind users to set off remote support functions on their system• Document all activities and record changed setting in the TTS/problem report. Where necessary, coordinate with other colleagues, such as requesting on-premise engineers to visit the customers/users <p>3. Exhibit professionalism</p> <ul style="list-style-type: none">• Possess customer service oriented attitude• Always keep customer informed of actions and status of the rectification process• Follow industry best practices to use best remote support application to provide remote support
Assessment Criteria	<p>The integrated outcome requirements of this UoC are the abilities to:</p> <ul style="list-style-type: none">• Comprehend the reported problem from the internal TTS/problem report system and able to update the appropriate record in accordance with the organisation's procedures after the completion of the remote support session• Persuade customers/users to allow remote access/control to their system for troubleshooting and/or correcting of issues• Perform the remote support to the satisfaction of customers/users
Remark	

Specification of Competency Standards for ICT Operation and Support

Unit of Competency

Functional Area: Web Support

Title	Troubleshoot web browser and connection issues
Code	107909L3
Range	This unit of competency applies to support personnel who are responsible for providing front line support on web browser usage to users on different client platforms, including desktops, notebooks, tablets and even smartphones. The web browser is one of the most used applications. Very often users will encounter many issues which will need assistance. Common issues encountered including but not limited to the following: cannot start browser, wrong security setting, incompatibility, malware, connection problem, unable to initiate download after click of links, etc. To assist users the support personnel will troubleshoot and provide a remedy. Additionally the support personnel should provide some basic tutorial to users to avoid repetition and facilitate self-help.
Level	3
Credit	3
Competency	<p>Performance Requirements</p> <p>1. Knowledge for troubleshooting web browser and connection issues:</p> <ul style="list-style-type: none">• Possess good communication and interpersonal skills• Possess good troubleshooting skills and capable of providing systematic instructions for remote problem solving• Possess good knowledge of functions of various web browsers on different platforms• Possess basic knowledge of operating different computing platforms• Possess basic knowledge of web browser development and trends such as: technologies, web browser features, malwares attacks, etc.• Possess basic knowledge of the organisation's network infrastructure

Specification of Competency Standards for ICT Operation and Support

Unit of Competency

Functional Area: Web Support

Competency	<p>2. Troubleshoot web browser and connection issues</p> <ul style="list-style-type: none">• Patiently listen to user describing issues and symptoms. Use appropriate questioning techniques to gather as much information to help troubleshoot the issue:<ul style="list-style-type: none">• What are the types of issue user is experiencing,• What type of browser• What platform and OS environment the browser is operating on• Refer to history problem log to determine if similar problems and solutions exist• If web browser shows “cannot connect to server” or similar message, then troubleshoot network connection by verifying and correcting below items:<ul style="list-style-type: none">• Verify the client is actually connected to the network (LAN or mobile)• Verify client has acquired a valid IP and DNS address• Verify correct proxy server setting• etc.• If displayed content is inconsistent with the new contents of the web site, then clear the cache of the browser• If downloads are not permitted or no activities after user clicked a link, then review and adjust the security settings that prevent certain risky functions and scripts from auto activated, such as: ActiveX, cookies and downloads. Any adjustment of security setting must be complied with the organisation security policies• If web browser cannot start then locate related error messages from system or application logs to determine the issue. If application is corrupted, and no alternative method of correcting the problem, then uninstall and reinstall the Web browser• If the browser consistently redirected to unwanted web site, this may be due to the browser being hijacked by malware. Use anti-malware software to detect and remove the malware• Explain the cause of issues and remedies applied to users and provide some basic training and advice to user on “best practices on using web browser and surfing internet”• Create or update problem log in accordance with the organisation’s procedures and issues and remedies performed <p>3. Exhibit professionalism</p> <ul style="list-style-type: none">• Possess customer service attitude with desire to assist users with problems• Follow organisation safety guidelines and procedures when troubleshooting and/or reification of equipment
Assessment Criteria	<p>The integrated outcome requirements of this UoC are the abilities to:</p> <ul style="list-style-type: none">• Systematically apply web browser troubleshooting techniques to identify the cause of issues and provide remedies• Use correct level of technical language to gather information related to the Web browser issues and conduct tutorial to users• Complete the “after event” procedures in accordance with the organisation’s standards
Remark	

Specification of Competency Standards for ICT Operation and Support

Unit of Competency

Functional Area: Web Support

Title	Maintain website performance
Code	107910L3
Range	This unit of competency applies to IT support personnel who are responsible to maintain the performance of the organisation's website. One of the tasks of website maintenance is to ensure the site is running at an optimal speed that can provide a good user experience to visitors and a successful website with business.
Level	3
Credit	3
Competency	<p>Performance Requirements</p> <ol style="list-style-type: none"> 1. Knowledge for Maintain website performance <ul style="list-style-type: none"> • Possess good knowledge of various website performance testing tools, such as : Webpage analyser, Google's site tool and Google Page Speed, Yahoo's YSlow, etc. • Possess good knowledge of creating web contents • Possess basic knowledge of different web browsers • Possess good knowledge of the organisation basic network infrastructure • Possess good knowledge of the organisation website performance requirements 2. Maintain website performance <ul style="list-style-type: none"> • Work with supervisor and/or colleagues to identify the website response time required. Different types of responses for different types of contents • Verify the website performance using suitable performance testing/measuring tools • Study the website network and hosting server performance <ul style="list-style-type: none"> • If loading is high, consider off load some of the tasks from the server • If web server is hosted on a Cloud Server, consider using a different hosting service provider • Work with content developers to review and advice on some but not limited to the following: <ul style="list-style-type: none"> • Minimise size of webpage • Minimise the use of nested table • Avoid using oversized image file straight from camera. Resize image files to a match the purpose • Optimise programs, scripts and databases • Regularly run stress tests to ensure the performance of the website is within the organisation's standard • Document performance test results for reporting purpose 3. Exhibit professionalism <ul style="list-style-type: none"> • Possess quality of service attitude. Website performance affects the organisation image and business
Assessment Criteria	<p>The integrated outcome requirements of this UoC are the abilities to:</p> <ul style="list-style-type: none"> • Work with supervisors or colleagues to identify the and formulate a performance standard for the organisation's website • Use performance measuring tools to determine the performance of the organisation website • Work with website developers to improve performance of the website to meet the organisation's performance requirement
Remark	

Specification of Competency Standards for ICT Operation and Support

Unit of Competency

Functional Area: Web Support

Title	Build simple web site using content management systems
Code	107911L3
Range	This unit of competency applies to IT personnel who are responsible for building a simple web site for the organisation. Most companies will want to have an Internet presence; having at least a simple web site and IT personnel are entrusted with building this web site. As Internet and web content management system (CMS) technologies are maturing, building web sites is almost as simple as creating "Office" documents. However, once the web site is built the IT personnel will need to provide tutorials to webpage designer on use of CMS editor to build webpages. This UoC assumes the web site is hosted by hosting service provider.
Level	3
Credit	3
Competency	<p>Performance Requirements</p> <ol style="list-style-type: none"> 1. Knowledge for building simple web site using content management systems <ul style="list-style-type: none"> • Possess good communication and interpersonal skills • Possess good knowledge of web hosting concept and sourcing of hosting facilities • Possess detail knowledge of implementing web CMS systems • Possess detail knowledge of operating and administering the organisation's CMS • Possess basic knowledge of HTML • Possess some basic training skills 2. Build simple web site using content management systems <ul style="list-style-type: none"> • Work with supervisor and other stakeholders to identify the website technical requirements from, such as: <ul style="list-style-type: none"> • Type and usage of web site (dynamic, static, Internet store, etc.) • Performance required (response time) • Size of storage • Network speed • Identify suitable web CMS and web hosting company (unless for the organisation use, taking into various factors, including: <ul style="list-style-type: none"> • Prices • Backup service • Facilities offered (storage, network bandwidth, CPU speed, etc.) • Prepare purchasing document, in accordance with organisation procurement procedures, and recommendation for supervisor approval • Liaise with hosting service provider to setup DNS reference to the organisation's new web site and acquire hosting servers logon details to administer the CMS • Download and perform remote installation web CMS on hosting server • Access administrative functions of web CMS to perform following tasks: <ul style="list-style-type: none"> • Upload and install a template for the website • Upload company logo and other media (pictures and video) contents for the home page • Edit the home page with CMS editor • Test the web site with different web browsers to ensure compatibility • Create login accounts and provide tutorial sessions for web designers to use the CMS editor to create web pages on the web site 3. Exhibit professionalism <ul style="list-style-type: none"> • Be familiar with W3C web standards and ensure the CMS and web site are W3C compliant • Always look after the interest of the organisation when dealing with external parties

