

Specification of Competency Standards
Software Products and Software Services (SW)

Branch

Information and Communications Technology Industry

Hong Kong

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Chapter 1 Introduction

With the advent of globalisation, rapid advancement in technology and Hong Kong's further transformation into a knowledge-based economy, the local workforce needs to enhance its capabilities and competitiveness. To ensure sustainable manpower development in the rapidly changing environment, the Hong Kong Qualifications Framework (QF) was introduced by the Education and Manpower Bureau (EMB) (EMB was renamed Education Bureau (EDB) from 1 July 2007) in 2004 to facilitate life-long learning. More information on the QF can be found in Chapter 2 of this document.

2. The establishment of the QF will facilitate personal development in various aspects and provide inherent learning and training incentives for individuals to explore and utilise their potential, thus preparing them for success. To this end, the EMB has assisted various industries in setting up their Industry Training Advisory Committees (ITACs). One of the responsibilities of ITAC is to develop a set of Specification of Competency Standards (SCS) for the respective industry.

3. The SCS mainly comprises task-based competency standards, which are benchmarks for skills required to perform different job functions of the industry, including industry-specific knowledge, professional skills and soft skills. The tasks, functions and functional areas in the SCS shall reflect industry perception on the need areas for best practices, as well as the consensual core requirements for employability. The SCS does not only set out the work competencies required for today, but also reflect on the development trends of both the industry and the society.

4. In the long run, this industry-based SCS would provide a vocational competency benchmark for training. It would help training providers to grasp the needs of the industry and to develop responsive programmes to meet those needs. Together with the QF, SCS will provide employees with insight into competency upgrading and learning articulation, and in their planning of personal development and career advancement roadmaps. Further discussion on SCS can be found in Chapter 3 of this document.

5. In July 2005, the Information and Communications Technology (ICT) ITAC was formed. It comprises major stakeholders of the industry, including representatives of employers, employees and professional bodies.

6. Based on the classification of the International Telecommunications Union (ITU), which is also adopted in the Mainland China, the ICT ITAC identified the ICT industry in Hong Kong to have four distinct branches of business, namely:

- a. The Software Products and Software Services (SW) branch,
- b. * The Information and Communications Services,
- c. The Electronic Product, Information Processing Hardware and Communications Equipment, and
- d. The Electronic and Optical Components.

7. In view of the broad spectrum of the industry, the ICT ITAC ventured to develop initially SCS for the Software Products and Software Services (SW) branch. Production of the Information and Communications Services SCS will follow in the next phase.

8. This document contains the complete set of SCS for the SW branch of the ICT industry endorsed by the ICT ITAC and went through an industry-wide consultation. Chapter 1 is a general profile on the ICT industry, which highlights the business, technology and manpower trends of the SW branch in Hong Kong, Mainland China and other leading countries in the world. The present situation and the further potential of SW, with particular reference to the Pearl River Delta in Mainland, is considered. Chapter 2 is a discussion on the general Qualifications Framework and how it may facilitate the general public to pursue lifelong learning. Chapter 3 specifies the Competency Standards required by the SW branch of the ICT industry.

* The branch "Information and Communication Services" has been renamed as " Communications and Information Services".

Section 1.1 Background of ICT Industry

9. In the past few decades, ICT has advanced at an astonishing pace, shaping today's civilization and the future of mankind. The productivity and efficiency gains resulting from the application of ICT have created tremendous wealth in many knowledge-based societies. ICT has penetrated and rooted in most sectors of today's highly integrated economy. It has brought great conveniences to mankind and has caused some revolutionary changes to the way we lead our lives.

ICT is a Strategic Asset Creating Societal Wealth

10. Highly developed and high-growth economies generally recognize ICT as a strategic asset, which can create societal wealth. In the Mainland China, to meet the challenges of the rapidly changing technological, social and business environment of the 21st century, the Central Government has strategically positioned ICT as a leading and pillar industry in developing the national economy. It is also a core industry to enhance people's livelihood and accelerate societal progress as well as social transformation.

11. Societal wealth created by the ICT industry extends beyond the immediate economic benefits of individuals and enterprises. It means more quality job opportunities where individuals can realize their potentials. People are able to make more informed choices through ready access to relevant information. The integration of ICT in the full spectrum of our education system will produce a workforce more ready to accept challenges in this increasingly complex world. Bridging the digital-divide will create a more harmonious society and bring about a higher standard of living and a better quality life.

ICT Gears our Economic Transformation

12. Hong Kong's economy is undergoing a structural transformation, which is critically important to our long-term prosperity and sustainable growth. We must work hard to preserve and strengthen our core competence in the highly successful sectors of financial services, trading, logistics and tourism. At the same time, Hong Kong must explore and develop new industry sectors to open up new opportunities and equip itself to take up the leading role in the Asia-Pacific economy.

13. ICT is the most critical and essential force that has driven the economic transformation in the advanced economies. It has penetrated into numerous industry sectors and brought metamorphic transformation to many traditional businesses. New jobs and new business opportunities are constantly created by ICT. Many leaders in our communities clearly recognize the value of ICT. They have credited ICT as the indispensable tool for Hong Kong to maintain its leading and competitive position in the four pillar industries that we have worked very hard to develop.

ICT Enables Hong Kong to Compete Effectively in the Global Market

14. Hong Kong possesses a world-class ICT infrastructure and personnel quality and stands as the pioneer in ICT applications. The successes of ICT applications by the SAR government and big organisations bear witness to this. Hong Kong boasts of a hundred percent in the personal use of wireless communication, taking pride in being number one worldwide. Broadband Internet access covers all business districts and most residential buildings. More than 70% families have computers. ICT has brought us quality services in many aspects of our lives e.g. an excellent banking network, an efficient stock exchange, round the corner ATMs, a convenient electronic payment system, a reliable mass transport system, the best international airport, bustling cargo terminals and logistics services for containers, etc. The Government's Electronic Service Delivery (ESD) Scheme brings us further conveniences.

15. In this era of globalization, ICT is the means to ensure that Hong Kong maintains its competitive edge. Considerable resources and manpower have been invested in related sectors by the government, the private sector and individuals. Government-driven initiatives included the Hong Kong Science and Technology Parks, the Hong Kong Cyberport and the Hong Kong Applied Science and Technology Research Institute. The Innovation and Technology Fund in Hong Kong was another measure to promote ICT research and projects. Besides the government, education and research institutions, professional and trade bodies, as well as the public, have increased their annual spending on ICT, especially in the areas of personnel training and human resources development. The impact and applications of ICT have penetrated all sectors and businesses and created numerous success stories.

Different Branches of the ICT Industry

16. To help the ICT industry (known to some as the Information Technology and Telecommunications (IT&T)¹ industry) to board the international bandwagon and to promote regional reorganisation and expansion, we have divided the industry into 4 branches (see previous sections) for the purpose of work competency standards development.

17. The combination of information and communications services, the digitalization of the electronic products, the integration of the optical and electronic technologies, the wide use of programmable-controlled machinery and software components in electronic products, the large-scale digitalized entertainment and media content have widened the scope of ICT and enriched its meaning. To give a young, vital and fast-growing industry a boundary is a task that will not get one any thanks. On the contrary, a certain level of ambiguity allows richer and more far-sighted ideas, giving the industry more flexibility and space to develop and expand.

18. Comparatively speaking, two of the branches, namely the Software Products and Software Services (SW) branch, and the Information and Communications Services sector, grew to be more significant economically than the others in Hong Kong. A large population of software professionals are employed in the ICT divisions of government departments, public services organisations and private enterprises.

19. In the past, the Electronic and Optical Components branch was grouped under the Manufacturing Industry. However, the traditional industry classification cannot satisfy the current economic development and the needs of this sector for two reasons. First, the wide use of technology and the increasing proportion of software components as well as intellectual content in these products distinguish the sector from the traditional Manufacturing Industry. Second, the proportion of the

¹ As ITU noted in its Annual Report 2005 the definitions of ICT and IT&T overlapped each other in most areas. However, there were also differences. To align with the definition used in Mainland China, this document has adopted ITU's definition of ICT.

manufacturing costs of these products and their values has been decreasing to a point that makes it different from those products covered by the traditional Manufacturing Industry.

Section 1.2 Software Products and Software Services (SW) branch in Hong Kong and Mainland China

20. According to the ICT Human Resources Survey 2006 conducted by the Vocational Training Council, about 64,000 professionals were employed in the first two ICT sectors. 45% of them (about 29,000) were engaged in software design and development. Half of the remaining number (about 14,000) was employed in software applications and the other half (65,000) in software related services.

21. According to the survey conducted by the Hong Kong Productivity Council in 2005, there were about 700 software product and software services companies in Hong Kong. Most of them were small companies with 20 staff or less but they worked aggressively to expand their business. More than 30% had subsidiaries in Mainland China in the form of wholly owned or joint ventures, and the percentage has been increasing. To lay down guidelines and explore new directions for our software industry, there is a need to understand the development of this industry in the Mainland.

22. Alongside strong economic growth of Mainland China is the continuous expansion of the scale and influence of the local software industry. The industry recorded a steadfast annual growth of more than 30%. Revenue rose from RMB440.5 billion in 1999 to RMB2,300 billion in 2004. Worldwide, the increase went up from 1.0% in 1999 to 3.55% in 2004. In terms of GDP, it was a rise from 0.54% in 1999 to 1.69% in 2004.

23. Up to September 2005, 28,401 software products were registered. Software sales in 2004 reached \$920 billion, representing 40% of the revenue of the software product and software services sector and an annual increase of 14.3%. With the rapid growth of the software industry, people widely accept software services to include services such as software outsourcing, system integration, software standardization, customization and networking, call centre, and data processing. In 2004,

revenue from software services (including system integration services) reached \$1,165 billion, taking up 50.6% of the whole software industry, an annual increase of 46.5%.

24. The number of software personnel in China is increasing and so is their quality. Besides the universities, 35 software professional colleges and 35 software vocational training colleges have been set up to provide formal education for software personnel. At the same time, they also provide in-service training for the existing workforce. By these different modes of training, more software professionals can be produced. In 2004, more than 700,000 were employed in the software industry, and another 400,000 were working in jobs related to software application, research and education. It is estimated that within three years, China will rank second in its number of software professionals.

25. In terms of GDP, the scale of workforce and growth rate, the software industry in Mainland China far exceeds that in Hong Kong. However, we must not view this as a threat and lose confidence in ourselves for this will only obstruct our efforts of finding areas for co-operation. Matching our strengths to China's needs, there is much room for co-operation. In fact, the software industry in Hong Kong and Mainland China can supplement and compliment each other. There will be wider scope and more opportunities for businesses and individuals in Hong Kong to develop and excel.

Section 1.3 The Global Software Industry in a Snapshot

26. In 2005, the worldwide total software market size exceeded US\$800 billion. As a highly internationalized industry, the software industry is often used as one of the benchmarks gauging the economic strength of a nation. It has become the industry "high-ground" that many economies are competing to capture. In the coming 5 to 10 years, the projected annual growth of the software industry will remain at a rate exceeding 13%.

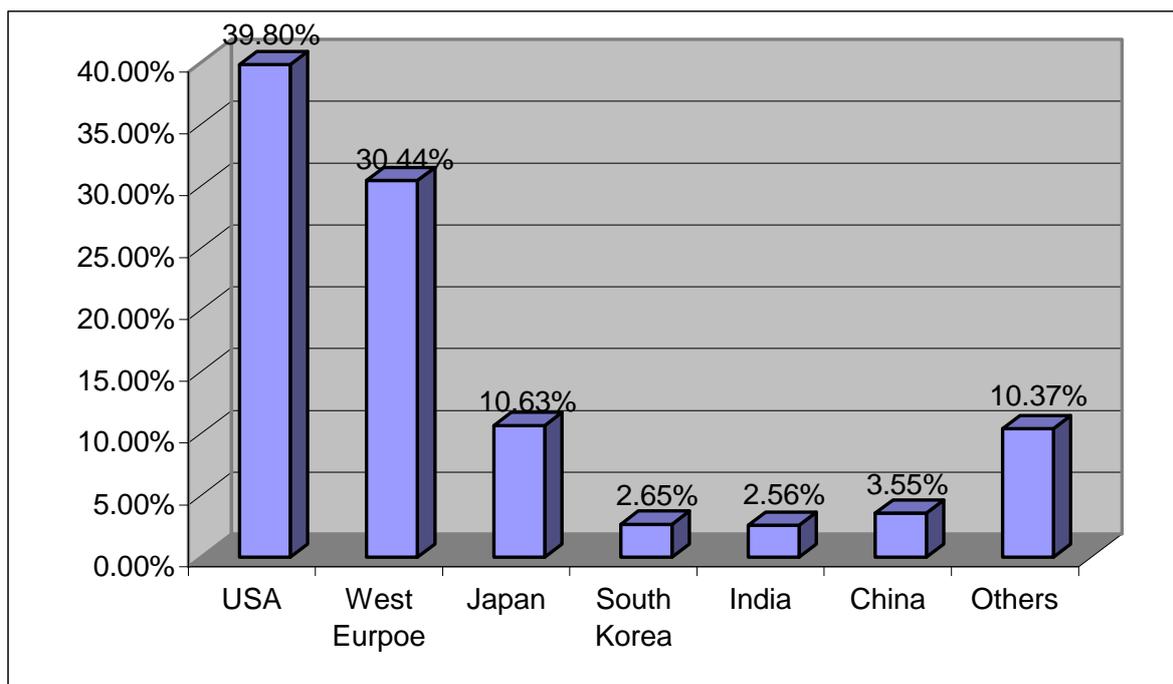


Figure 1 2004 Software Market Share by Major Economies

27. At the 28th ICSE Conference held in May 2006, it was reported that China had taken up 3.55% of the total worldwide software market share in 2004, surpassing South Korea and India for the first time ever. In 2005, China's market share expanded to 5.9%. With an annual growth rate averaging at 47.5%, the Mainland China software market had enjoyed a 7-fold growth in the past 5 years. However, when compared with America's 47.5% market share and \$3,213 billion revenue, China is dwarfed by more than one order of magnitude. There also exist sizeable gaps comparing the China figures with those of Western Europe and Japan. These gaps represent ample rooms for expansion. They are opportunities that the local software industry can tap into to fuel its growth.