Specification of Competency Standards for ICT Operation and Support

Unit of Competency

Functional Area: Web Support

Assessment Criteria	The integrated outcome requirements of this UoC are the abilities to: <ul style="list-style-type: none">• Fully comprehend the requirements of the type of web site the organisation is building and acquire sufficient technical details to subscribe to a web hosting service• Install the CMS on the hosting server and be able to use the CMS editing tools to create the web site's home page that is compatible with common web browsers• Provide sufficient tutorial and assistance to web page designers that enable them to construct other web pages without any difficulties
Remark	

Specification of Competency Standards for ICT Operation and Support

Unit of Competency

Functional Area: Web Support

Title	Maintain website
Code	107912L3
Range	This unit of competency applies to IT personnel who are responsible to maintain the organisation's website. The website is the window of companies to the Internet world. It represents the organisation. Hence, it is essential to be always in operation and the contents are update without any embarrassing issues, such as customer cannot complete purchasing transaction or students cannot upload (hand in) projects or homework. This UoC concerned with the website maintenance of the content rather than the physical server which the website is hosted on.
Level	3
Credit	3
Competency	<p>Performance Requirements</p> <p>1. Knowledge for maintaining website:</p> <ul style="list-style-type: none">• Possess interpersonal and coordination skills• Possess basic knowledge of principles of website design and maintenance• Possess good knowledge of creating web contents• Possess basic knowledge of operating common web browsers• Possess good knowledge of operating website testing tools• Understand user feedbacks or complaints related to the website• Understand the organisation's website performance requirements• Possess basic knowledge of the organisation document standards and procedures

Specification of Competency Standards for ICT Operation and Support

Unit of Competency

Functional Area: Web Support

Competency	<p>2. Maintain website</p> <ul style="list-style-type: none"> • Coordinate with various parties in the organisation to implement new features, upload new contents to website • Create various channels to receive information related to the organisation’s website, included but not limited to the following: <ul style="list-style-type: none"> • Visitor feedbacks or user complaints • Results of website testing tools • Monitoring/log statistics • Alerts of website outage • Periodically perform tests including but not limited to the following: <ul style="list-style-type: none"> • Access to the website is still possible • Web contents are compatible with different browsers and different clients (mobiles and desktops) • No broken links • Software are updated • Access and download speed • Functions/features are operational as expected, such as: checkout, blog, forum, registration, upload, download, etc. • Correct or coordinate with appropriate parties to correct any detected issues and remove redundant contents • Collect visitor traffic statistic for security purpose and/or business use <ul style="list-style-type: none"> • Pages entered on and exited on • Time spent on the site • Bounce rate • Referring sites • Countries of visitors are from • Use monitoring tools for “Reputation management” of the organisation’s name, brands and contents of the website appeared on the Internet, such as Google alert • Apply backup strategies: <ul style="list-style-type: none"> • Perform scheduled backups • Perform drills for recovery, in the event of website corruption • Document and create reports that comply with the organisation’s standards and procedures for assisting website developers and management decision making <p>3. Exhibit professionalism</p> <ul style="list-style-type: none"> • Look after the interest and reputation of the organisation • Apply industry best practices and web technologies when maintaining website • Adhere to Intellectual Properties and copyright laws
Assessment Criteria	<p>The integrated outcome requirements of this UoC are the abilities to:</p> <ul style="list-style-type: none"> • Use different tools to monitor and test organisation’s website • Liaise with appropriate parties to correct issues and ensure the website is fully functional, updated and tested with different browsers on different clients • Ensure the website is well backup according to the organisation’s planned schedules and can be recovered within the organisation standard
Remark	

Specification of Competency Standards
for the Information and Communications Technology Industry
Unit of Competency

1. Title	Implement algorithms and methods of image processing
2. Code	111112L5
3. Range	This UoC involves implementing algorithms and methods of image processing to facilitate AI and ML development
4. Level	5
5. Credit	3 (for reference only)
6. Competency	<p>Performance Requirements</p> <p>6.1 Understand image processing algorithm viewpoints</p> <ul style="list-style-type: none"> ● Be able to <ul style="list-style-type: none"> ■ identify the AI and ML stakeholders of the algorithms ■ select algorithm and document viewpoints to address stakeholder's concerns (Remark) <p>6.2 Identify, evaluate, apply, and develop image processing algorithms and methods</p> <ul style="list-style-type: none"> ● Be able to apply appropriate algorithms (e.g. enhancement methods, compression techniques, and segmentation methods) <p>6.3 Perform stakeholders' reviews</p> <ul style="list-style-type: none"> ● Be able to <ul style="list-style-type: none"> ■ illustrate to the stakeholders that the development goals are met ■ keep track of comments and changes in documentation
7. Assessment Criteria	The integrated outcome requirements of this UoC is to develop, illustrate, and document image processing algorithms and methods that address stakeholders' concerns.
8. Remark	Example of image processing algorithm viewpoints include hardware, software, standards, cost, and integration

Specification of Competency Standards
for the Information & Communications Technology Industry
Unit of Competency

1. Title	Apply diagnostic and troubleshooting skills to solve hardware, software and networking related issues
2. Code	111121L4
3. Range	This UoC involves troubleshooting and identifying the causes of the problem in ICT systems.
4. Level	4
5. Credit	3 (for reference only)
6. Competency	<p>Performance Requirements</p> <p>6.1 Knowledge in hardware, software and networking aspects and diagnosis of hardware, software and networking aspects in ICT systems.</p> <p>6.2 Troubleshooting across hardware, software and networking aspects in ICT systems</p> <ul style="list-style-type: none"> ● comprehend the issues and symptoms of the issues from the problem report or from user and plan how to troubleshoot the issues. ● apply appropriate diagnostic tools and command set to obtain the status of the system. ● attempt to reproduce the issues that were reported and collect as much information as possible for problem analysis. ● When needed, consult colleagues, professionals and vendors ● formulate an action plan to implement the solutions to rectify the issues. <p>6.3 Exhibit professionalism</p> <ul style="list-style-type: none"> ● take necessary measures to prevent or minimise data loss or service interruption during the diagnosis process. ● follow organisation safety procedures when handling any hardware or equipment during the troubleshooting process. ● follow organisation Standard Operating Procedures (SOPs) or guidelines when handling the troubleshooting process.
7. Assessment Criteria	<p>The integrated outcome requirements of this UoC are the abilities to:</p> <ul style="list-style-type: none"> ● apply proper diagnostic tools and system functions for problem identification. ● plan the troubleshoot work and systematically perform the troubleshooting to identify the issues or cause of issues. ● follow organisation procedures when handling any hardware or equipment during the troubleshooting process.
8. Remark	

Specification of Competency Standards
for the Information and Communications Technology Industry
Unit of Competency

1. Title	Review, design and re-engineer business processes to form a new business architecture
2. Code	111125L6
3. Range	Promote and explain the adopted business processes to stakeholders in an organisation to obtain their buy-in and support in a general business environment
4. Level	6
5. Credit	6 (for reference only)
6. Competency	<p>Performance Requirements</p> <p>6.1 Define business performance indicators to meet with business goals in consistent to stakeholders' expectation</p> <ul style="list-style-type: none"> ● Be able to <ul style="list-style-type: none"> ■ identify the stakeholders from different categories: <ul style="list-style-type: none"> ◆ Internal stakeholders ◆ External stakeholders ◆ Primary stakeholders ◆ Secondary stakeholders ■ understand the different stakeholders' expectation from different stakeholders' categories ■ define business performance indicators to meet with strategic drivers, and stakeholders' concerns (Remark) <p>6.2 Identify, design, and re-engineer business processes of an organisation with new technologies to improve business performance</p> <ul style="list-style-type: none"> ● Be able to identify, design, and re-engineer business processes of an organisation with new technologies to achieve the pre-defined business performance indicators <p>6.3 Continuously measure and monitor the business performance of using the existing technologies</p> <ul style="list-style-type: none"> ● Be able to <ul style="list-style-type: none"> ■ continuously measure the business performance of applying the existing technologies ■ continuously measure the technology capability of the existing technologies ■ monitor and report the effects of the technology capability on the business performance <p>6.4 Establish management structure to continuously improve business performance with new technologies</p>