28. The United States of America is indisputably the world leader in the software market. Being the largest user and exporter of software products, it also plays a leadership role in importing software services. It has pioneered the use of international software outsourcing services, such as IT Outsourcing (ITO), Business Process Outsourcing (BPO) and Knowledge Process Outsourcing (KPO). Leveraging on the innovative and strategic use of these services, the US has expanded its overall capability and capacity in the software industry.

29. In 2005, Global Insight (USA) Inc. conducted a study on the impact of offshore software and IT services outsourcing on the US economy [GIUSAICT2005]. Some of their major findings included:

- a. While global software and IT service outsourcing displaced some IT workers, total employment in the US increased as the benefits rippled through the economy. The incremental economic activity that followed offshore IT outsourcing created over 257,000 net new jobs in 2005 and was expected to create over 337,000 net new jobs by 2010.
- b. Spending for global sourcing of software and IT services would grow at a compound annual rate of 20%, increasing from \$15.2 billion in 2005 to \$38.2 billion in 2010.
- c. The benefits of global outsourcing of IT services and software contributed significantly to the real GDP in the US, adding \$68.7 billion in 2005. By 2010, real GDP was expected to be \$147.5 billion higher than it would be in an environment in which offshore software and IT services outsourcing did not occur.

30. Through thorough study of the issue, pessimistic conservatism and the unfounded stigma associated with international software outsourcing have gradually been removed from the mainstream thinking of the society. International software outsourcing does not necessarily mean the displacement of positions or the elimination of jobs. Instead, new and higher-value-adding jobs are created with a net gain of positions in the overall job market. IT outsourcing, software outsourcing on a global scale, the re-distribution of jobs internationally, the re-design and rationalization of work-processes in software engineering are some of the irreversible trends in this increasingly globalised economy of today.

31. Through many years of hard work and supported by proactive government policies, India has developed into a world leader in the supply of IT and software outsourcing services. In the fiscal year 2004-05, India has recorded a total revenue of US\$17.3B in international IT related outsourcing services. The industry has employed 685,000 full-time professionals and contributed 4% to the GDP. Leveraging on the success of its IT-related outsourcing services, India has, in recent years, accelerated its economic transformation in various industry sectors. As a result, the internal demands of IT services and the overall ICT industry are also growing at a very healthy pace.

32. Leveraging on its language skills and geographical proximity, the North-eastern region of China has in recent years developed rapidly into a software outsourcing centre for the Japanese market. As a result, software companies with more than 10,000 employees are beginning to emerge in this region. ASEAN countries, including the Philippines, Vietnam and Malaysia are also devoting large amount of their resources and aggressively strengthening their infrastructures and capabilities in order to capture the international opportunities provided by this growing market sector.

Section 1.4 Trends and Prospects of the ICT Industry in the Pearl River Delta

33. Under the impact of a single world economy and the supra-speed economic development of Mainland China, the ICT industry in Hong Kong and the Pearl River Delta will see fundamental changes in the coming few years. The changes can be categorized as follows:

- a. Reorganisation of resources and markets – Within the region, the trend of complementing one another in terms of human resources and skill sets is becoming obvious. The deployment of human resources becomes more flexible and the division of labour more mature. Hong Kong's ICT industry will wriggle out of its small and enclosed market and become a proactive player in the regional and international markets. The macro changes in the international arena will speed up merges and acquisitions within the ICT industry in this region and subsequently helps the industry to expand.
- b. Rise in the use of proprietary and intellectual products – Taking advantage of the expanding market opportunities, more software companies will invest additional resources on software product development. Instead of simply providing services, they become software producers. This change marks the promotion of the industry from selling non-reusable intelligent services to selling highly reusable intellectual products.
- c. Development of open standard technologies and fair trade – The rapid developments of open technology standards, common standards coming out of forum discussions and open source software have changed the direction of the software industry. When the related market mechanism and modes of collaboration become more mature, a fair trade environment will be created. This will contribute to the growth of intellectual products e.g. software, in the new markets.

- d. Re-structuring of jobs – The combination of information and communication services, the use of artificial intelligence in electronic products, the digitalization of multimedia production and delivery, and the successful use of ICT in all business and sectors have changed the traditional modes of operation and division of labour. As a result, some businesses have become obsolete and some have reorganized. Without exception, they are looking for new directions and new business opportunities.
- e. Creation and development of multimedia content – The rapid development in digitalized content for interactive games, entertainment and education has opened up a brand new direction for the software industry. To meet new demands, software development will go beyond traditional programming to include a huge volume of highly interactive multimedia content.
- f. Widening the scope and content of outsourcing services –With the advanced mode of communication and the wide use of ICT, more and more services can be procured and provided across regions. Outsourcing is the natural outcome of this single world economy. In the coming years, the expansion of software outsourcing is an irreversible trend. This includes ITO, BPO and KPO.

Section 1.5 The Needs for Software Industry Workers

34. Confronted with the internal factors mentioned above and the changes in the surrounding environment, we should, on one hand, explore and take advantage of the opportunities created by these changes. On the other, we should learn to cope with the anxiety and resistance brought about by our fear of changes. To advance Hong Kong's software industry to a new high, we must consider these issues: What kind of people do we need? What characteristics and skills should they possess? The answers are critical to the success of our software industry. The right decisions will help the industry to grasp the opportunities and move with the trend, but the wrong decisions will marginalize the industry and bring about its decline.

35. In our discussion for the future need of software personnel, let us leave "quantity" for the time being and focus on the more important issue of "quality".

36. The set of specification of competency standards for the software industry in this document has described the skills required of a professional software worker. We have classified the technological skills into 7 dimensions and explained them in detail. Clear and observable standards for each unit are also given. However, some areas need further explanations, e.g. how to cluster the skills, how to assemble the pieces into a complete whole, how to find out from the skills units concrete and tangible examples, what kind of character, behaviours and cognitive ability a software worker should possess, etc. The following paragraphs may provide some insights:

- a. The Hong Kong software industry needs a great number of “synthetic” people – people with broad knowledge and professional skills, people who can extend beyond the technical level to other core areas of their industry and other industries, people who can understand and analyse the needs of a business, people who are persuasive and good at communication, and people who can drive the industry forward.
- b. Young software personnel should have a good foundation of the specific skills required in each professional dimension. They should broaden their visions and skills first, and then specialize in the dimensions they are interested in. In due course, they can become experts in their specialized areas.
- c. Hong Kong also needs world-class software experts with renowned research and academic achievements to drive research and development of pinnacle technology and guide the industry to new directions.
- d. Distinguished software personnel should have a sound academic background, with the capability for self-learning, high adaptability and good EQ management skills. They can get to the core of the problem and find solutions and then solve the problem appropriately.
- e. Software people should have a strong sense of professionalism. They should feel a sense of responsibility for their customers, society and country. They should set strict moral standards for themselves and their colleagues. They should love their jobs and have a good understanding of the nature of their jobs. They should appreciate the possible impacts their jobs may have on society and respond with professional actions.

Chapter 2 Qualifications Framework

Section 2.1 Hong Kong Qualifications Framework

37. In July 2005, the Education and Manpower Bureau set up an Industry Training Advisory Committee (ITAC) for the Information and Communications Technology (ICT) industry to facilitate the implementation of the Hong Kong Qualifications Framework (QF) in the industry. Participation in the proposed QF is voluntary. The QF is a seven-level hierarchy that has been benchmarked to determine the levels of complexity and challenges of individual work competencies, or to rank order learning qualifications of different natures and titles. The QF has in place an independent quality assurance (QA) system that would enhance recognition and acceptance of qualifications in the industry, irrespective of the mode and source of learning.

38. The ICT ITAC is responsible initially for the development of its industry specific, task-based Specification of Competency Standards (SCS) for the identified core functional areas. The SCS, in the form of Units of Competencies (UoCs), provide not only quantitative and qualitative specifications on competencies required for specific tasks, but also the integrated outcome standards required as well as the QF level and credit information.

39. The SCS may be used to aid vocational curriculum design by VET providers or in-service employee development by HR personnel, or best practice recognition and qualifications by awarding bodies within the industry. SCS is the cornerstone to facilitate workforce competitiveness and industry sustainability in the long run.

40. The QF aims to provide clear and quality assured qualification and articulation roadmap for members of the public to plan their own learning needs. Learners can either pursue a specific learning pathway to upgrade their skills in a particular area of specialization in a gradual and orderly manner (vertical development), or progress through traversing learning pathways to become a multi-skilled (horizontal development) person. Through the full-scale implementation of the QF, we will foster a vocational and culture conducive environment to lifelong learning and continuing education in the industry. With the active participation of employers and employees as well as the wide acceptance of

the industry, the QF will also encourage the development of quality training programmes by providers to meet the needs of the community and the industry.

Section 2.2 QF Level

41. The QF has seven levels, from level 1 to level 7, where level 1 is the lowest and level 7 the highest. The outcome characteristic of each level is depicted by the set of QF's generic level descriptors (GLD) in Appendix A. The GLD specifies for each QF level the generic complexity, demand and challenges in four dimensions on:

- a. Knowledge and intellectual skills;
- b. Process;
- c. Application, autonomy and accountability; and
- d. Communications, IT skills and numeracy.

The UoCs (See Appendix D) are benchmarked to the QF levels in accordance with the GLD. It is worth noting that the competency elements in a UoCs may fall in some or all of the GLD dimensions. This is natural as the QF level assignment is essentially a holistic judgement on the unit's integrated outcome specifications.

42. QF levels are discrete. That is, there cannot be assignment of UoCs in-between QF levels. Also, UoCs that may not fully match the characteristic requirement of one or more dimensions of a level would be "rounded" to the level below.

Chapter 3 Specification of Competency Standards (SCS)

Section 3.1 Major Functional Areas

43. The Information and Communications Technology (ICT) Industry Training Advisory Committee (ITAC) has identified eight functional and competency areas in the Software Products and Software Services (SW) branch, namely (1) Strategic Management, (2) Project Management, (3) Architecture, (4) Information Security, (5) Design, Development, and Maintenance, (6) Operations and Support, (7) Quality Assurance, and (8) Generic Skills. Figure 1 is a functional mapping of the SW branch of the ICT industry in Hong Kong. The scope of each functional area is briefly outlined below:

- (1) **Strategic Management (SM)** involves formulating ICT strategies to align with existing an organisation's objectives and suggesting new ICT strategies to increase the organisation's competitiveness. It may also involve adopting appropriate information and communication technologies and ideas in product development management and ICT management. This also includes developing and involving the ICT organisation, people and process in support of the business strategy.

The set of UoCs under the Strategic Management area covers the competencies to:

- Formulate business visions, business and IT strategies and policies;
- Execute, monitor, evaluate, and review IT strategies and plans;
- Establish IT governance policies and processes;
- Formulate IT plans and budgets;
- Develop and manage business continuity and disaster recovery plans;
- Manage information and transform information to business knowledge and value;
- Manage brand;
- Acquire knowledge and skills of ICT technologies, standards, laws, and related developments;
- Assess and manage risks;
- Allocate and manage resources;
- Develop and manage human resources;
- Manage IT investment;
- Manage relationship with business partners.

- (2) **Project Management (PM)** applies the knowledge, skills, tools and techniques to project activities to meet project requirements. It involves management of software projects and/or professional services so as to deliver quality products/services to stakeholders according to the project scope, schedule, cost, quality and any other agreed terms and conditions, and if necessary, to manage changes in an effective manner.

The set of UoCs under the Project Management area covers the competencies to:

- Perform the necessary project management activities in accordance to the nine Knowledge areas – Project Integration Management, Project Scope Management, Project Time Management, Project Cost Management, Project Quality Management, Project Human Resources Management, Project Risk Management, Project Procurement Management and Project Communications Management;
- Understand the implications and requirements of local contract, law and legal compliance;
- Demonstrate a high level of personal and professional competences and ethical standards.

- (3) **Architecture (AR)** refers to the knowledge and skills required for the activities and professional practices undertaken by its practitioners in the design of the fundamental organisation of a software system, embodied in its components and building blocks. It includes the various considerations given to the inter-relationship of these components and the environment under which they need to operate and function to meet their design goals. It also defines the sets of principles governing the evolution of these architecture components and the way by which they must be fitted together to serve the agreed system objectives.