	<ul style="list-style-type: none"> ● Be able to design and establish management structure <ul style="list-style-type: none"> ■ review current business performance in relation to existing technology capability ■ review new technologies with respect to improving business performance ■ conduct cost-benefit analysis on adopting new technologies and check for any improvement in business performance ■ formulate a new business architecture
7. Assessment Criteria	<p>The integrated outcome requirements of this UoC are the abilities to :</p> <ul style="list-style-type: none"> ● identify, design, and re-engineer business processes of an organisation with new technologies to improve business performance ● continuously monitor the business performance of using the existing technologies ● design and establish management structure and guidelines to continuously improve business performance with new technologies
8. Remark	<p>Examples of metrics and methodologies are:</p> <ul style="list-style-type: none"> ● Key Performance Indicators (KPIs); ● Objective and key results (OKRs); ● Return on investment (ROI) analysis; ● Internal rate of return (IRR); ● Balanced scorecard

Specification of Competency Standards
for the Information & Communications Technology Industry
Unit of Competency

1. Title	Define metrics to ensure that a technology architecture meets the business goals
2. Code	111127L5
3. Range	Define metrics to evaluate and analyse technology architectures to ensure that it can support the business goals and objectives.
4. Level	5
5. Credit	3 (for reference only)
6. Competency	<p>Performance Requirements</p> <p>6.1 Understand the principles of quality assurance</p> <ul style="list-style-type: none"> ● articulate the needs for quality assurance to ensure that the resulting technology architecture really meets the required quality standards ● understand the quality assurance standards and measures provided by IT service providers <p>6.2 Understand the purposes of relevant metrics for quality assurance standards</p> <ul style="list-style-type: none"> ● understand appropriate and measurable metrics to evaluate the ability of a technology architecture to meet the business goals and objectives (See Remark) <p>6.3 Define metrics for quality assurance standards</p> <ul style="list-style-type: none"> ● keep updated of the business and technology changes ● observe the code of practices in trade ● update the developed software deployment or migration plan and contingency plan whenever necessary <p>6.4 Exhibit professional skills</p> <ul style="list-style-type: none"> ● a formal checkpoint review of the architecture model and building blocks with stakeholders, validating that the business goals are met ● document all findings
7. Assessment Criteria	<p>The integrated outcome requirements of this UoC is the ability to:</p> <ul style="list-style-type: none"> ● validate that the business goals and other objectives of implementing the technology architecture are met. <p>Please note that this may be a continuous exercise because of the ongoing changes of business requirements and technology options. This makes the definition of quality assurance standards and metrics a key to this activity.</p>
8. Remark	An example of the metrics can be a key question list which is used to pose questions against the architecture model and service description

	portfolio to test its merit and completeness
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Specification of Competency Standards
for the Information and Communications Technology Industry
Unit of Competency

1. Title	Model technology architecture
2. Code	111129L5
3. Range	This UoC involves modelling technology architecture using architecture building blocks and by considering appropriate architecture viewpoints for the particular problem domain or industry
4. Level	5
5. Credit	6 (for reference only)
6. Competency	<p>Performance Requirements</p> <p>6.1 Understand technology architecture viewpoints</p> <ul style="list-style-type: none"> ● Be able to <ul style="list-style-type: none"> ■ identify relevant stakeholders of the technology architecture ■ select technology architecture viewpoints to address stakeholders' concerns (Remark) <p>6.2 Identify, evaluate, apply, and develop technology architecture tools and techniques</p> <ul style="list-style-type: none"> ● Be able to apply appropriate tools and techniques (e.g. architecture patterns, architecture description languages, diagrams and schematics) to capture, model, analyse and document the technology architecture viewpoints <p>6.3 Use a building block approach to model the architecture</p> <ul style="list-style-type: none"> ● Be able to abstract the technology architecture based on the relevant viewpoints into architecture building blocks <p>6.4 Understand the inter- relationships of the various viewpoints</p> <ul style="list-style-type: none"> ● Be able to integrate the various viewpoints in the architecture model in order to <ul style="list-style-type: none"> ■ facilitate the building blocks decomposition ■ enhance the understanding of the audience <p>6.5 Develop an initial technology architecture using building block approach</p> <ul style="list-style-type: none"> ● Be able to develop and document the initial technology architecture through the use of appropriate architecture building blocks <p>6.6 Conduct reviews with stakeholders</p> <ul style="list-style-type: none"> ● Be able to seek feedbacks from stakeholders <ul style="list-style-type: none"> ■ confirm with stakeholders that the architecture addresses all stakeholders' initial concerns

	■ re-work the architecture if necessary
7. Assessment Criteria	The integrated outcome requirement of this UoC is to develop and document a technology architecture model using a building block approach that integrates the various viewpoints with the use of appropriate tools and techniques
8. Remark	Examples of technology architecture viewpoints include hardware, communication, processing, standards, cost, and integration.

Specification of Competency Standards
for the Information and Communications Technology Industry
Unit of Competency

1. Title	Develop data analysis programmes in enterprise intelligence systems
2. Code	111156L5
3. Range	This UoC involves developing programmes to assist data analysis in individual intelligence system. This covers all kinds of data analysis programmes.
4. Level	5
5. Credit	6 (for reference only)
6. Competency	<p>Performance Requirements</p> <p>6.1 Knowledge in Regulatory Requirements</p> <ul style="list-style-type: none"> ● Be able to <ul style="list-style-type: none"> ■ have an in-depth understanding of the latest regulations (e.g. Basel), particularly concerning data governance and compliance; ■ assess the impact of any new regulations, identify the potential areas of concerns, and mitigate risks. <p>6.2 Knowledge in the Subject Area</p> <ul style="list-style-type: none"> ● Be able to <ul style="list-style-type: none"> ■ have an in-depth understanding of the concepts and methodologies of collecting views from key stakeholders and liaise with product development and sales team to analyse types of data application required by different users; ■ possess comprehensive knowledge of the key components of an effective data analysis programmes (e.g. sources of data, data screening approaches, data clustering, data analysis methodologies, etc.) and based on that to develop the programmes. <p>6.3 Applications</p> <ul style="list-style-type: none"> ● Be able to <ul style="list-style-type: none"> ■ Develop coding to automate calculation of necessary statistical analysis in intelligence system; ■ Cooperate with user to identify features to be included in the report so as to facilitate application of the results to different functions of the bank; ■ Design output format which can cater to the different needs and purposes of users. <p>6.4 Professional Behaviour and Attitude</p> <ul style="list-style-type: none"> ● Be able to <ul style="list-style-type: none"> ■ Design data analysis programmes in consideration of artificial

	<p>intelligence (AI) and machine learning element;</p> <ul style="list-style-type: none"> ■ Cooperate with analysts to develop or identify suitable analysis models and maintain model reliability by periodic fine-tuning; ■ Cooperate with different users to review application of the system to ensure effectiveness and user-friendliness of the function.
7. Assessment Criteria	<p>The integral outcome requirement of this UoC is the ability to develop data analysis programmes by identifying different features for data analysis and reporting them to facilitate the analysis and application of stored data. The measures should be based on analysis on users' requirements.</p>
8. Remark	

Specification of Competency Standards
for the Information and Communications Technology Industry
Unit of Competency

1. Title	Perform statistical analysis and refine the operational decision-making process
2. Code	111158L5
3. Range	This UoC involves performing statistical analysis and based on actionable insights, refining the organisation operations to make better-informed decisions
4. Level	5
5. Credit	3 (for reference only)
6. Competency	<p>Performance Requirements</p> <p>6.1 Understand operational problems and operations' key performance indicators (KPIs) and how they are related</p> <p>6.2 Select statistical analysis viewpoints that best help dissect the operational problems</p> <p>6.3 Communicate actionable insights to refine the organisation operations to make better-informed decisions</p> <ul style="list-style-type: none"> ● explain operational problems through statistical analysis outcomes ● based on organisation actionable insights, refine the organization operations to make better-informed decisions
7. Assessment Criteria	<p>The integrated outcome requirement of this UoC are the abilities to</p> <ul style="list-style-type: none"> ● perform statistical analysis for the organisation operations based on the predefined KPIs ● refine the organisation operations based on organisation actionable insights
8. Remark	

Specification of Competency Standards
for the Information and Communications Technology Industry
Unit of Competency