The set of UoCs under the Architecture area covers the competencies to:

- Define and formulate architecture framework and vision;
- Develop, review and revise business architecture based on business principles and goals;

- Define, evaluate and revise data architecture to support the business architecture;
- Create, evaluate and revise technology architecture in alignment with the business architecture, data architecture and application architecture;
- Define, evaluate and revise network architecture in line with business needs as well as technology advancement and availability;
- Establish and maintain the application integration architecture in line with business needs as well as technology advancement and availability;
- Establish and maintain the application software architecture to support the application integration architecture and in line with technology advancement and availability;
- Establish and maintain the embedded software architecture to support the current and future needs of business, and in line with technology advancement and availability.

(4) **Information Security (IS)** refers to the protection of information from a wide range of threats in order to ensure business continuity, minimize business risk, and maximize return on investments and business opportunities. It involves providing advice and counsel to senior management to establish information security requirements and appropriate corporate-wide policies as well as managing the execution of information security programmes within an organisation.

The set of UoCs under the Information Security area covers the competencies to:

- Establish and maintain an information security governance framework to ensure that information security strategies are aligned with business objectives and consistent with applicable laws and regulations;
- Identify and manage information security risks to achieve business objectives;
- Design, develop and manage an information security program to implement the information security governance framework;
- Oversee and direct information security activities to execute the information security program;

- Develop and manage capabilities to respond to and recover from disruptive and destructive information security events;
- Enable a business or organization to plan for, respond to, and recover from an event;
- Develop and perform information security audits to evaluate business and technical risks and to determine whether appropriate and timely actions have been taken to address these risks;
- Understand the legal requirements of forensic investigation process and be able to plan and document the process;
- Plan, develop and maintain the Business Continuity Plan based on business requirement, risk management model and regulation requirements.

(5) **Design, Development, and Maintenance (DM)** refers to the design, development and maintenance of appropriate software applications for stakeholders. It is considered as the traditional core activities in the software lifecycle from gathering requirements, proposing design solutions, developing programme modules, and maintaining software operations when the software is in production.

The set of UoCs under the Design, Development, and Maintenance area covers the competencies to:

- Formulate, analyse, develop, verify and validate software project requirements;
- Propose, verify and validate various levels of software design;
- Develop program modules and manage program source;
- Develop test plans and perform testing activities;
- Maintain software;
- Manage software configurations;
- Plan and execute software release and control;
- Plan, execute and monitor software deployment and migration;
- Manage software decommissioning.

(6) **Operations and Support (OS)** refers to the operations and support of Software Products and Software Services (SW) branch in their day-to-day running. It covers the management and provision of operations and support services for all related ICT operation activities such as change management services, system/server operations, configuration management services, and disaster recovery services.

The set of UoCs under the Operations and Support area covers the competencies to:

- Manage, monitor and control the severity incident request;
- Setup and manage Help Desk service;
- Establish and deliver services for problems management, change management, availability management ,release management and configuration management;
- Monitor and control the performance and capacity management services;
- Ensure continuous operations of the computing environment through service continuity management;
- Establish, deliver and maintain service level management services, system operations services and system support services;
- Monitor, control and deliver database operations services;
- Deliver field support services in relation to hardware and software failures;
- Deliver security services for operations by means of conducting security investigation and operation security risk assessment and auditing.

(7) **Quality Assurance (QA)** refers to the knowledge and skills required for assuring the quality of the software products developed by the organisations and/or software services provided by them. The purpose of QA is to provide an independent evaluation of software products/services with respect to the adherence to the intended objectives, processes and standards. QA activities refer to those activities that are used to assure the quality of software products/services are of appropriate standards subject to the quality, scope, cost and time requirements/constraints of the project. QA activities fall into two categories, namely the organisational level QA and the project level QA. The organisational level QA governs the policies, standards, processes, procedures and work that have to be followed by all software

products/services whereas the project level QA governs those that are specifically related to and, perhaps, catered for each individual software product/service.

The set of UoCs under the Quality Assurance area covers the competencies to:

- Formulate quality assurance (QA) strategies, policies and procedures and acceptance criteria for the software product/services;
- Execute and manage organisational level and product level QA procedures and plans;
- Obtain certification of international standards;
- Plan and conduct training for quality assurance (QA) activities;
- Evaluate the quality of a software product;
- Perform software audit.

- (8) **Generic Skills (GS)** refer to the skills that are common to other functional areas. This involves soft skills like ethics, professionalism (e.g., lifelong learning, continuous professional development, and issues related to data privacy, copyright laws as well as intellectual property), communication skills (oral and written; English and Chinese – Cantonese and Putonghua), people and team skills, management skills (both business and personal) and leadership skills.

The set of UoCs under the Generic Skills area covers the competencies to:

- Manage ethics and professionalism standards in an organization;
- Protect intellectual property rights and data privacy;
- Foster professional responsibilities;
- Build and lead teams to solve business problems;
- Formulate business visions and strategies to capture on opportunities;
- Develop sales and marketing strategies and manage brand;
- Develop and apply language, communication, and negotiation skills;
- Assess and manage risks;
- Manage changes;
- Manage contract and procurement;
- Allocate and manage resources;

- Develop and manage human resources;
- Manage IT investment;
- Manage relationship with business partners;
- Acquire knowledge and skills of ICT technologies, standards, laws, and related developments.

44. The ICT ITAC has recognised that there is a fundamental difference between the competencies in Generic Skills and those in the other seven functional areas. Some of the Generic Skills are more tangible than others. The tangible ones are being specified as competency standards in the same way as those competencies in other functional areas. However, there are many important Generic Skills that are less tangible for quantitative specification. These are being described using a narrative approach in Appendix E. Although they are less tangible in practice when compared with their counterparts, they contribute no less to what should be expected from the ICT practitioners or professionals.

45. Based on the QF levels and the core functional areas identified by the ICT ITAC for the SW branch, a “Competency Matrix” (Appendix C) is formed to index the core activities that have competency standards specifications (i.e., UoCs development). The matrix provides information on the task-based competency requirements with level assignment for each of the eight functional areas mentioned in Paragraph 43 above. The matrix will allow readers to glance through available core functions of the UoCs, their inter-relationships and relative QF levels for use in different applications.

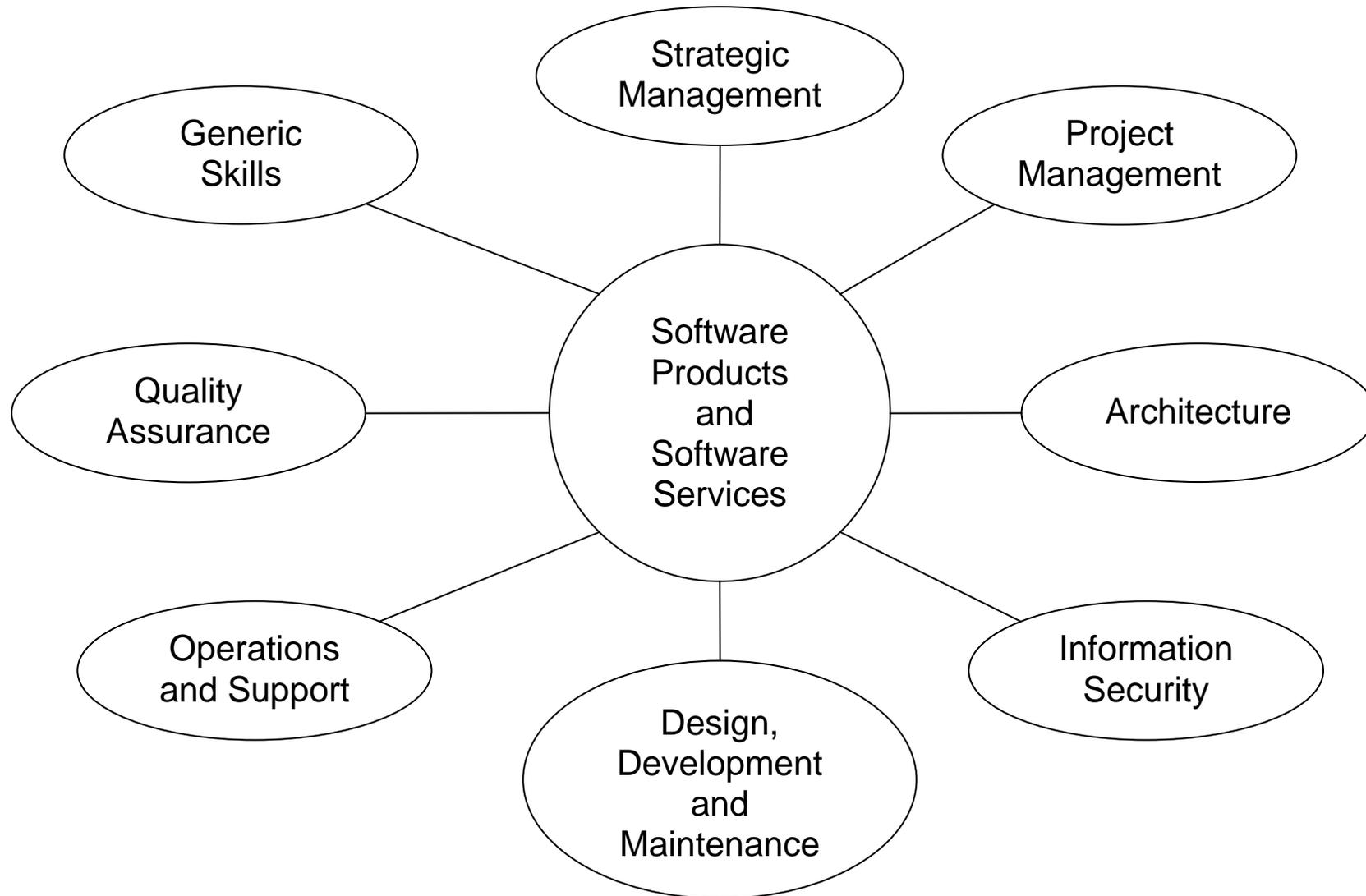


Figure 1 Functional map of SW branch in the ICT industry

Section 3.2 Competency standards

46. Competency standards refer to the performance requirement on related competencies required to perform a task in a given environment to meet a specific demand. The nature of competencies may include the cognitive (knowledge and skills) capacities, the process and application abilities, and/or the professional attributes necessary for achieving a task competently with industry accepted quality. The competency standards set out the best practices of the industry and are therefore the most important elements in the SCS.

Section 3.3 Unit of Competencies (UoCs)

47. The ICT ITAC has set out competency standards for various job functions in the form of unit of competencies (UoCs) in Appendix D. Each UoCs comprises eight entries, namely the:

- a. Title – a concise description of the task for competency specification;
- b. Code – a unique labelling to signify the origin of UoCs. Appendix B is the syntax and abbreviations used in the SCS coding system;
- c. Range – a concise description on the environment, situation and demand that the UoCs development was based;
- d. Level – an index between 1 to 7 in accordance to GLD criteria to reflect the complexity and challenge on competency specification for the task;
- e. Credit – a suggestive learning size of the UoCs with a learner of relevant pre-requisite in mind. One QF credit is accorded to a learning effort of 10 notional learning hours;
- f. Competencies – a collection of relevant competencies required to perform the task with the performance requirements specified;
- g. Assessment criteria – a concise description of key evidence(s) expected to demonstrate attainment of the unit's integrated outcome requirement; and
- h. Remark – useful information to the user about the UoCs that may not form part of the unit requirements.

Section 3.4 UoCs Clustering

48. UoCs are the basic building blocks on work competencies. Each UoCs represents the smallest inseparable set of .competencies required to perform the self-contained and standalone task of the unit. However, the ICT ITAC recognizes that (1) employers require their employees to perform a group of mutually supportive and related tasks to serve a job specification; (2) certification bodies require their members be equipped with a group of skills and competencies to become certified professionals in particular areas; (3) education and training bodies may design courses that share common competencies and knowledge domains to facilitate participants' learning. In view of the above needs, the ICT ITAC suggests that the UoCs may be clustered to serve different needs for different users. Moreover, this can further increase the flexibility of the SCS documents and, hence, its usability for the industry, certification bodies as well as education and training providers.

49. Instead of using a prescriptive approach, the ICT ITAC allows different users of the SCS (e.g. employers and human resources staff, professional/certification bodies, education and training providers, as well as professionals and practitioners) to form clusters of UoCs freely to suit their own needs (e.g. newly created job function envisioned by the Chief Information Officer of an organisation, specific requirements imposed by the company policies, specific training needs required by the industry or professional bodies). It is impossible for ICT ITAC to enumerate all possible UoCs clusters. Nonetheless, ICT ITAC exemplifies some typical UoCs clusters for the three aspects mentioned above in the following three paragraphs.