1. Title	Verify and validate that the deployed / migrated software and the existing software are functioning properly
2. Code	111159L4
3. Range	Verify and validate that the deployed/migrated software and the existing software are functioning properly in the context of deploying and migrating software
4. Level	4
5. Credit	6 (for reference only)
6. Competency	<p>Performance Requirements</p> <p>6.1 Understand the relationship between the deployed or migrated software with other systems</p> <ul style="list-style-type: none"> ● Be able to <ul style="list-style-type: none"> ■ state the features of the newly deployed software ■ state which functionalities from the retired software were replaced by that from the migrated software ■ identify the position of the deployed or migrated software in the integrated environment within an organization <p>6.2 Perform verification and validation on the deployed or migrated software</p> <ul style="list-style-type: none"> ● Be able to <ul style="list-style-type: none"> ■ draw up a verification and validation plan on the deployed or migrated software for subsequent verification and validation process ■ trace the recorded results from deployment or migration process and any other traceable reports to determine whether the software was implemented correctly and completely according to defined requirements such as those in the area of <ul style="list-style-type: none"> ◆ Performance ◆ Data security and integrity ◆ Interoperability with other system components <p>6.3 Ensure independent operation in verification and validation process</p> <ul style="list-style-type: none"> ● Be able to <ul style="list-style-type: none"> ■ conduct additional tests to verify and testify that the deployed / migrated software and any existing software are functioning properly ■ walkthrough all steps in verification and validation plan ■ review documentary evidence received and fully document audit works ■ ensure audit documentations are properly retained by

	<p>following the organisation's / auditor's guidelines</p> <p>6.4 Verify and validate the deployed / migrated software and the existing software are functioning properly professionally</p> <ul style="list-style-type: none"> ● Be able to verify and validate the deployed / migrated software and the existing software are functioning properly in accordance with organization's guidelines as well as any (local and international) laws and regulatory requirements, if applicable
7. Assessment Criteria	<p>The integrated outcome requirement of this UoC are the abilities to :</p> <ul style="list-style-type: none"> ● confirm that the deployed or migrated software delivers its expected outcomes ● confirm that the deployed or migrated software and the existing software are functioning properly
8. Remark	

Specification of Competency Standards
for the Information and Communications Technology Industry
Unit of Competency

1. Title	Define user requirements
2. Code	111162L4
3. Range	This UoC involves defining user requirements of IT application and communicating with stakeholders to produce a user requirement document
4. Level	4
5. Credit	6 (for reference only)
6. Competency	<p>Performance Requirements</p> <p>6.1 Know the stakeholders and information needed to be conveyed</p> <ul style="list-style-type: none"> ● understand the relationship of business requirements, user requirements and system requirements for defining an IT application development project ● identify the stakeholders who will be the users of the IT application to be developed ● collect profile of stakeholders, whenever possible, to preliminarily identify what the users do with the IT application or what activities the users must be able to perform ● understand any constraints on the delivery of information such as time and location etc. <p>6.2 Consolidate information for delivery</p> <ul style="list-style-type: none"> ● collect relevant data and compose a draft appropriate to the communication assignment ● explain the use of special terms and short forms ● bridge the gap between technical and non-technical people by communicating technical terms in generic terms ● seek recommendation or approval from management before release of information where necessary <p>6.3 Exhibit professionalism in the user requirement document</p> <ul style="list-style-type: none"> ● follow the organisation's style and format to prepare the user requirement document ● produce accurate and concise the user requirement document
7. Assessment Criteria	<p>The integrated outcome requirement of this UoC are the abilities to :</p> <ul style="list-style-type: none"> ● understand and identify the needs of stakeholders for an IT application design project ● communicate technical information to non-technical people effectively ● Produce accurate and concise user requirement document
8. Remark	

Specification of Competency Standards
for the Information & Communications Technology Industry
Unit of Competency

1. Title	Manage organisation resources for implementation across multiple processing environment
2. Code	111163L4
3. Range	This UoC involves managing organisation computing resources devoted to multiple platform processing environment for the benefits of the organisation.
4. Level	4
5. Credit	3 (for reference only)
6. Competency	<p>Performance Requirements</p> <p>6.1 Understand the key principles of managing computing resources</p> <ul style="list-style-type: none"> ● Be able to know the principles of managing the computing resources across multiple processing environment <ul style="list-style-type: none"> ■ Automation ■ Identity and Access Management ■ Continuous integration and development ■ Optimisation of course costs and consumption <p>6.2 Understand the available resources of the organisation</p> <ul style="list-style-type: none"> ● Be able to <ul style="list-style-type: none"> ■ list the on-premise computing resources of the organization accurately ■ understand the computing resources required for the future business development <p>6.3 Define the computing resources management plan in accordance with the IT strategies</p> <ul style="list-style-type: none"> ● Be able to <ul style="list-style-type: none"> ■ manage on-premise computing resources effectively ■ choose the suitable on-demand service models across multiple processing environment, such as <ul style="list-style-type: none"> ◆ Infrastructure as a service (IaaS) ◆ Platform as a service (PaaS) ◆ Software as a service (SaaS) ◆ Function-as-a-Service (FaaS) <p>6.4 Formulate plans to manage organisation computing resources for the benefits of the organisation</p> <ul style="list-style-type: none"> ● Be able to formulate plans for managing the computing resources on-premises and on multiple processing environment according to the business requirements

7. Assessment Criteria	The integrated outcome requirements of this UoC is the ability to manage both on-premises computing resources and resources on multiple processing environment for the benefits of the organisation.
8. Remark	

Specification of Competency Standards
for the Information and Communications Technology Industry
Unit of Competency

1. Title	Conduct solicitation process in project outsourcing
2. Code	111196L5
3. Range	This UoC involves preparing and initiating the tender procedure for outsourcing parts of or the whole project.
4. Level	5
5. Credit	6 (for reference only)
6. Competency	<p>Performance Requirements</p> <p>6.1 Understand the outsourcing requirements</p> <ul style="list-style-type: none"> ● Understand the organisation policies on outsourcing work ● Understand the project requirements and goals ● Aware of the technological skills needed for the completion of the project ● Have a rough idea of the budget ● Define a set of selection criteria <p>6.2 Awareness of the market condition</p> <ul style="list-style-type: none"> ● Identify appropriate prospective bidders who are capable of providing the services ● Identify and collect information on services available in the market ● Aware of the reputation of different potential bidders <p>6.3 Prepare procurement documents</p> <ul style="list-style-type: none"> ● Prepare all internal and external documents that are related to the solicitation process, for example: <ul style="list-style-type: none"> ■ invitation for Bid (IFB) ■ request for Proposal (RFP) ■ request for Quotation (RFQ) ■ initiation for Negotiation ■ contractor Initial Response <p>6.4 Invite or notify potential bidders and conduct bidder's conference</p> <ul style="list-style-type: none"> ● Send invitations to identified potential bidders ● Place advertisements to attract more potential bidders ● Establish key principles for conducting a bidder's conference and clarify bidder's concerns <p>6.5 Proposals collection and tender board formulation</p> <ul style="list-style-type: none"> ● Receive tenders following guidelines ● Identify suitable members and invite them to be members of the tender board for the tender evaluation process

	<p>6.6 Exhibit professionalism</p> <ul style="list-style-type: none"> ● Comply with the organisation's guidelines and procedures as well as any (local and international) laws and regulatory requirements, if applicable
<p>7. Assessment Criteria</p>	<p>The integrated outcome requirements of this UoC are the abilities to :</p> <ul style="list-style-type: none"> ● develop effective procurement documents and procedures for the tender bidders to submit bids/quotations ● formulate a tender board with suitable members for the tender evaluation process ● carry out the solicitation process in accordance with organisation guidelines
<p>8. Remark</p>	

Specification of Competency Standards
for the Information & Communications Technology Industry
Unit of Competency

1. Title	Analyse the available solutions from IT service providers
2. Code	111199L4
3. Range	This UoC involves analysing solutions from external IT service providers that fit most to the organisation's business goals
4. Level	4
5. Credit	3 (for reference only)
6. Competency	<p>Performance Requirements</p> <p>6.1 Knowledge in evaluation criteria of external IT service providers</p> <ul style="list-style-type: none"> ● Technical expertise ● Domain expertise ● Business maturity <p>Evaluation criteria of external IT service providers can also be divided into various sub-criteria. (See Remark 1)</p> <p>6.2 Rank the proposals according to the criteria as listed in the procurement management plan</p> <p>6.3 Make preparation for drafting the service agreement with the successful bidder</p> <ul style="list-style-type: none"> ● Apply appropriate methods to identify service agreement concerns: <ul style="list-style-type: none"> ■ project warranties ■ liabilities ■ indemnity ■ insurance clause-related activities ● Make negotiation with the external service providers according to the rank sequence ● clarify any unclear points in the received proposal from the external service providers and negotiate with them on the terms and conditions according to relevant local / international laws ● reach consensus on the structure and requirements of the service agreement with the successful bidder prior to the signing of the agreement (Remark 2)
7. Assessment Criteria	<p>The integrated outcome requirements of this UoC are the abilities to:</p> <ul style="list-style-type: none"> ● apply appropriate criteria to evaluate proposals from external IT service providers ● make a fair selection for a successfully bidder and reach consensus with the successful bidder on the important terms and conditions for drafting the service agreement.
8. Remark	<p>1. The evaluation sub-criteria are:</p> <ul style="list-style-type: none"> ● Service / Product Value Creation / Provision <ul style="list-style-type: none"> ■ Service / Product Portfolio: Service scope including the

	<p>completeness of the portfolio or the skill set.</p> <ul style="list-style-type: none"> ■ Service / Product Experience: Service availability and service experience from a customer perspective. Maturity of the offer. ■ Integration: Interoperability of Technologies with one another or the skills to integrate them. ■ Economic factors: Price transparency and the quality of the business model, not the prices themselves. For service providers, nearshore concepts or skills that deliver low-cost architectures have also been evaluated. ■ Disruption potential: Recognition of the availability of highly innovative approaches <ul style="list-style-type: none"> ● Vendor Performance <ul style="list-style-type: none"> ■ Strategy: Strategy and market understanding. Does technology fit the company strategy? ■ Footprint: Competitive strength and market presence in terms of customers, reach, visibility and go-to-market. ■ Ecosystem: For IT service providers, the number of development service providers who are familiar with their technologies is critical. On the other hand, we evaluate the number of technology suppliers that are listed by Development Service Providers under Partners and Skills. Active involvement in open source communities is also a plus. ■ Customer Experience: Availability of information and training for technology providers. Local availability of employees for service providers. ■ Agility: Speed and innovation strength of the providers, assessed in terms of their ability to grasp market trends quickly and, if necessary, develop them with an innovation budget. <p>2. Subjects covered generally include, but not limited to, responsibilities and authorities, applicable terms and law, technical and business management approaches, contract financing and price.</p>
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Specification of Competency Standards
for the Information & Communications Technology Industry
Unit of Competency

1. Title	Prepare system operation documentation
2. Code	111200L4
3. Range	Prepare technical and user documentation describing how the system works for third party management. Documentation should reflect maintenance and update processes to ensure integrity the deployment.
4. Level	4
5. Credit	3 (For Reference Only)
6. Competency	<p>Performance Requirements</p> <p>6.1 Understand system requirements</p> <ul style="list-style-type: none"> ● Be able to: <ul style="list-style-type: none"> ■ identify system operation issues, i.e. system installation/update and deployment, day-to-day technical operations, server or software application failure and maintenance, etc. ■ comprehend the workflow as stated in the system operation plan according to technical and user requirements <p>6.2 Prepare the operation documentation containing information that will aid system administrators to understand the functions and capabilities of your information technology systems, applications, and components</p> <ul style="list-style-type: none"> ● Be able to: <ul style="list-style-type: none"> ■ describe the user typical processes and operation procedures as required by the needs of the technical and user requirements ■ provide standards on document to help with consistency and avoid potential pitfalls <p>6.3 Check the consistence and completeness of the documentation</p> <ul style="list-style-type: none"> ● Be able to: <ul style="list-style-type: none"> ■ comply with corporate policy in documentation standards ■ review developed templates and guidelines to ensure their consistence in format and their completeness meet with system requirements ■ issue the developed templates and guidelines to stakeholders for review and feedback ■ incorporate feedback from stakeholders and management to finalise the system documentation standards
7. Assessment Criteria	<p>The integrated outcome requirements of this UoC are the abilities to:</p> <ul style="list-style-type: none"> ● establish system report and documentation standard and ensure consistency and completeness in the operation documentation ● enhance efficiency of system operation, support, maintenance and system training, etc.

8. Remark	
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Specification of Competency Standards
for the Information and Communications Technology Industry
Unit of Competency

1. Title	Formulate business strategies and policies
2. Code	111201L6
3. Range	Formulate the business strategies and policies for an organisation in alignment with its approved vision and mission statements by considering the potential impacts and implications of both current and emerging technologies
4. Level	6
5. Credit	6 (for reference only)
6. Competency	<p>Performance Requirements</p> <p>6.1 Understand business objectives and envisioned future of an organisation</p> <ul style="list-style-type: none"> ● Be able to <ul style="list-style-type: none"> ■ articulate the core values and purpose of an organisation ■ articulate the current trends of business and the envisioned future of an organisation <p>6.2 Understand issues related to both business and IT perspectives of the industry</p> <ul style="list-style-type: none"> ● Be able to <ul style="list-style-type: none"> ■ understand the issues related to both business and IT perspectives of the industry ■ have insights of technology trends and viability of technology products under market forces ■ understand the potential impacts and implications of current and new technologies in the fields related to the organisation ■ think of possible ways to utilise new technologies in the organisation operation and marketing strategy. <p>6.3 Understand the current development trends of a business</p> <ul style="list-style-type: none"> ● Be able to summarise the business trends related to the organisation ● Aware of the business profile and positioning of the organisation ● Understand and state up to date with the business field related to the organisation <p>6.4 Understand the ICT applications related to a business</p> <ul style="list-style-type: none"> ● Be able to summarise the ICT applications related to the operational aspect of the organisation ● Consider and make suggestions on updating current or adopting new technologies to enhance the operation and governance aspect of the organisation

	<p>6.5 Analyse the strengths, weaknesses, opportunities and threats (SWOT) of an organisation</p> <ul style="list-style-type: none"> ● Be able to perform a SWOT analysis for an organisation to develop business strategies and policies that bring reasonable and acceptable return of investment (ROI) <p>6.6 Formulate strategies and policies for the sustainability of the business</p> <ul style="list-style-type: none"> ● Be able to <ul style="list-style-type: none"> ■ formulate the strategies and policies for the long-term sustainability of the business taking into consideration Business-IT alignment and enablement ■ formulate partnership/alliance strategies with external partners like vendors/suppliers, investors, distributors to win the market ■ carry out the above in accordance with the organisation's business goals, objectives, policies and guidelines as well as any (local and international) laws and regulatory requirements, where applicable <p>6.7 Formulate ideas where IT can help the growth of the business</p> <ul style="list-style-type: none"> ● Be able to identify and think of ways to update and implement technologies that could strengthen the operational goal and governance of the organisation
7. Assessment Criteria	<p>The integrated requirements of this UoC are the abilities to :</p> <ul style="list-style-type: none"> ● formulate business strategies and policies for an organisation in alignment with its approved vision and mission statements to support its sustainable development ● suggest updates to current technologies and adaptation of new technologies that could assist the development and governance of the organisation
8. Remark	<p>Some examples of emerging ICT technologies are:</p> <ul style="list-style-type: none"> ● Artificial intelligence and machine learning ● Cloud computing ● Internet of things ● Security and automation

Specification of Competency Standards
for the Information & Communications Technology Industry
Unit of Competency

1. Title	Identify and evaluate information technologies that support the objectives of an organisation
2. Code	111202L6
3. Range	This UoC involves applying analysis methods to identify and evaluate the information technologies that fit most to the organisation's business processes
4. Level	6
5. Credit	3 (for reference only)
6. Competency	<p>Performance Requirements</p> <p>6.1 Understand the organisation's objectives</p> <ul style="list-style-type: none"> ● comprehend the organisation's vision, mission, objectives, goals and plans ● seek clarification on the above from relevant people, if necessary ● understand the implications of the organisation's objectives on the application of emerging technologies <p>6.2 Have broad knowledge of the information technologies applicable to the organisation's industry</p> <ul style="list-style-type: none"> ● understand the emerging technologies landscape, including but not limited to: <ul style="list-style-type: none"> ■ Artificial intelligence and machine learning ■ Cloud computing ■ Internet of things ■ Security and automation ● understand the applicability, advantages and disadvantages, constraints and limitations of various information technologies available for the specific industry of the organization ● evaluate the opportunities and threats of the emerging technologies ● Understand the shared responsibility model with IT service providers, if applicable <p>6.3 Identify and evaluate information technologies that support the organisation's objectives with a high degree of expertise and professionalism</p> <ul style="list-style-type: none"> ● identify and evaluate the appropriate information technologies for the organisation using standard guidelines and methodologies ● consider and evaluate the appropriateness of managed or outsourcing services. ● make appropriate references to industry sources, such as vendors

	and their customers, experts and consultants in the industry, etc.
7. Assessment Criteria	The integrated outcome requirement of this UoC is the ability to ensure that the information technologies identified and evaluated are the most appropriate to support the organisation's objectives.
8. Remark	