50. First, employers can form their own UoCs clusters to suit particular job specifications. For example, if an employer needs to select a project manager to properly manage a software project, they can form a UoCs cluster that includes all UoCs that fall in Project Management Functional Area so as to assess their employees and potential candidates. Another instance is to cluster all UoCs in the Architecture (AR) Functional Area for employing systems architects. Similarly, organisations working to improve their current Information Security (IS) practices may require their IS consultants or specialists to be competent in all UoCs that fall in the IS Functional Area. In fact, each of the eight Functional Areas can be viewed as a big cluster of UoCs. Moreover, the UoCs within each functional area can further be subdivided according to the functions (tasks groupings) found in the workplace.

The Competency Matrix of each Functional Area in Appendix C depicts how these clusters related to the functions in each functional area. For example, in the Strategic Management Functional Area, there are thirteen UoCs clusters, namely, Strategic Formulation, Strategic Execution and Review, IT Governance, IT Planning and Budgeting, Contingency Management, Information Management, Brand Management, IT Consulting and Champion, Risk Management, Resources Management, Human Resources and Staff Management, Financial Management, and Relationship Management.

51. Second, certification bodies may form UoCs clusters to reflect the skill and competency requirements of their own certified professionals. For example, based on the Hong Kong IT Professional Certification (HKITPC) requirements, Hong Kong IT professionals wanting to be certified as Certified IT Systems Architect (CITSA) must demonstrate their competencies in at least 3 out of 8 competency groups; namely Architecture Framework and Vision, Business Architecture, Data Architecture, Technology Architecture, Network Architecture, Application Integration Architecture, Software Architecture, and Embedded Software Architecture. In fact, each of these competency groups corresponds to a function (task groupings) in the Architecture (AR) Functional Area. The Competency Matrix of Architecture Functional Area in Appendix C depicts these functions and their corresponding UoCs. Hence, those UoCs belong to a particular function can be clustered to form a UoCs cluster for certification purposes.

52. Third, education and training providers may cluster related UoCs to design courses that can enhance course participants' learning experiences. For example, they may selectively cluster UoCs related to programming, software testing, debugging, software maintenance and software quality assurance in the DM and QA Functional Areas. By doing so, the course participants will have a better understanding of the subtle relationships between these competencies and their related tasks in the software lifecycle processes.

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Appendix A Generic Level Descriptors of the Qualifications Framework

Table 1 Generic Level Descriptors of the Qualifications Framework

Level	Generic Level Descriptors			
	Knowledge & Intellectual Skills	Processes	Application, Autonomy & Accountability	Communications, IT & Numeracy
7	<ul style="list-style-type: none"> ▪ Demonstrate and work with a critical overview of a subject or discipline, including an evaluative understanding of principal theories and concepts, and of its broad relationships with other disciplines ▪ Identify, conceptualise and offer original and creative insights into new, complex and abstract ideas and information ▪ Deal with very complex and/or new issues and make informed judgements in the absence of complete or consistent data/information ▪ Make a significant and original contribution to a specialised field of inquiry, or to broader interdisciplinary relationships 	<ul style="list-style-type: none"> ▪ Demonstrate command of research and methodological issues and engage in critical dialogue ▪ Develop creative and original responses to problems and issues in the context of new circumstances 	<ul style="list-style-type: none"> ▪ Apply knowledge and skills in a broad range of complex and professional work activities, including new and unforeseen circumstances ▪ Demonstrate leadership and originality in tackling and solving problems ▪ Accept accountability in related decision making ▪ Demonstrate a high degree of autonomy, with full responsibility for own work, and significant responsibility for others ▪ Deal with complex ethical and professional issues 	<ul style="list-style-type: none"> ▪ Strategically use communication skills, adapting context and purpose for a range of audiences ▪ Communicate at the standard of published academic work and/or critical dialogue ▪ Monitor, review and reflect on own work and skill development, and change and adapt in the light of new demands ▪ Use a range of software and specify software requirements to enhance work, anticipating future requirements ▪ Critically evaluate numerical and graphical data, and employ such data extensively

Level	Generic Level Descriptors			
	Knowledge & Intellectual Skills	Processes	Application, Autonomy & Accountability	Communications, IT & Numeracy
6	<ul style="list-style-type: none"> ▪ Critically review, consolidate, and extend a systematic, coherent body of knowledge ▪ Utilise highly specialised technical research or scholastic skills across an area of study ▪ Critically evaluate new information, concepts and evidence from a range of sources and develop creative responses ▪ Critically review, consolidate and extend knowledge, skills practices and thinking in a subject/discipline ▪ Deal with complex issues and make informed judgements in the absence of complete or consistent data/information 	<ul style="list-style-type: none"> ▪ Transfer and apply diagnostic and creative skills in a range of situations ▪ Exercise appropriate judgement in complex planning, design, technical and/or management functions related to products, services, operations or processes, including resourcing and evaluation ▪ Conduct research, and/or advanced technical or professional activity ▪ Design and apply appropriate research methodologies 	<ul style="list-style-type: none"> ▪ Apply knowledge and skills in a broad range of professional work activities ▪ Practice significant autonomy in determining and achieving personal and/or group outcomes ▪ Accept accountability in related decision making including use of supervision ▪ Demonstrate leadership and /or make an identifiable contribution to change and development 	<ul style="list-style-type: none"> ▪ Communicate, using appropriate methods, with a range of audiences including peers, senior colleagues, specialists ▪ Use a wide range of software to support and enhance work; identify refinements to existing software to increase effectiveness or specify new software ▪ Undertake critical evaluations of a wide range of numerical and graphical data, and use calculations at various stages of the work

Level	Generic Level Descriptors			
	Knowledge & Intellectual Skills	Processes	Application, Autonomy & Accountability	Communications, IT & Numeracy
5	<ul style="list-style-type: none"> ▪ Generate ideas through the analysis of abstract information and concepts ▪ Command wide ranging, specialised technical, creative and/or conceptual skills ▪ Identify and analyse both routine and abstract professional problems and issues, and formulate evidence-based responses ▪ Analyse, reformat and evaluate a wide range of information ▪ Critically analyse, evaluate and/or synthesise ideas, concepts, information and issues ▪ Draw on a range of sources in making judgments 	<ul style="list-style-type: none"> ▪ Utilise diagnostic and creative skills in a range of technical, professional or management functions ▪ Exercise appropriate judgement in planning, design, technical and/or supervisory functions related to products, services, operations or processes 	<ul style="list-style-type: none"> ▪ Perform tasks involving planning, design, and technical skills, and involving some management functions ▪ Accept responsibility and accountability within broad parameters for determining and achieving personal and/or group outcomes ▪ Work under the mentoring of senior qualified practitioners ▪ Deal with ethical issues, seeking guidance of others where appropriate 	<ul style="list-style-type: none"> ▪ Use a range of routine skills and some advanced and specialized skills in support of established practices in a subject/discipline, for example: <ul style="list-style-type: none"> ○ Make formal and informal presentations on standard/mainstream topics in the subject/discipline to a range of audiences ○ Participate in group discussions about complex subjects; create opportunities for others to contribute ○ Use a range of IT applications to support and enhance work ○ Interpret, use and evaluate numerical and graphical data to achieve goals/targets

Level	Generic Level Descriptors			
	Knowledge & Intellectual Skills	Processes	Application, Autonomy & Accountability	Communications, IT & Numeracy
4	<ul style="list-style-type: none"> ▪ Develop a rigorous approach to the acquisition of a broad knowledge base, with some specialist knowledge in selected areas ▪ Present and evaluate information, using it to plan and develop investigative strategies ▪ Deal with well defined issues within largely familiar contexts, but extend this to some unfamiliar problems ▪ Employ a range of specialised skills and approaches to generate a range of responses 	<ul style="list-style-type: none"> ▪ Operate in a range of varied and specific contexts involving some creative and non-routine activities ▪ Exercise appropriate judgement in planning, selecting or presenting information, methods or resources ▪ Carry out routine lines of enquiry, development of investigation into professional level issues and problems 	<ul style="list-style-type: none"> ▪ Perform skilled tasks requiring some discretion and judgement, and undertake a supervisory role ▪ Undertake self-directed and some directive activities ▪ Operate within broad general guidelines or functions ▪ Take responsibility for the nature and quantity of own outputs ▪ Meet specified quality standards ▪ Accept some responsibility for the quantity and quality of the output of others 	<ul style="list-style-type: none"> ▪ Use a wide range of routine skills and some advanced skills associated with the subject / discipline — for example: <ul style="list-style-type: none"> ○ Present using a range of techniques to engage the audience in both familiar and some new contexts ○ Read and synthesise extended information from subject documents; organise information coherently, convey complex ideas in well-structured form ○ Use a range of IT applications to support and enhance work ○ Plan approaches to obtaining and using information, choose appropriate methods and data to justify results & choices ○ Carry out multi-stage calculations

Level	Generic Level Descriptors			
	Knowledge & Intellectual Skills	Processes	Application, Autonomy & Accountability	Communications, IT & Numeracy
3	<ul style="list-style-type: none"> ▪ Apply knowledge and skills in a range of activities, demonstrating comprehension of relevant theories ▪ Access, organise and evaluate information independently and make reasoned judgements in relation to a subject or discipline ▪ Employ a range of responses to well defined, but sometimes unfamiliar or unpredictable, problems ▪ Make generalisations and predictions in familiar contexts 	<ul style="list-style-type: none"> ▪ Operate in a variety of familiar and some unfamiliar contexts, using a known range of technical or learning skills ▪ Select from a considerable choice of predetermined procedures ▪ Give presentations to an audience 	<ul style="list-style-type: none"> ▪ Perform tasks in a broad range of predictable and structured contexts which may also involve some non-routine activities requiring a degree of individual responsibility ▪ Engage in self-directed activity with guidance/evaluation ▪ Accept responsibility for quantity and quality of output ▪ Accept well defined but limited responsibility for the quantity and quality of the output of others 	<ul style="list-style-type: none"> ▪ Use a wide range of largely routine and well practiced skills — for example: <ul style="list-style-type: none"> ○ Produce and respond to detailed and complex written and oral communication in familiar contexts, and use a suitable structure and style when writing extended documents ○ Select and use standard applications to obtain, process and combine information ○ Use a wide range of numerical and graphical data in routine contexts, which may have some non-routine elements

Level	Generic Level Descriptors			
	Knowledge & Intellectual Skills	Processes	Application, Autonomy & Accountability	Communications, IT & Numeracy
2	<ul style="list-style-type: none"> ▪ Apply knowledge based on an underpinning comprehension in a selected number of areas ▪ Make comparisons with some evaluation and interpret available information ▪ Apply basic tools and materials and use rehearsed stages for solving problems. ▪ Operate in familiar, personal and/or everyday contexts ▪ Take account of the identified consequences of actions 	<ul style="list-style-type: none"> ▪ Choose from a range of procedures performed in a number of contexts, a few of which may be non-routine ▪ Co-ordinate with others to achieve common goals. 	<ul style="list-style-type: none"> ▪ Perform a range of tasks in predictable and structured contexts ▪ Undertake directed activity with a degree of autonomy ▪ Achieve outcomes within time constraints ▪ Accept defined responsibility for quantity and quality of output subject to external quality checking 	<ul style="list-style-type: none"> ▪ Use skills with some assistance — for example: <ul style="list-style-type: none"> ○ Take active part in discussions about identified subjects ○ Identify the main points and ideas from documents and reproduce them in other contexts ○ Produce and respond to a specified range of written and oral communications, in familiar/routine contexts ○ Carry out a defined range of tasks to process data and access information ○ Use a limited range of familiar numerical and graphical data in everyday contexts ○ Carry out calculations, using percentages and graphical data to given levels of accuracy

Level	Generic Level Descriptors			
	Knowledge & Intellectual Skills	Processes	Application, Autonomy & Accountability	Communications, IT & Numeracy
1	<ul style="list-style-type: none"> ▪ Employ recall and demonstrate elementary comprehension in a narrow range of areas with dependency on ideas of others ▪ Exercise basic skills ▪ Receive and pass on information ▪ Use, under supervision or prompting, basic tools and materials. ▪ Apply learnt responses to solve problems ▪ Operate in familiar, personal and/or everyday contexts ▪ Take some account, with prompting, of identified consequences of actions 	<ul style="list-style-type: none"> ▪ Operate mainly in closely defined and highly structured contexts ▪ Carry out processes that are repetitive and predictable ▪ Undertake the performance of clearly defined tasks ▪ Assume a strictly limited range of roles. 	<ul style="list-style-type: none"> ▪ Perform tasks of routine and repetitive nature given clear direction ▪ Carry out directed activity under close supervision ▪ Rely entirely on external monitoring of output and quality 	<ul style="list-style-type: none"> ▪ Use very simple skills with assistance — for example: <ul style="list-style-type: none"> ○ Take some part in discussions about straightforward subjects ○ Read and identify the main points and ideas from documents about straightforward subjects ○ Produce and respond to a limited range of simple, written and oral communications, in familiar/routine contexts ○ Carry out a limited range of simple tasks to process data and access information ○ Use a limited range of very simple and familiar numerical and pictorial data ○ Carry out calculations, using whole numbers and simple decimals to given levels of accuracy

Appendix B Coding of Unit of Competencies (UoCs)

In this appendix, we describe the standard for coding the UoCs in the Software Products and Software Services (SW) branch of the ICT industry. Each UoCs has a specific code, with 10 alphanumeric characters. The code consists of 6 different parts as follows:

1. **First and Second digits refer to the Industry.** “IT” is used to abbreviate the Information and Communications Technology (ICT) industry.
2. **Third and Fourth digits refer to the Branch.** “SW” is used to abbreviate the Software Products and Software Services (SW) branch of the ICT industry.
3. **Fifth and sixth digits refer to the Functional Area.** The SW branch has eight functional areas with abbreviations as follows:
 - a. **AR** for Architecture
 - b. **DM** for Design, Development and Maintenance
 - c. **GS** for Generic Skills
 - d. **IS** for Information Security
 - e. **OS** for Operations and Support
 - f. **PM** for Project Management
 - g. **QA** for Quality Assurance
 - h. **SM** for Strategic Management
4. **Seventh digit refers to the Level.** It is a digit between 1 to 7 corresponding to the level in the QF
5. **Eighth and Ninth digits refer to the UoC Number.** Each UoCs is assigned a unique identity number in sequence from 01 to 99 within each functional area.
6. **Tenth digit refers to the Version.** The version of UoCs is signified by a letter starting from ‘A’ to ‘Z’, where ‘A’ is the first version followed by “B” upon revision.