Specification of Competency Standards
for the Information and Communications Technology Industry
Unit of Competency

1. Title	Review and comply with organisational policies and procedures, relevant laws and regulatory requirements
2. Code	111205L6
3. Range	This UoC involves reviewing practices to ensure that the service delivered adhere to the organisational policies and procedures, relevant laws and regulatory requirements
4. Level	6
5. Credit	6 (for reference only)
6. Competency	<p>Performance Requirements</p> <p>6.1 Have knowledge of organisational practices, infrastructures, policies and procedures</p> <ul style="list-style-type: none"> ● know the operational structure of the organisation ● aware of the different technologies, tools, equipment and online services that are related to the service or tasks delivered ● understand the organisation's policies, procedures and goals ● observe organisational practices and procedures <p>6.2 Have knowledge of relevant laws and regulatory requirements related to the industry of the organisation</p> <ul style="list-style-type: none"> ● comprehend the latest regulatory requirements applicable to the organisation, including but not limited to: <ul style="list-style-type: none"> ■ Intellectual property right protection ■ Personal data (Privacy) ordinance ■ National security law ■ Telecommunications ordinance ● refer to the appropriate experts for guidance where necessary <p>6.3 Review and comply with organisational policies and procedures, relevant laws and regulatory requirements</p> <ul style="list-style-type: none"> ● Identify the applicable laws and compliances ● observe and adhere to relevant policies and procedures, laws and regulations in an efficient and effective manner ● take the initiative to improve the organisation's policies and procedures where appropriate ● obtain the endorsement of relevant stakeholders ● obtain prior approvals for system resources and access, such as communication protocols and ports, data storage, online services,

	<p>other system peripherals, computer time as well as data of another person</p> <ul style="list-style-type: none"> ● review practices, identify and rectify any noncompliance procedures ● make use of tools, infrastructures, equipment and online services available to enhance the service delivered ● make suggestions to enhance existing or purchase of new tools, infrastructures, equipment and online services if it helps to improve on the compliance to related regulations or the effectiveness of the service delivered ● make effective and efficient use of external experts where necessary to meet its business goals and objectives ● report serious misconducts and noncompliance procedures to relevant management and suggest methods to avoid future occurrences (such as provide training programs or workshops to highlight issues to relevant personnel)
7. Assessment Criteria	<p>The integrated requirements of this UoC are the abilities to :</p> <ul style="list-style-type: none"> ● review of own practices; identify and rectify any noncompliance procedures ● comply to organisational policies and procedures, relevant laws and regulatory requirements ● obtain prior approval for system access and resources according to the aforementioned policies and requirements ● Utilise existing resources and make suggestions on updating or acquiring new resources to enhance the service delivered and adhesion to various related policies and regulations ● Report serious misconducts and noncompliance procedures to relevant management and suggest methods to avoid future occurrences (such as provide training programs or workshops to highlight issues to relevant personnel)
8. Remark	

Specification of Competency Standards
for the Information & Communications Technology Industry
Unit of Competency

1. Title	Set policy to control data security and privacy
2. Code	111206L6
3. Range	Establish policy to control data security and privacy of an organisation
4. Level	6
5. Credit	6 (for reference only)
6. Competency	<p>Performance Requirements</p> <p>6.1 Understand legal requirements on data security and privacy</p> <ul style="list-style-type: none"> ● locate and make reference to sources of legislation applicable to local business entities (Remark) ● seek professional advices on issues relating to security and privacy <p>6.2 Observe standards, guidelines and procedures published by professional bodies</p> <ul style="list-style-type: none"> ● comprehend the standards, guidelines and procedures published by professional bodies in the trade and extract the sections relevant to organisational operation as reference <p>6.3 Set corporate policy to control data security and privacy</p> <ul style="list-style-type: none"> ● formulate control policies to cover stages from data capture and processing, information flow and distribution, storage and access to retirement ● formulate control policies to ensure that information is relevant, accurate and timely and its management is an integral part of strategic management ● formulate control policies to maintain confidentiality, integrity, and reliability throughout the stages to comply with administrative, audit and legal requirements <p>6.4 Keep the policy up to date</p> <ul style="list-style-type: none"> ● perform regular review on the local and international policies to ensure it meets the changing operational environment ● cross check the policy with current best practice as published by professional bodies in the trade to make optimum use of the information resources <p>6.5 Set policy to control data security and privacy in a professional manner</p> <ul style="list-style-type: none"> ● establish the required policies in accordance with organisation's guidelines as well as any (local and international) laws and regulatory requirements, if applicable
7.	The integrated outcome requirements of this UoC is the ability to produce a

Assessment Criteria	policy document addressing the control of data security and privacy.
8. Remark	<p>Some reference sources of legislation applicable to business entities are:</p> <ul style="list-style-type: none">● Bilingual Laws Information System http://www.legislation.gov.hk/eng/index.htm● Personal Data (Privacy) Ordinance http://www.pcpd.org.hk/english/ordinance/ordfull.html● General Data Protection Regulation (GDPR) https://gdpr.eu/● The Personal Information Protection Law of the Mainland https://www.pcpd.org.hk/english/data_privacy_law/mainland_law/mainland_law.html● The PRC Data Security Law http://www.hk-lawyer.org/content/new-prc-data-security-law-and-its-potential-impact-overseas-data-transfers

Specification of Competency Standards
for the Information & Communications Technology Industry
Unit of Competency

1. Title	Review the emerging technologies and cross-functional strategies
2. Code	111207L6
3. Range	Review cross-functional strategies to enable an organisation to identify suitable emerging technologies for supporting its business strategies
4. Level	6
5. Credit	3 (for reference only)
6. Competency	<p>Performance Requirements</p> <p>6.1 Understand issues associated with emerging technologies</p> <ul style="list-style-type: none"> ● evaluate the values of the emerging technologies with respect to business-technology alignment and enablement of the organization ● understand the deployment procedures of the emerging technologies ● keep updated of the application development areas of various emerging technologies, including but not limited to: <ul style="list-style-type: none"> ■ Artificial intelligence and machine learning ■ Cloud computing ■ Internet of things ■ Security and automation ■ Streaming technologies ● aware of the data security and privacy concerns in the domains of various emerging technologies <p>6.2 Review cross-functional strategies for deploying and managing the emerging technologies</p> <ul style="list-style-type: none"> ● review the organization business strategies, and conduct a mapping between the possible application areas of emerging technologies with the business strategies ● setup a clear digital strategy, if necessary, to <ul style="list-style-type: none"> ■ identify the appropriate technology applications for different operations of the organization ■ prioritize projects that require cross-functional collaboration ■ setup the project management team for cross-functional projects
7. Assessment Criteria	<p>The integrated outcome requirements of this UoCs are the abilities to</p> <ul style="list-style-type: none"> ● conduct a mapping between the possible application areas of emerging technologies with the business strategies ● setup digital strategy to support the deployment and management

	of cross-functional projects
8. Remark	

Specification of Competency Standards
for the Information & Communications Technology Industry
Unit of Competency

1. Title	Review the ethical and social issues for IT applications
2. Code	111208L6
3. Range	This UoC involves reviewing/addressing the social, environmental, political and legal challenges related to the emergence and convergence of information and communication technologies from the point of view of morality and ethics.
4. Level	6
5. Credit	3 (for reference only)
6. Competency	<p>Performance Requirements</p> <p>6.1 Understand the moral and ethical dimensions for IT applications</p> <ul style="list-style-type: none"> ● identify and understand the major moral and ethical dimensions that tie together ethical, social, and political issues in IT applications including <ul style="list-style-type: none"> ■ Information rights and obligations ■ Property rights and obligations ■ Accountability and control ■ Application/system quality ■ Culture and lifestyle: economic disparity, equality and ethnicity on rights ● understand the impacts from technology advancement on individual and society such as data collection and analysis, privacy invasion etc. <p>6.2 Review the ethical and social issues for an organisation</p> <ul style="list-style-type: none"> ● review the IT applications and/or processes within the organization from the point of view of morality and ethics ● identify and properly record any shortfalls relevant to moral and ethical considerations <p>6.3 Exhibit Professionalism</p> <ul style="list-style-type: none"> ● always look after the interest of the organisation as well as customers.
7. Assessment Criteria	The integrated outcome requirements of this UoC is the ability to review the social, environmental, political and legal challenges related to IT applications/systems to support organisation's business strategies from the point of view of morality and ethics
8. Remark	

Specification of Competency Standards
for the Information and Communications Technology Industry
Unit of Competency

1. Title	Formulate IT plans
2. Code	111210L5
3. Range	Formulate IT plans to illustrate the IT business model
4. Level	5
5. Credit	6 (for reference only)
6. Competency	<p>Performance Requirements</p> <p>6.1 Have good knowledge of IT business plans</p> <ul style="list-style-type: none"> ● Be able to <ul style="list-style-type: none"> ■ understand the importance of documenting an IT business plan ■ understand the structure of an IT business plan <p>6.2 Develop the plans according to the objectives of the organisation</p> <ul style="list-style-type: none"> ● Be able to <ul style="list-style-type: none"> ■ identify the IT business models of the organisation ■ identify the prioritised objectives for the whole organisation to achieve ■ develop the plan to fit the models and objectives above ■ account for new technologies and the potential adaption of them to enhance IT plans <p>6.3 Formulate IT business plans</p> <ul style="list-style-type: none"> ● Be able to formulate IT plans, such as (but not limited to) the following: <ul style="list-style-type: none"> ■ hardware and software deployment and updates ■ software development and maintenance ■ procurement ■ IT outsourcing ■ IT services ■ IT infrastructure remodelling (e.g. replacing on-site network/storage with cloud services) ● Identify new technologies that are aligned to the organisation's goals and integrate them into IT plans for the benefit of the organisation <p>6.4 Exhibit professionalism</p> <ul style="list-style-type: none"> ● Comply with the organisation's guidelines and procedures as well as any (local and international) laws and regulatory requirements, if applicable ● Stay up to date with the new developments related to the IT industry and the organisation's industry

7. Assessment Criteria	The integrated outcome requirements of this UoC are the abilities to : <ul style="list-style-type: none">● formulate detailed IT business plans for the benefit of the organisation.● refine IT business plans to implement technological updates that align with the organisation's goals
8. Remark	

Specification of Competency Standards
for the Information and Communications Technology Industry
Unit of Competency

1. Title	Project the potential costs, benefits and ROI of IT project
2. Code	111211L5
3. Range	This UoC involves preparing and assembling a preliminary cost model so that an IT project can be completed within an approved budget and achieve the target Return On Investment (ROI)
4. Level	5
5. Credit	3 (for reference only)
6. Competency	<p>Performance Requirements</p> <p>6.1 Understand the budget planning of IT project</p> <ul style="list-style-type: none"> ● understand the structure of an IT budget plan ● identify the existing available resources of the company ● identify the resources requirements of the IT business plan ● compute the cost of extra resources to acquire for budgeting ● conduct amortization of the current resources and factor the cost into the budget <p>6.2 Review the existing business strategies and policies against the business trends and business performance of the organisation</p> <ul style="list-style-type: none"> ● examine the business performance against the identified performance indicators of the organisation ● analyse the effectiveness of the existing business strategies and policies in achieving business performance and matching with the business trends ● perform a SWOT analysis for an organisation to develop business strategies and policies that bring reasonable and acceptable Return of Investment (ROI) <p>6.3 Formulate an IT budget plan</p> <ul style="list-style-type: none"> ● analyse the resource requirement above according to the IT plans ● develop and present a coherent budget plan according to industry standards ● regularly review the budget plan in accordance with the organisation's business goals as well as compliance requirements, and make adjustment whenever appropriate
7. Assessment Criteria	The integrated outcome requirement of this UoC is the ability to prepare a coherent budget plan according to IT business models and IT plans of the organisation
8. Remark	

**Information and Communications Technology Industry Training Advisory Committee
Software Products and Software Services (SW) branch
Unit of Competencies**

1. Title	Develop program modules of the software based on its design documents	
2. Code	ITSWDM504A	
3. Range	Develop program modules of the software based on its design documents using specified programming languages following the company's coding standards or by adopting certain international coding standards in the context of development of software products / services within an organisation or for a client [Design, Development and Maintenance – Software Development (Programming) and Related Activities]	
4. Level	5	
5. Credit	6	
6. Competency	<p>6.1 Comprehend design documentations</p> <p>6.2 Decompose program modules</p> <p>6.3 Develop program modules in a professional manner</p>	<p><u>Performance Requirement</u> Be able to comprehend the structure and content of various design documents including:</p> <ul style="list-style-type: none"> ▪ AD (Architecture design) ▪ HLD (High level design) ▪ DLD (Detailed level design) <p>Be able to</p> <ul style="list-style-type: none"> ▪ devise program modules based on DLD, HLD and AD ▪ decompose different program modules into software/system components according to its design documentations <p>Be able to</p> <ul style="list-style-type: none"> ▪ develop program modules according to company and/or international coding standards, and in an efficient and effective manner ▪ develop codes that execute efficiently ▪ develop programs with proper documentation
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) devise system components based on design documents; and (ii) develop program modules according to company's / international coding standards.	
Remark		

**Information and Communications Technology Industry Training Advisory Committee
Software Products and Software Services (SW) branch
Unit of Competencies**

1. Title	Develop test plans for various levels of testing (See Remark for various levels of testing)	
2. Code	ITSWDM507A	
3. Range	Develop test plans for various levels of testing in the context of development of software products / services within an organisation or for a client [Design Development Maintenance – Software Quality Assurance]	
4. Level	5	
5. Credit	2	
6. Competency	<p>6.1 Have the knowledge to design test plans according to the software requirements specification (SRS) and other software documents</p> <p>6.2 Develop test plans for various levels of testing</p> <p>6.3 Ensure the total cost for software testing is within budget</p> <p>6.4 Develop test plans for various levels of testing in a professional manner</p>	<p><u>Performance Requirement</u> Be able to identify the requirements of various level of test plans according to the SRS, various software design documents and program source</p> <p>Based on software documentations such as the SRS, various software design documents and program source, be able to</p> <ul style="list-style-type: none"> ▪ develop test plan for unit testing ▪ develop test plan for integration testing ▪ develop test plan for system testing ▪ develop test plan for functional and performance testing ▪ develop test plan for user-acceptance testing <p>Be able to</p> <ul style="list-style-type: none"> ▪ evaluate the total cost for software testing according to various level test plans ▪ review the test plans if the cost exceeds the budget <p>Be able to</p> <ul style="list-style-type: none"> ▪ develop test plans for various levels of testing ▪ ensure the total cost for testing is within the budget <p>in accordance with the organization's guidelines as well as any (local and international) laws and regulatory requirements, if applicable</p>
7. Assessment Criteria	The integrated outcome requirements of this UoCs is the ability to design effective test plans for various levels of testing.	
Remark	Various levels of testing include unit testing, integration testing, system testing – functional testing and performance testing, and user-acceptance testing.	

**Information and Communications Technology Industry Training Advisory Committee
Software Products and Software Services (SW) branch
Unit of Competencies**

1. Title	Understand Systems Development Life Cycle (SDLC) and software development process	
2. Code	ITSWG619A	
3. Range	Understand Systems Development Life Cycle (SDLC) and software development process in order to perform IT consulting within an organisation or for an external client [Generic Skills - IT Consulting / Champion]	
4. Level	6	
5. Credit	4	
6. Competency	<p>6.1 Have knowledge of SDLC and software development process</p> <p>6.2 Apply the knowledge of SDLC and software development process in developing software for an organisation</p> <p>6.3 Enhance effectiveness and efficiency in software development through the use of SDLC and software development process in an organisation</p>	<p><u>Performance Requirement</u> Be able to</p> <ul style="list-style-type: none"> ▪ specify the activities involved in SDLC ▪ understand the various methodologies on software development process ▪ understand the IT tools, if any, available for SDLC and software development processes <p>Be able to</p> <ul style="list-style-type: none"> ▪ plan the activities involved in SDLC and software development process, with reference to the appropriate methodologies on software development ▪ make use of the IT tools, if any, in the planning of these activities <p>Be able to</p> <ul style="list-style-type: none"> ▪ apply SDLC and software development process in the most effective and efficient manner, taking into consideration the specific situation of the organisation ▪ make use of appropriate IT tools, if any, in the most effective and efficient manner ▪ manage software development projects and demonstrate that it is under control through the use of SDLC and software development process ▪ keep stakeholders informed on the activities and progress of software development
7. Assessment Criteria	The integrated outcome requirement of this UoCs is that software development in the organisation is well managed and under control through the use of SDLC and appropriate software development process.	
Remark	This UoCs is related to and may overlap with UoCs defined in Design, Development and Maintenance functional area.	