Example: The unit code ITSWAR601A is the **first** version of the **UoCs** “01” at Level **6** of the **Architecture** functional area (**AR**) in the **Software Products and Software Services (SW)** branch of the **ICT** industry (**IT**).

IT SW AR 6 01 A

Appendix C Competency Matrix of Each Functional Area

Table 2 Competency Matrix of Strategic Management

Function Competency Level	Strategic Formulation	Strategic Execution and Review	IT Governance	IT Planning and Budgeting	Contingency Management	Information Management	Brand Management	IT Consulting and Champion	Risk Management [Generic Skills]	Resources management [Generic Skills]	Human Resources and Staff Management [Generic Skills]	Financial Management [Generic Skills]	Relationship Management [Generic Skills]
7													
6	Formulate vision and mission statements ITSWSM601A Credit: 3 P. 68	Formulate relevant tactical plans based on the approved IT strategies and policies ITSWSM604A Credit: 5 P. 72	Establish the IT governance framework and process ITSWSM607A Credit: 4 P. 75		Develop business continuity plans and disaster recovery plans related to IT ITSWSM609A Credit: 7 P. 77	Transform information into business knowledge and value ITSWSM610A Credit: 2 P. 79		Identify and evaluate information technologies that support the objectives of an organisation ITSWSM612A Credit: 2 P. 81	Identify and assess the risk factors related to IT ITSWGS609A Credit: 4 P. 452	Allocate and prioritize IT and related resources ITSWGS614A Credit: 4 P. 456	Develop and maintain succession plans for human resources related to IT ITSWGS615A Credit: 8 P. 457	Establish a business case for an IT investment ITSWGS617A Credit: 11 P. 458	Manage and maintain the portfolio and relationship with business partners ITSWGS618A Credit: 4 P. 459
	Formulate the business strategies and policies ITSWSM602A Credit: 4 P. 69	Execute, monitor and review the approved IT strategies and plans ITSWSM605A Credit: 5 P. 73	Evaluate and review the execution of the approved IT plans ITSWSM608A Credit: 4 P. 76			Set policy to control data security and privacy ITSWSM611A Credit: 4 P. 80		Select appropriate information technologies for business purposes ITSWSM613A Credit: 1 P. 82	Develop risk mitigation strategies and plans related to IT ITSWGS610A Credit: 4 P. 453				
	Formulate IT strategies and policies ITSWSM603A Credit: 4 P. 71	Evaluate the effectiveness of the execution of the approved IT plans ITSWSM606A Credit: 5 P. 74						Understand Systems Development Life Cycle (SDLC) and software development process ITSWGS619A Credit: 4 P. 460	Review risk factors related to IT, and execute and monitor risk mitigation plans ITSWGS611A Credit: 3 P. 454				

Function Competency Level	Strategic Formulation	Strategic Execution and Review	IT Governance	IT Planning and Budgeting	Contingency Management	Information Management	Brand Management	IT Consulting and Champion	Risk Management [Generic Skills]	Resources management [Generic Skills]	Human Resources and Staff Management [Generic Skills]	Financial Management [Generic Skills]	Relationship Management [Generic Skills]
								Understand IT operations and IT processing ITSWG620A Credit: 4 P. 461					
								Understand IT project management ITSWG621A Credit: 4 P. 462					
								Understand organisational and project quality assurance ITSWG622A Credit: 3 P. 463					
								Adopt and adapt international standards concerning information security as appropriate ITSWG623A Credit: 3 P. 464					
								Comply with relevant laws and regulatory requirements ITSWG624A Credit: 1 P. 465					

Function Competency Level	Strategic Formulation	Strategic Execution and Review	IT Governance	IT Planning and Budgeting	Contingency Management	Information Management	Brand Management	IT Consulting and Champion	Risk Management [Generic Skills]	Resources management [Generic Skills]	Human Resources and Staff Management [Generic Skills]	Financial Management [Generic Skills]	Relationship Management [Generic Skills]
5			Monitor the IT governance process ITSWSM501A Credit: 3 P. 58	Formulate IT business model ITSWSM502A Credit: 4 P. 59	Manage contingency situations ITSWSM505A Credit: 7 P. 62	Collect and distribute disseminate information ITSWSM506A Credit: 2 P. 64	Manage product/ services brand through the use of IT ITSWSM508A Credit: 4 P. 67		Acquire and protect the copyrights and IP rights related to IT ITSWGS523A Credit: 4 P. 443	Utilize the given IT and related resources ITSWGS520A Credit: 4 P. 440	Recruit, retain and develop IT staff ITSWGS521A Credit: 8 P. 441		
				Formulate IT plan ITSWSM503A Credit: 4 P. 60		Manage information life cycle ITSWSM507A Credit: 3 P. 65							
				Prepare a budget based on the IT plan ITSWSM504A Credit: 6 P. 61									
4													
3													
2													
1													

Table 3 Competency Matrix in Project Management

Function Competency Level	Project Integration Management	Project Scope Management	Project Time Management	Project Cost Management	Project Quality Management	Project Human Resources Management	Project Communications Management	Project Risk Management	Project Procurement and Contract Management
7									
6	Perform an initial project feasibility study ITSWPM601A Credit: 2 P. 117	Monitor and control the project scope ITSWPM607A Credit: 2 P. 125	Develop a project schedule ITSWPM609A Credit: 4 P. 127	Prepare a preliminary cost model ITSWPM610A Credit: 2 P. 129	Determine quality policies and define quality requirements for a project ITSWPM613A Credit: 3 P. 133	Conduct Project Closure with respect to project team ITSWPM616A Credit: 2 P. 137		Establish a risk management approach and process for a project ITSWPM617A Credit: 2 P. 138	Establish preliminary procurement policies and procedures ITSWPM621A Credit: 5 P. 143
	Prepare a project charter and kick-off package as well as information ITSWPM602A Credit: 1 P. 118	Conduct project closure with regard to project scope ITSWPM608A Credit: 3 P. 126		Develop the project cost ITSWPM611A Credit: 4 P. 130	Develop a project quality management plan for project execution ITSWPM614A Credit: 4 P. 134			Develop a risk management plan ITSWPM618A Credit: 2 P. 139	Conduct project procurement planning ITSWPM622A Credit: 6 P. 144
	Prepare initial project plan ITSWPM603A Credit: 2 P. 119			Conduct cost review upon project completion ITSWPM612A Credit: 2 P. 132	Conduct project closure with regard to quality ITSWPM615A Credit: 2 P. 136			Develop a risk response plan ITSWPM619A Credit: 2 P. 141	
	Execute the project plan ITSWPM604A Credit: 1 P. 121							Conduct project closure with respect to project risk management ITSWPM620A Credit: 1 P. 142	
	Monitor and control project execution ITSWPM605A Credit: 1 P. 122								
	Conduct project closure with regard to integration ITSWPM606A Credit: 1 P. 124								
5		Define project scope ITSWPM501A Credit: 4	Articulate the time and effort requirements needed for product-based	Articulate the project costing requirements	Manage the execution of a project quality management plan	Define the organisational structure of a project	Establish a preliminary project communications plan	Execute the risk management and response plans	Conduct solicitation planning ITSWPM521A

Function Competency Level	Project Integration Management	Project Scope Management	Project Time Management	Project Cost Management	Project Quality Management	Project Human Resources Management	Project Communications Management	Project Risk Management	Project Procurement and Contract Management
		P. 89	planning ITSWPM503A Credit: 1 P. 92	ITSWPM506A Credit: 2 P. 95	ITSWPM509A Credit: 2 P. 98	ITSWPM511A Credit: 3 P. 100	ITSWPM515A Credit: 1 P. 105	ITSWPM519A Credit: 2 P. 109	Credit: 7 P. 111
		Execute and manage the project scope ITSWPM502A Credit: 2 P. 91	Monitor, control and update project schedule ITSWPM504A Credit: 2 P. 93	Execute and manage the project cost ITSWPM507A Credit: 2 P. 96	Monitor and control the project quality ITSWPM510A Credit: 1 P. 99	Establish organisational plan ITSWPM512A Credit: 3 P. 101	Develop a project communications plan ITSWPM516A Credit: 2 P. 106	Monitor and control the risks of a project ITSWPM520A Credit: 2 P. 110	Conduct solicitation ITSWPM522A Credit: 5 P. 112
			Conduct project closure with respect to time ITSWPM505A Credit: 1 P. 94	Monitor and control the project cost ITSWPM508A Credit: 2 P. 97		Establish and develop the project team ITSWPM513A Credit: 4 P. 102	Conduct project performance reporting ITSWPM517A Credit: 2 P. 107		Conduct source selection and/or contract development ITSWPM523A Credit: 5 P. 113
						Manage project team ITSWPM514A Credit: 2 P. 104	Conduct project closure with respect to project communications ITSWPM518A Credit: 2 P. 108		Award Contract ITSWPM524A Credit: 4 P. 114
									Conduct contract administration and contract monitoring ITSWPM525A Credit: 5 P. 115
									Conduct contract closeout ITSWPM526A Credit: 5 P. 116
4			Prepare the project schedule ITSWPM401A Credit: 1 P. 83				Establish project communications documentation requirements ITSWPM403A Credit: 2 P. 85		
			Execute and manage				Perform information		

Function Competency Level	Project Integration Management	Project Scope Management	Project Time Management	Project Cost Management	Project Quality Management	Project Human Resources Management	Project Communications Management	Project Risk Management	Project Procurement and Contract Management
			the project schedule ITSWPM402A Credit: 1 P. 84				distribution ITSWPM404A Credit: 2 P. 86		
							Implement project time reporting ITSWPM405A Credit: 1 P.87		
							Communicate with stakeholders at project checkpoints ITSWPM406A Credit: 2 P. 88		
3									
2									
1									

Table 4 Competency Matrix for Architecture

Function Competency Level	Architecture Framework and Vision	Business Architecture	Data Architecture	Technology Architecture	Network Architecture	Application Integration Architecture	Application Software Architecture	Embedded Software Architecture
7								
6	Define, prioritise and document architecture vision and principles for an organisation ITSWAR601A Credit: 4 P. 171	Review the current baseline and develop a target business architecture for an organisation ITSWAR605A Credit: 5 P. 176	Define data management policies and architecture principles ITSWAR608A Credit: 3 P. 179	Define, review and document a technology architecture baseline ITSWAR614A Credit: 5 P. 188		Recommend application integration architecture models ITSWAR617A Credit: 2 P. 194		Recommend embedded software architecture models ITSWAR619A Credit: 6 P. 196
	Advocate and explain the adopted architecture design methodology to stakeholders ITSWAR602A Credit: 2 P. 173	Capture, analyse and model various viewpoints of a business architecture ITSWAR606A Credit: 5 P. 177	Build a data architecture registry ITSWAR609A Credit: 6 P. 180	Build, evaluate and review a target technology architecture reference model ITSWAR615A Credit: 5 P. 190		Develop application integration architecture resources ITSWAR618A Credit: 2 P. 195		Determine technology mix for the design and development of embedded software systems ITSWAR620A Credit: 3 P. 198
	Establish processes to monitor the adopted architecture principles, design guidelines and resultant designs ITSWAR603A Credit: 2 P. 174	Review, design and re-engineer business processes to form a new business architecture ITSWAR607A Credit: 3 P. 178	Define and establish a data architecture ITSWAR610A Credit: 3 P. 182	Manage technology architecture life cycle ITSWAR616A Credit: 3 P. 192				Decompose embedded software system model into manageable layers ITSWAR621A Credit: 6 P. 200
	Establish processes to manage the implementation of the adopted architecture designs ITSWAR604A Credit: 2 P. 175		Construct a data architecture for an information system ITSWAR611A Credit: 5 P. 183					Maintain a common library of reusable embedded software components ITSWAR622A Credit: 6 P. 201
			Check usability of a target data architecture ITSWAR612A Credit: 5 P. 184					Exercise lifecycle management on the adopted embedded software architecture ITSWAR623A Credit: 5 P. 202
			Enforce compliance of the enterprise data standards					

Function Competency Level	Architecture Framework and Vision	Business Architecture	Data Architecture	Technology Architecture	Network Architecture	Application Integration Architecture	Application Software Architecture	Embedded Software Architecture
			ITSWAR613A Credit: 3 P. 186					
5	Evaluate and select architecture design options and related architecture artefacts ITSWAR501A Credit: 2 P. 147	Perform gap analysis of the current business architecture against the target business architecture ITSWAR504A Credit: 5 P. 150		Model technology architecture ITSWAR507A Credit: 4 P. 154	Define, review and validate network architecture principles ITSWAR509A Credit: 2 P. 156	Establish guidelines for adoption of application integration architecture ITSWAR515A Credit: 1 P. 163	Understand key characteristics of various application software architecture models ITSWAR518A Credit: 1 P. 166	Understand key characteristics of embedded software systems ITSWAR521A Credit: 2 P. 169
	Review and make improvements to the relevant architecture development initiatives ITSWAR502A Credit: 2 P. 148	Define metrics and methodologies to measure business performance of applying new technologies ITSWAR505A Credit: 3 P. 152		Define metrics to ensure that a technology architecture meets the business goals ITSWAR508A Credit: 3 P. 155	Develop a network technology architecture model ITSWAR510A Credit: 5 P. 157	Ensure operable application integration architecture is in place ITSWAR516A Credit: 1 P. 164	Develop application software architecture models ITSWAR519A Credit: 2 P. 167	
	Define and develop various architecture design building blocks (components) for the organisation ITSWAR503A Credit: 2 P. 149	Promote and explain the new business architecture to stakeholders in an organisation ITSWAR506A Credit: 2 P. 153			Perform gap analysis of the current network architecture against the business requirements ITSWAR511A Credit: 3 P. 159	Manage application integration architecture life cycle ITSWAR517A Credit: 1 P. 165	Keep in-house practices in line with industry best practices ITSWAR520A Credit: 2 P. 168	
					Design and construction of network architecture ITSWAR512A Credit: 3 P. 160			
					Model and analyse network architecture ITSWAR513A Credit: 3 P. 161			
					Perform lifecycle management of the network architecture ITSWAR514A Credit: 3			

Function Competency Level	Architecture Framework and Vision	Business Architecture	Data Architecture	Technology Architecture	Network Architecture	Application Integration Architecture	Application Software Architecture	Embedded Software Architecture
					P. 162			
4					Document the abstracted layer design of the network architecture ITSWAR401A Credit: 2 P. 145		Maintain a library of reusable application components ITSWAR402A Credit: 1 P. 146	
3								
2								
1								

Table 5 Competency Matrix of Information Security

Function Competency Level	Information Security Governance	Risk Management	Information Security Programme Management	Information Security Management	Response Management	Crisis Management	Information System Audit	Forensics	Business Continuity Planning
7									
6	<p>Establish information security policies</p> <p>ITSWIS601A Credit: 4 P. 233</p>	<p>Develop a risk management process</p> <p>ITSWIS604A Credit: 3 P. 237</p>	<p>Create plans to implement information security governance framework</p> <p>ITSWIS606A Credit: 4 P. 239</p>	<p>Develop, propose and promulgate an enterprise's information security policies</p> <p>ITSWIS611A Credit: 4 P. 242</p>	<p>Devise processes for detecting, identifying and analysing security incident</p> <p>ITSWIS613A Credit: 2 P. 244</p>	<p>Facilitate cross functional teams for crisis management</p> <p>ITSWIS616A Credit: 1 P. 247</p>	<p>Develop an information system security audit plan</p> <p>ITSWIS618A Credit: 4 P. 249</p>		<p>Plan and maintain business continuity solutions</p> <p>ITSWIS620A Credit: 4 P. 250</p>
	<p>Develop a business case and perform an enterprise value analysis</p> <p>ITSWIS603A Credit: 3 P. 234</p>	<p>Identify and evaluate risks</p> <p>ITSWIS605A Credit: 2 P. 238</p>	<p>Integrate information security programme requirements into an enterprise's life cycle activities</p> <p>ITSWIS607A Credit: 4 P. 240</p>	<p>Establish corporate information security standards</p> <p>ITSWIS612A Credit: 2 P. 243</p>	<p>Develop response and recovery plans</p> <p>ITSWIS614A Credit: 3 P. 245</p>	<p>Prepare a crisis management plan and perform life cycle management of the plan</p> <p>ITSWIS617A Credit: 3 P. 248</p>			
	<p>Develop information security strategy and obtain management buy-in</p> <p>ITSWIS621A Credit: 2 P. 235</p>		<p>Establish metrics to manage information security governance framework</p> <p>ITSWIS609A Credit: 4 P. 241</p>		<p>Manage post-event reviews</p> <p>ITSWIS615A Credit: 3 P. 246</p>				
5	<p>Establish reporting and communication channels</p> <p>ITSWIS502A Credit: 2 P. 209</p>	<p>Ensure risk management related activities are integrated into life cycle processes</p> <p>ITSWIS503A Credit: 1 P. 211</p>	<p>Develop methods to satisfy information security policy requirements</p> <p>ITSWIS505A Credit: 4 P. 213</p>	<p>Develop information security practices and procedures</p> <p>ITSWIS506A Credit: 2 P. 216</p>	<p>Manage the execution of response and recovery plans</p> <p>ITSWIS511A Credit: 3 P. 220</p>		<p>Enact information system security audit plan</p> <p>ITSWIS513A Credit: 3 P. 222</p>	<p>Provide advice on computer forensics</p> <p>ITSWIS515A Credit: 3 P. 225</p>	<p>Establish a business continuity planning strategy</p> <p>ITSWIS519A Credit: 2 P. 229</p>
	<p>Maintain information security policies</p> <p>ITSWIS523A Credit: 2 P. 210</p>	<p>Define strategies and prioritize options to mitigate risk</p> <p>ITSWIS504A Credit: 2 P. 212</p>	<p>Promote accountability in managing information security risks</p> <p>ITSWIS524A Credit: 3 P. 214</p>	<p>Evaluate and assess effectiveness of corporate information security practices</p> <p>ITSWIS507A Credit: 3 P.217</p>	<p>Establish procedures for documenting security incident</p> <p>ITSWIS512A Credit: 2 P. 221</p>		<p>Prepare and deliver information system security audit report</p> <p>ITSWIS514A Credit: 4 P. 223</p>	<p>Manage computer forensics evidence</p> <p>ITSWIS516A Credit: 3 P.226</p>	<p>Prepare full set of business continuity planning documentation</p> <p>ITSWIS520A Credit: 2 P. 230</p>
			<p>Minimize information security risks</p> <p>ITSWIS525A</p>	<p>Ensure availability, integrity and confidentiality of information systems</p>			<p>Evaluate and follow up the recommendations in the information system security audit</p>	<p>Investigate an information security case</p>	<p>Conduct drill test on business continuity planning</p>

Function Competency Level	Information Security Governance	Risk Management	Information Security Programme Management	Information Security Management	Response Management	Crisis Management	Information System Audit	Forensics	Business Continuity Planning
			Credit: 3 P. 215	ITSWIS508A Credit: 2 P. 218			report ITSWIS526A Credit: 4 P. 224	ITSWIS517A Credit: 5 P. 227	ITSWIS521A Credit: 4 P.231
				Develop information security awareness programme ITSWIS509A Credit: 2 P. 219				Prepare and present forensics investigation report ITSWIS518A Credit: 3 P. 228	Provide awareness training programme to staff dealing with business continuity planning ITSWIS522A Credit: 2 P. 232
4	Ensure information security procedures and guidelines support information security policies ITSWIS402A Credit: 2 P. 203	Report significant changes in risks ITSWIS401A Credit: 1 P. 204	Maintain plans to implement information security governance framework ITSWIS403A Credit: 3 P. 205		Conduct drills according to response and recovery plans ITSWIS406A Credit: 2 P. 208				
				Support and implement information security practices and procedures ITSWIS404A Credit: 2 P. 206					
				Implement information security awareness programme ITSWIS405A Credit: 2 P. 207					
3									
2									
1									

Table 6 Competency Matrix of Design, Development and Maintenance

Function Competency Level	Requirements	Software/Systems Design	Software Development (Programming) and Related Activities	Software Quality Assurance	Software Maintenance	Software Configuration Management	Software Releases & Control	Software Deployment and Migration	Software Decommissioning
7									
6		Propose an architecture design (AD) of the software/system ITSWDM601A Credit: 1 P. 271				Develop and implement the change control policy ITSWDM604A Credit: 1 P. 277	Identify the requirements for software releases and control ITSWDM606A Credit: 2 P. 280	Perform risk assessment on software deployment and migration ITSWDM610A Credit: 2 P. 286	Define software decommissioning policy and plan ITSWDM613A Credit: 4 P. 289
		Propose a high level design (HLD) of the software ITSWDM602A Credit: 1 P. 273				Develop and implement software configuration management plan ITSWDM605A Credit: 1 P. 278	Perform risk assessment on software releases and control ITSWDM607A Credit: 4 P.282	Define a software deployment / migration plan ITSWDM611A Credit: 4 P. 287	
		Propose a detailed level design (DLD) of the software ITSWDM603A Credit: 1 P. 275					Define software releases and control plan ITSWDM608A Credit: 4 P. 283	Monitor the deployment /migration process ITSWDM612A Credit: 2 P. 288	
							Execute and monitor the software releases and control plan ITSWDM609A Credit: 4 P. 284		
5	Formulate, analyse, and develop requirements for the development of software products / services ITSWDM501A Credit: 8 P. 259	Verify and validate the relevant design documentations of the software/system ITSWDM503A Credit: 1 P. 261	Develop programme modules of the software based on its design documents ITSWDM504A Credit: 6 P. 262	Perform inspection for the programme code and software documents ITSWDM506A Credit: 2 P. 264	Identify extra functional requirements of an existing software ITSWDM508A Credit: 1 P. 267			Identify the Standard Operating Environment (SOE) and related issues for a software to be deployed/migrated ITSWDM510A Credit: 2 P. 269	Monitor the decommissioning plan and processes ITSWDM511A Credit: 2 P. 270

Function Competency Level	Requirements	Software/Systems Design	Software Development (Programming) and Related Activities	Software Quality Assurance	Software Maintenance	Software Configuration Management	Software Releases & Control	Software Deployment and Migration	Software Decommissioning
	Verify and validate requirements for the development of the software product ITSWDM502A Credit: 6 P. 260		Manage and maintain the programme source ITSWDM505A Credit: 2 P. 263	Develop test plans for various levels of testing ITSWDM507A Credit: 2 P. 266	Identify extra non-functional requirements of an existing software ITSWDM509A Credit: 1 P. 268				
								Develop programme modules of the software based on its design documents ITSWDM504A Credit: 6 P. 262	Manage and maintain the programme source ITSWDM505A Credit: 2 P. 263
4				Perform testing activities to facilitate different levels of testing ITSWDM401A Credit: 2 P. 251				Verify and validate the deployed/migrated software and the existing software are functioning properly ITSWDM405A Credit: 1 P. 255	Identify components that need to be managed in software decommissioning ITSWDM406A Credit: 1 P. 257
				Report discrepancies between software and its related documents ITSWDM402A Credit: 1 P. 252					Verify and validate the remaining software are functioning properly ITSWDM407A Credit: 1 P. 258
				Debug a programme ITSWDM403A Credit: 1 P. 253					
				Perform software audit ITSWDM404A Credit: 1 P. 254					
3									
2									
1									