**Information and Communications Technology Industry Training Advisory Committee
Software Products and Software Services (SW) branch
Unit of Competencies**

1. Title	Establish and develop the project team	
2. Code	ITSWPM513A	
3. Range	Establish and develop the project team to achieve optimal project performance so as to make the most effective use of the people involved in a project [Project Management – Project Human Resources Management]	
4. Level	5	
5. Credit	4	
6. Competency		<u>Performance Requirement</u>
	6.1 Understand staff acquisition and team development	<p>Be able to</p> <ul style="list-style-type: none"> ▪ comprehend the processes to acquire quality staff ▪ understand the importance and the processes of team development
	6.2 Plan for staff acquisition	<p>Be able to</p> <ul style="list-style-type: none"> ▪ determine human resources requirements for individual tasks with input from business users and guidance from higher project authorities ▪ provide a basis for determining staffing level and competencies with requirements obtained above ▪ establish project organization, structure and directory to align individual and group competencies with project tasks
	6.3 Execute staff acquisition	<p>Be able to</p> <ul style="list-style-type: none"> ▪ allocate project staff to and within the project or within the organization as directed by a higher project authority, to meet competency requirements throughout the project life cycle ▪ communicate designated staff responsibilities and authority to ensure clear understanding of project work ▪ provide the staff with personal performance measurement criteria to provide a basis for ongoing assessment
	6.4 Plan for team development	<p>Be able to</p> <ul style="list-style-type: none"> ▪ define project team policies and procedures ▪ develop rewards and recognition plan
	6.5 Conduct team development	<p>Be able to</p> <ul style="list-style-type: none"> ▪ perform team building activities ▪ establish a collocated team if possible ▪ implement programs that enhance project team performance, including use of conflict / stress reduction techniques ▪ implement rewards and recognitions according to plan

	6.6 Establish and develop the project team in a professional manner	Be able to <ul style="list-style-type: none"> ▪ acquire quality staff according to organizational policies and regulatory requirements ▪ develop project team according to organizational procedures and policies
7. Assessment Criteria	The integrated outcome requirements of this UoCs is the ability to plan and conduct staff acquisition and team development for the project.	
Remark		

**Information and Communications Technology Industry Training Advisory Committee
Software Products and Software Services (SW) branch
Unit of Competencies**

1. Title	Manage project team								
2. Code	ITSWPM514A								
3. Range	Manage project team with focus on monitoring and control so as to make the most effective use of the people involved in a project [Project Management – Project Human Resources Management]								
4. Level	5								
5. Credit	2								
6. Competency	<table border="0" style="width: 100%;"> <tr> <td style="width: 30%;"></td> <td style="text-align: center;"><u>Performance Requirement</u></td> </tr> <tr> <td>6.1 Comprehend the monitoring tools</td> <td> Be able to <ul style="list-style-type: none"> ▪ understand the structure of timesheet and work progress report to monitor project team performance ▪ analyse and interpret performance metrics (see remark) to ensure project is on schedule </td> </tr> <tr> <td>6.2 Monitor and measure performance</td> <td> Be able to <ul style="list-style-type: none"> ▪ monitor results of team building activities ▪ monitor effectiveness of programs for enhancing project team performance ▪ monitor rewards and recognition plan </td> </tr> <tr> <td>6.3 Manage and control changes professionally</td> <td> Be able to <ul style="list-style-type: none"> ▪ identify if changes in organizational plans have occurred ▪ manage the changes with approvals from project authority in charge ▪ document the changes and communicate the impact to relevant stakeholders according to organizational guidelines and regulatory requirements if any </td> </tr> </table>		<u>Performance Requirement</u>	6.1 Comprehend the monitoring tools	Be able to <ul style="list-style-type: none"> ▪ understand the structure of timesheet and work progress report to monitor project team performance ▪ analyse and interpret performance metrics (see remark) to ensure project is on schedule 	6.2 Monitor and measure performance	Be able to <ul style="list-style-type: none"> ▪ monitor results of team building activities ▪ monitor effectiveness of programs for enhancing project team performance ▪ monitor rewards and recognition plan 	6.3 Manage and control changes professionally	Be able to <ul style="list-style-type: none"> ▪ identify if changes in organizational plans have occurred ▪ manage the changes with approvals from project authority in charge ▪ document the changes and communicate the impact to relevant stakeholders according to organizational guidelines and regulatory requirements if any
	<u>Performance Requirement</u>								
6.1 Comprehend the monitoring tools	Be able to <ul style="list-style-type: none"> ▪ understand the structure of timesheet and work progress report to monitor project team performance ▪ analyse and interpret performance metrics (see remark) to ensure project is on schedule 								
6.2 Monitor and measure performance	Be able to <ul style="list-style-type: none"> ▪ monitor results of team building activities ▪ monitor effectiveness of programs for enhancing project team performance ▪ monitor rewards and recognition plan 								
6.3 Manage and control changes professionally	Be able to <ul style="list-style-type: none"> ▪ identify if changes in organizational plans have occurred ▪ manage the changes with approvals from project authority in charge ▪ document the changes and communicate the impact to relevant stakeholders according to organizational guidelines and regulatory requirements if any 								
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) conduct continuous monitoring and measurement of the project performance; and (ii) exercise proactive management and control on identified changes during the project lifecycle.								
Remark	Some examples of performance metrics are schedule performance index, and schedule variance.								

**Information and Communications Technology Industry Training Advisory Committee
Software Products and Software Services (SW) branch
Unit of Competencies**

1. Title	Conduct project performance reporting	
2. Code	ITSWPM517A	
3. Range	Review and report project performance against agreed specification and make follow up recommendation to ensure timely and appropriate communication of project information [Project Management – Project Communications Management]	
4. Level	5	
5. Credit	2	
6. Competency	<p>6.1 Understand performance requirements in a project</p> <p>6.2 Conduct project performance reporting</p> <p>6.3 Evaluate effectiveness of performance</p>	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ locate the requirement specifications from project definition document ▪ identify the stakeholders (e.g. sponsors, business users/customers, vendors, and suppliers) relevant to performance reporting ▪ note the inputs and outputs format in various reports <p>Be able to</p> <ul style="list-style-type: none"> ▪ implement project performance reviews for management ▪ generate and disseminate progress related data for reporting functions in progress assessment (see Remark 1) ▪ create change requests based on performance reports for approval from management and stakeholders <p>Be able to</p> <ul style="list-style-type: none"> ▪ monitor compliance to ensure that timely and accurate data are available ▪ manage and escalate project issues as they arise through project organization hierarchy (see Remark 2)
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) monitor and control project performance; and (ii) resolve problems through effective communication.	
Remark	<p>1. Progress related data are status or progress on schedule, issues, risk items, change requests, highlights, Phase end, check point, exception or forecast reports to appropriate stakeholders, e.g., variance, trend, earned value, etc.</p> <p>2. Examples of project issues are ad-doc meeting in case of problem, documented impact analysis, proposed solutions for executives' decision and change control according to agreed procedures.</p>	

**Information and Communications Technology Industry Training Advisory Committee
Software Products and Software Services (SW) branch
Unit of Competencies**

1. Title	Formulate IT strategies and policies	
2. Code	ITSWSM603A	
3. Range	Formulate IT strategies and policies for an organization to support its approved business strategies and policies and to cover areas including resource optimization, business alignment, and information security [Strategic Management – Strategy Formulation]	
4. Level	6	
5. Credit	4	
6. Competency		<u>Performance Requirement</u>
	6.1 Understand the business strategies and policies of an organization	Be able to know the business strategies and policies of an organization with respect to business-IT alignment and enablement
	6.2 Understand international standards and regulatory requirements	Be able to understand international standards and regulatory requirements
	6.3 Understand related issues in information security and related laws of intellectual property	Be able to know related issues in information security (e.g. data security, authentication, integrity and privacy) and related laws including copyrights and IP rights etc
	6.4 Formulate IT strategies and policies of an organization	Be able to formulate IT strategies and policies of an organization to support its approved business strategies and policies including resources optimization, business alignment, and information security in compliance with necessary international standards and regulatory requirements
7. Assessment Criteria	The integrated outcome requirements of this UoCs is the ability to formulate IT strategies and policies for an organization to support its approved business strategies and policies, with profound considerations of resources optimization, business alignment, information security and regulatory compliance.	
Remark	Pre-requisite: ITSWSM602A	