Table 7 Competency Matrix of Operations and Support

Function Competency Level	Help Desk Service	Problem Management Service	Change Management Services	Availability Management Services	Release Management Services	Performance and Capacity Management Services	Configuration Management Services	IT Service Continuity Management	Service Level Management	System Operations	Database Administration and Support	Field Support Services	System Support Services	Security Management Services
7														
6	Manage the highest severity incident request ITSWOS601A Credit: 3 P. 373	Manage exceptional problems ITSWOS603A Credit: 2 P. 374	Manage the emergency change request ITSWOS605A Credit: 2 P. 376			Establish and maintain the performance and capacity management processes ITSWOS609A Credit: 4 P. 378	Establish and maintain configuration management process ITSWOS610A Credit: 2 P. 381	Perform disaster impact assessment and mitigation ITSWOS611A Credit: 3 P. 382	Establish and maintain the service level management process ITSWOS612A Credit: 3 P. 383		Manage exceptional database operations process ITSWOS615A Credit: 8 P. 385		Manage the complex system support services ITSWOS617A Credit: 7 P. 388	Conduct security investigation ITSWOS619A Credit: 2 P.390
											Establish and maintain database operations process ITSWOS616A Credit: 14 P. 386			
5	Monitor and control higher severity service requests ITSWOS501A Credit: 4 P. 333	Monitor and control problem management services ITSWOS502A Credit: 2 P. 337	Maintain a change schedule ITSWOS503A Credit: 2 P. 341	Recommend availability improvement plans ITSWOS505A Credit: 3 P. 346	Establish and maintain the release management process ITSWOS527A Credit: 4 P. 352	Deliver performance and capacity management service ITSWOS508A Credit: 3 P. 354	Monitor and control the configuration management services ITSWOS511A Credit: 1 P. 360	Monitor and control the implementation of Disaster Recovery Plan ITSWOS512A Credit: 2 P. 361	Manage the service relationship with customers and suppliers ITSWOS514A Credit: 3 P. 362	Manage the exceptional system operations services ITSWOS528A Credit: 3 P. 364	Monitor and control the database operations services ITSWOS517A Credit: 8 P. 366		Establish and maintain system support services process ITSWOS529A Credit: 8 P. 368	Deliver security services for operations ITSWOS521A Credit: 3 P. 370
	Establish and maintain the help desk process ITSWOS523A Credit: 3 P. 335	Establish and maintain the problem management process ITSWOS524A Credit: 2 P. 339	Manage the day-to-day operation of a change management process ITSWOS504A Credit: 2 P. 342	Monitor and control service level fulfilment ITSWOS506A Credit: 3 P. 348		Prepare capacity upgrade plan ITSWOS509A Credit: 3 P. 356								Define operational security protection processes ITSWOS522A Credit: 2 P. 371
			Establish and maintain the change management process ITSWOS525A Credit: 2 P. 344	Establish and maintain the availability management process ITSWOS526A Credit: 3 P. 350		Monitor and control the performance and capacity management services ITSWOS510A Credit: 3 P. 358								Conduct operation security risk assessment and audit ITSWOS530A Credit: 2 P. 372
4		Deliver problem management services ITSWOS403A Credit: 1 P. 305	Deliver change management services ITSWOS405A Credit: 3 P. 307	Deliver availability management services ITSWOS406A Credit: 2 P. 309	Deliver release management services ITSWOS407A Credit: 3 P. 311		Deliver configuration management services ITSWOS408A Credit: 1 P. 315	Ensure continuous operations of the computing environment ITSWOS410A Credit: 3 P. 316	Deliver service level management services ITSWOS420A Credit: 3 P. 320	Establish and maintain the system operations process ITSWOS422A Credit: 4 P. 324	Deliver database operations services ITSWOS413A Credit: 14 P. 326	Analyse and fix the hardware and software failure ITSWOS423A Credit: 2 P. 327	Deliver system support services ITSWOS424A Credit: 6 P. 328	Maintain the security control documents ITSWOS418A Credit: 2 P. 332

Function Competency Level	Help Desk Service	Problem Management Service	Change Management Services	Availability Management Services	Release Management Services	Performance and Capacity Management Services	Configuration Management Services	IT Service Continuity Management	Service Level Management	System Operations	Database Administration and Support	Field Support Services	System Support Services	Security Management Services
					Monitor and control the release management services ITSWOS419A Credit: 3 P. 313			Conduct tests and drills to support the Disaster Recovery Plan ITSWOS411A Credit: 3 P. 318	Manage the day-to-day operations of service delivery ITSWOS421A Credit: 3 P. 322				Monitor and control system support services ITSWOS425A Credit: 7 P. 330	
3	Deliver Help Desk services ITSWOS301A Credit: 3 P. 292	Maintain the problem management knowledge database ITSWOS303A Credit: 1 P. 297								Monitor and control the system operation services ITSWOS304A Credit: 3 P. 298		Deliver the field support services ITSWOS306A Credit: 3 P. 302		
	Maintain the help desk knowledge database ITSWOS302A Credit: 4 P. 295									Deliver the system operations services ITSWOS305A Credit: 2 P. 300		Recover failed hardware and software components ITSWOS307A Credit: 2 P. 303		
												Apply technical changes and patches to the hardware and software components ITSWOS308A Credit: 2 P. 304		
2							Perform stock-take of IT assets ITSWOS201A Credit: 1 P. 291							
1														

Table 8 Competency Matrix of Quality Assurance

Function Competency Level	QA Governance	Organisational Level QA	Product Level QA	Project Quality Management [Project Management]	Software Quality Assurance [Design, Development and Maintenance]
7					
6	Establish a Quality Assurance (QA) entity ITSWQA601A Credit: 4 P. 402			Determine quality policies and define quality requirements for a project ITSWPM613A Credit: 3 P. 133	
	Formulate quality assurance (QA) policies and procedures ITSWQA602A Credit: 4 P. 404			Develop a project quality management plan for project execution ITSWPM614A Credit: 4 P. 134	
				Conduct project closure with regard to quality ITSWPM615A Credit: 2 P. 136	
5		Implement quality assurance (QA) policies and procedures ITSWQA501A Credit: 4 P. 395	Prepare quality assurance (QA) requirements of a software product ITSWQA505A Credit: 2 P. 399		Perform inspection for the programme code and software documents ITSWDM506A Credit: 2 P. 264
		Assist in quality assurance (QA) certification and international standards adoption ITSWQA502A Credit: 4 P. 396	Plan quality assurance (QA) activities for a software product ITSWQA506A Credit: 3 P. 401		Develop test plans for various levels of testing ITSWDM507A Credit: 2 P. 266
		Plan and execute organisational level quality initiatives ITSWQA503A Credit: 4 P. 397			
		Plan and conduct training for quality assurance (QA) activities ITSWQA504A Credit: 4 P. 398			

Function Competency Level	QA Governance	Organisational Level QA	Product Level QA	Project Quality Management [Project Management]	Software Quality Assurance [Design, Development and Maintenance]
4			Perform quality assurance (QA) activities of a software product ITSWQA401A Credit: 2 P. 391		Perform testing activities to facilitate different levels of testing ITSWDM401A Credit: 2 P. 251
			Evaluate the quality of a software product ITSWQA402A Credit: 2 P. 393		Report discrepancies between software and its related documents ITSWDM402A Credit: 1 P. 252
					Debug a programme ITSWDM403A Credit: 1 P. 253
					Perform software audit ITSWDM404A Credit: 1 P. 254
3					
2					
1					

Table 9 Competency Matrix of Generic Skills

Function Competency Level	Management of Ethics and Professionalism	Business Ethics	Specific Professional Responsibilities	Continuous Professional Development	Personal Attribute	Business Acumen	Sales and Marketing	Communications Skills	Social Skills	Risk Management	Change Management	Contract Management	Procurement Management	Resource Management	Human Resources and Staff Management	Financial Management	Relationship Management	IT Consulting / Champion	
7						Lead and motivate a team to attain extraordinary goals and accomplish incredible task ITSWG701A Credit: 12 P. 467													
6			Adopt and adapt international standards as appropriate ITSWG601A Credit: 5 P. 444		Lead and motivate a team ITSWG604A Credit: 6 P. 447	Formulate vision and mission statements ITWSM601A Credit: 3 P. 68				Identify and assess the risk factors related to IT ITSWG609A Credit: 4 P. 452	Manage changes ITSWG613A Credit: 5 P. 455			Allocate and prioritize IT and related resources ITSWG614A Credit: 4 P.456	Develop and maintain succession plans for human resources related to IT ITSWG615A Credit: 8 P. 457	Establish a business case for an IT investment ITSWG617A Credit: 11 P.458	Manage and maintain the portfolio and relationship with business partners ITSWG618A Credit: 4 P. 459	Understand Systems Development Life Cycle (SDLC) and software development process ITSWG619A Credit: 4 P.460	
			Comply with organisational policies and procedures, relevant laws and regulatory requirements ITSWG602A Credit: 5 P.445		Apply analytical methods and techniques in problem solving ITSWG605A Credit: 6 P.448	Formulate the business strategies and policies ITWSM602A Credit: 4 P.69				Develop risk mitigation strategies and plans related to IT ITSWG610A Credit: 4 P. 453									Understand IT operations and IT processing ITSWG620A Credit: 4 P.461
			Seek and provide professional peer review ITSWG603A Credit: 4 P. 446		Delegate responsibilities ITSWG606A Credit: 3 P. 449	Forecast and monitor business performance ITSWG607A Credit: 4 P. 450				Review risk factors related to IT, and execute and monitor risk mitigation plans ITSWG611A Credit: 3 P. 454									Understand IT project management ITSWG621A Credit: 4 P. 462
						Identify opportunities to increase, strengthen and enhance competitive advantages ITSWG608A Credit: 4 P. 451													Understand organisational and project quality assurance ITSWG622A Credit: 3 P.463
						Capture market and competitor intelligence ITSWG625A Credit: 4													Adopt and adapt international standards concerning information security as

Function Competency Level	Management of Ethics and Professionalism	Business Ethics	Specific Professional Responsibilities	Continuous Professional Development	Personal Attribute	Business Acumen	Sales and Marketing	Communications Skills	Social Skills	Risk Management	Change Management	Contract Management	Procurement Management	Resource Management	Human Resources and Staff Management	Financial Management	Relationship Management	IT Consulting / Champion
						P.466												appropriate ITSWG5623A Credit: 3 P. 464
																		Comply with relevant laws and regulatory requirements ITSWG5624A Credit: 1 P. 465
5	Develop policies and guidelines for the appraisal of the enactment of professionalism ITSWG501A Credit: 3 P. 411	Protect intellectual property rights and data privacy, and observe relevant laws ITSWG505A Credit: 4 P. 418		Collect and digest ICT development and application information ITSWG506A Credit: 3 P.420		Identify business opportunities ITSWG508A Credit: 3 P. 422	Develop sales and marketing strategies and establish the marketing teams ITSWG510A Credit: 4 P. 424	Communicate (oral and written) technical information ITSWG512A Credit: 4 P. 426	Team building ITSWG515A Credit: 2 P. 431	Acquire and protect the copyrights and IP rights related to IT ITSWG523A Credit: 4 P. 443		Manage contract ITSWG518A Credit: 5 P. 436	Manage Procurement ITSWG519A Credit: 5 P. 438	Utilize the given IT and related resources ITSWG520A Credit: 4 P. 440	Recruit, retain and develop IT staff ITSWG521A Credit: 8 P. 441			
	Define and establish an appraisal mechanism for the enactment of professionalism ITSWG502A Credit: 4 P. 413			Acquire new knowledge and skills ITSWG507A Credit: 3 P. 421		Review and adjust business strategies and policies ITSWG524A Credit: 4 P. 423	Manage product/ services brand ITSWG511A Credit: 4 P. 425	Listen to all stakeholders effectively ITSWG513A Credit: 2 P. 427	Interpersonal and people networking skills ITSWG516A Credit: 1 P. 432						Manage staff performance and appraisal ITSWG522A Credit: 7 P. 442			
	Monitor the defined appraisal mechanism for the enactment of professionalism ITSWG503A Credit: 4 P. 415							Present effectively ITSWG514A Credit: 2 P. 429	Negotiate with all stakeholders effectively ITSWG517A Credit: 2 P. 434									
	Review and improve the existing appraisal mechanism of the enactment of professionalism ITSWG504A Credit: 3 P. 417																	
4						Manage operation based on existing environment and routines ITSWG401A		Communicate (oral and written) information with team members and clients ITSWG402A										

Function Competency Level	Management of Ethics and Professionalism	Business Ethics	Specific Professional Responsibilities	Continuous Professional Development	Personal Attribute	Business Acumen	Sales and Marketing	Communications Skills	Social Skills	Risk Management	Change Management	Contract Management	Procurement Management	Resource Management	Human Resources and Staff Management	Financial Management	Relationship Management	IT Consulting / Champion
						Credit: 4 P.405		Credit: 4 P. 406										
								Listen to clients and team members effectively ITSWG403A Credit: 2 P. 407										
								Present effectively to team members and clients ITSWG404A Credit: 2 P. 409										
3																		
2																		
1																		

Appendix D Unit of Competencies (UoCs)

Appendix D.1 UoCs in Strategic Management

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

1. Title	Monitor the IT governance process	
2. Code	ITSWSM501A	
3. Range	Execute, monitor and review the IT governance processes of the organisation with respect to the defined IT governance framework and process [Strategic Management – Information Technology Governance]	
4. Level	5	
5. Credit	3	
6. Competency	<p>6.1 Understand the definition and establishment of IT governance</p> <p>6.2 Execute the IT governance processes</p> <p>6.3 Monitor and control the progress of the execution of IT governance processes</p> <p>6.4 Review and report the progress of executing the IT governance processes</p> <p>6.5 Update the IT governance processes</p> <p>6.6 Execute, monitor and review the IT governance processes in a professional manner</p>	<p><u>Performance Requirement</u> Be able to know the definition and establishment of IT governance in compliance with the local and international regulatory requirements</p> <p>Be able to execute the IT governance processes under the governance structures and best practices</p> <p>Be able to monitor and control the progress of the execution of IT governance processes</p> <p>Be able to review and report the progress of executing the IT governance processes</p> <p>Be able to update and improve the IT governance processes so as to respond to changing events, if necessary</p> <p>Be able to execute, monitor and review the IT governance processes in compliance with industry best practices, organisation's policies, procedures and guidelines as well as any (local and international) laws and regulatory requirements, where applicable</p>
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to execute, monitor and review the IT governance processes for continual improvements.	
Remark		

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

1. Title	Formulate IT business models	
2. Code	ITWSM502A	
3. Range	Formulate IT business models to fit the mission of the organisation [Strategic Management – IT Planning and Budgeting]	
4. Level	5	
5. Credit	4	
6. Competency	<p>6.1 Have good knowledge of IT business models</p> <p>6.2 Understand IT organisational needs</p> <p>6.3 Formulate IT business models</p>	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ understand the importance of adopting business models in IT departments ▪ comprehend popular IT business models <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify the information needs of the organisation ▪ identify the information technology needs for running the business in the organisation ▪ identify the needs of information technologies for day-to-day operations and administrative work <p>Be able to</p> <ul style="list-style-type: none"> ▪ adopt a suitable IT business model according to the information and technology needs ▪ adjust the model according to the specific business environment of the organisation ▪ tailor the model according to local requirements wherever necessary, if it is a regional or international organisation
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) understand the information and technology needs of the organisation; and (ii) formulate a suitable IT business model for the organisation.	
Remark		

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

1. Title	Formulate IT plans	
2. Code	ITWSM503A	
3. Range	Formulate IT plans to exemplify the IT business model [Strategic Management – IT Planning and Budgeting]	
4. Level	5	
5. Credit	4	
6. Competency	<p style="text-align: right;"><u>Performance Requirement</u></p> <p>6.1 Have good knowledge of IT business plans</p> <p style="margin-left: 20px;">Be able to</p> <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 Frame the plans according to the objectives of the organisation</p> <p style="margin-left: 20px;">Be able to</p> <ul style="list-style-type: none"> ▪ identify the IT business models of the organisation ▪ identify the prioritized objectives for the whole organisation to achieve ▪ frame the plan to fit the models and objectives above <p>6.3 Formulate IT business plans</p> <p style="margin-left: 20px;">Be able to formulate plans for</p> <ul style="list-style-type: none"> ▪ hardware and software deployment ▪ software development and maintenance ▪ procurement ▪ IT outsourcing ▪ IT services 	
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to formulate detailed IT business plans for the benefits of the organisation.	
Remark		

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

1. Title	Prepare a budget based on the IT plan	
2. Code	ITSWSM504A	
3. Range	Prepare a budget based on the IT plan for budget planning of the organisation [Strategic Management – IT Planning and Budgeting]	
4. Level	5	
5. Credit	6	
6. Competency	<p>6.1 Have good knowledge of IT budget planning</p> <p>6.2 Identify the elements and information for preparing for an IT budget</p> <p>6.3 Formulate an IT budget plan</p>	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ understand the importance of documenting an IT budget plan ▪ understand the structure of an IT budget plan <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify the existing available resources in the organisation ▪ 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>Be able to formulate plans for</p> <ul style="list-style-type: none"> ▪ analyse the resource requirements above according to the IT plans ▪ develop budgetary estimates according to historical figures and lessons learnt in previous years, if available ▪ present a coherent budget plan according to industry standards
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to prepare a coherent budget plan according to IT business models and IT plans of the organisation.	
Remark		

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

1. Title	Manage contingency situations	
2. Code	ITSWSM505A	
3. Range	Manage contingency situations according to the approved business continuity plans (BCPs) and disaster recovery plans (DRPs) of an organisation [Strategic Management – Contingency Management]	
4. Level	5	
5. Credit	7	
6. Competency	<p>6.1 Have knowledge of contingency plans</p> <p>6.2 Evaluate the plan through testing</p> <p>6.3 Conduct training and exercise to involved personnel</p>	<p><u>Performance Requirement</u></p> <p>Be able to understand thoroughly about the contingency plan and its appropriate procedures in various scenarios</p> <p>Be able to ensure the business continuity plan and disaster recovery plan are able to be carried out effectively through planned tests that involve the following activities</p> <ul style="list-style-type: none"> ▪ develop the objectives with a schedule detailing the time frames and participants ▪ select a worst-case incident or an incident most likely to occur for each test ▪ study each IT contingency plan element addressed in the test, such as system recovery on an alternate platform from back media, coordination among recovery teams, internal and external connectivity, system performance using alternate equipment, restoration of normal operations, notification operations ▪ develop the success criteria ▪ document lessons learned ▪ incorporate lessons learned into the plan <p>Be able to arrange the following two different formats of exercises for the appropriate personnel</p> <ul style="list-style-type: none"> ▪ classroom exercises for walking through the procedures without any actual recovery operations occurring ▪ functional exercises that require the event to be faked with simulations and war-gaming <p>Be able to provide training, in complementary to the above exercises, at least annually to newly recruited staff with the following plan elements</p> <ul style="list-style-type: none"> ▪ purpose of the plan ▪ cross-team coordination and communication ▪ reporting procedures ▪ security requirements ▪ team-specific process ▪ individual responsibilities

	<p>6.4 Handle the notification of the contingency events</p> <p>6.5 Make professional damage assessment</p> <p>6.6 Activate the disaster recovery plan and provide professional support</p> <p>6.7 Carry out reconstitution steps after recovery</p>	<p>Be able to ensure that notifications of contingency events to the specific personnel are effective</p> <ul style="list-style-type: none"> ▪ through a variety of methods including telephone, pager, electronic mail or cell phone ▪ in the event that the specific personnel cannot be contacted, other procedures are to be followed <p>Be able to ensure that the Damage Assessment Team carry out the appropriate damage assessment procedures as defined in the contingency plan</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ ensure the recovery plan is activated when the damage assessment indicates that one or more of the activation criteria for the system are met ▪ ensure that the sequence of recovery activities is carried out properly. The procedure should include instructions to deal with certain situations including <ul style="list-style-type: none"> ➢ an action is not completed within the expected time frame ➢ a key step has been completed ➢ items must be procured ➢ other system-specific concerns <p>Be able to ensure the organisation returns to normal operation after the system is restored and tested</p>
7. Assessment Criteria	<p>The integrated outcome requirements of this UoCs are the abilities to:</p> <ul style="list-style-type: none"> (i) test that a contingency plan is effective; (ii) train staff to carry out the pre-set contingency plan properly; (iii) make accurate assessment to activate the contingency plan; and (iv) ensure the system is transitioned back to normal after disaster recovery has been completed. 	
Remark		

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

1. Title	Collect and distribute disseminate information
2. Code	ITWSM506A
3. Range	Collect, collate, assess, distribute and disseminate information within an organisation [Strategic Management – Information Management]
4. Level	5
5. Credit	2
6. Competency	<p style="text-align: right;"><u>Performance Requirement</u></p> <p>6.1 Recognize disparate types and versions of records holding corporate information</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify the media storing raw data or information ▪ identify various types of physical and electronic records holding data for business transactions ▪ differentiate the difference between raw data and information <p>6.2 Collect and collate data for information processing</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ collect and summarize relevant data to form useful information in the form of records suitable for business transactions or the production of written or verbal reports ▪ trace the source of data in a record and identify the corresponding data flow ▪ collate records in pursuance of legal obligations or in the transaction of business <p>6.3 Assess and disseminate information</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ assess the effectiveness of manual methods on organizing, disseminating and managing information ▪ separate data or information flow from the physical flow of media whenever applicable ▪ utilize information and communication technologies (ICT) to streamline information flow for effective and efficient communication <p>6.4 Exercise information control</p> <p>Be able to observe corporate policy on information management, in particular on the aspects of data security and privacy</p>
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to make use of ICT to collect, collate, assess, and disseminate information for effective and efficient communication and distribution of information within an organisation.
Remark	This UoCs assumes the existence of a corporate policy on information management.

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

1. Title	Manage information life cycle	
2. Code	ITSWSM507A	
3. Range	Streamline infrastructure and procedures in handling data and information within an organisation [Strategic Management – Information Management]	
4. Level	5	
5. Credit	3	
6. Competency	<p>6.1 Understand the cyclic activities on data or information upon their processing</p> <p>6.2 Recognize the shortfalls in traditional data management</p> <p>6.3 Justify the needs and set applicable procedures to perform Information Life-cycle Management (ILM)</p>	<p><u>Performance Requirement</u> Be able to</p> <ul style="list-style-type: none"> ▪ understand data processing is a process to capture, store, process, retrieve or disseminate data or integrated information ▪ recognize the activities could be repeated in loop until retirement of that piece of data or information <p>Be able to list the shortfalls in traditional data management such as</p> <ul style="list-style-type: none"> ▪ inconsistent data processing due to multiple copies and versions of data on different systems ▪ difficult to enforce security and privacy control policy ▪ lengthy backup or restore process ▪ voluminous storage system ▪ lack of convenient tools to prioritize data storage in accordance to content and business value of data <p>Be able to</p> <ul style="list-style-type: none"> ▪ state and explain how ILM optimizes the usage of storage hierarchy ▪ link up ILM to corporate policy on access, security, retention and disposal requirements ▪ set up uniform information environment to reduce and eliminate errors <ul style="list-style-type: none"> ➢ redundancies and irrelevant data; ➢ version control problem; ➢ unnecessary data volume; ➢ hardware, software and supporting staff costs ▪ set up systematic procedures to <ul style="list-style-type: none"> ➢ categorize and prioritize data according to its business values such as timeliness and usefulness ➢ reduce data redundancies ➢ ensure immediate accessibility to critical business data ➢ enforce policy on preservation, distribution or deletion of information to improve efficiency and productivity

	6.4 Proactively and professionally manage the information life cycle	Be able to <ul style="list-style-type: none"> ▪ operate ILM so as to achieve the lowest unit cost for information management ▪ ensure reliability and performance level of ILM meeting requirements ▪ control activities in ILM to conform to corporate policy, audit and regulatory requirements in accordance with organisation's guidelines as well as any (local and international) laws and regulatory requirements, if applicable
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to utilize the information lifecycle model to manage business information in a cost effective way and seek improvements in operational efficiency while at the same time meets external audit or regulatory requirements.	
Remark		

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

1. Title	Manage product/services brand through the use of IT	
2. Code	ITWSM508A	
3. Range	Manage product/services brand of the organisation through appropriate use of IT [Strategic Management – Brand Management]	
4. Level	5	
5. Credit	4	
6. Competency	<p>6.1 Understand the basic principles of marketing</p> <p>6.2 Develop and establish a marketing strategy for the product/services brand</p> <p>6.3 Setup and establish a marketing team to develop and execute marketing strategy and tactics</p> <p>6.4 Develop and establish corporate and product identity</p> <p>6.5 Use e-marketing tools to execute, manage and evaluate the marketing tactics</p> <p>6.6 Manage product/services brand through the use of IT in a professional manner</p>	<p><u>Performance Requirement</u></p> <p>Be able to know and use the marketing strategy and tactics like the 4Ps (Product, Price, Promotion and Place) to analyse, research and establish marketing strategy</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ analyse, research, and develop the competitive strategy of the product/services ▪ identify the uniqueness and differentiation of the product/services offered by the organisation <p>Be able to set up and establish a professional marketing team to develop, execute and follow up the marketing strategy, tactics and plans</p> <p>Be able to develop and establish the corporate and product identity and document it properly in a brand and logo guide books</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ know and use the e-marketing tools like interactive CDROM, website, e-CRM, and e-DM to communicate and establish interactive relationship with the market ▪ use the e-marketing tools to analyse and evaluate the effectiveness marketing campaigns in compliance with local and international codes of practices, rules and laws related to information privacy and security <p>Be able the manage product/services brand through appropriate use of IT in accordance with organisation's business goals, objectives, policies and 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 are the abilities to properly manage the brand of the product/services provided by the company, and properly respond to and interact with the needs of the market through appropriate use of IT.	
Remark		

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

1. Title	Formulate vision and mission statements	
2. Code	ITWWSM601A	
3. Range	Formulate vision and mission statements for the entire organisation to support its long-term as well as strategic objectives [Strategic Management – Strategic Formulation]	
4. Level	6	
5. Credit	3	
6. Competency	<p>6.1 Discover core ideology and envisioned future of the organisation</p> <p>6.2 Understand the current trends of global economic development and ICT</p> <p>6.3 Understand issues related to both business and ICT perspectives of the industry</p> <p>6.4 Analyse the potential impacts of economic trends and ICT trends to an organisation</p> <p>6.5 Articulate the core values and purpose of the organisation</p> <p>6.6 Articulate the envisioned future of the organisation</p> <p>6.7 Formulate vision and mission statements for the entire organisation</p>	<p>Performance Requirement</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ understand the founding core values and purpose of the organisation ▪ understand the envisioned future of the founding members of the organisation <p>Be able to</p> <ul style="list-style-type: none"> ▪ summarize the global economic trends related to a business and an organisation ▪ summarize ICT trends related to a business and an organisation <p>Be able to identify and know the issues related to both business and ICT perspectives of the industry</p> <p>Be able to analyse the impacts of economic and ICT trends on the long-term as well as pre-defined strategic objectives of a business and an organisation</p> <p>Be able to articulate and preserve the core values and purpose of the organisation in line with the founding principles of the organisation</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify, envision and describe the future of the industry ▪ have basic insights into the industry as well as its long term and sustainable vision with well-supported data, analysis, research and references <p>Be able to</p> <ul style="list-style-type: none"> ▪ formulate the vision and mission statements for the entire organisation to support its long-term as well as strategic objectives using relevant data, thorough analysis, market search and intelligence ▪ ensure that the formulation process follows proper standard and recognized methodologies in compliance with local and international laws
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to formulate the vision and mission statements for the entire organisation capturing on the development trends of global economy and ICT to support its long-term and strategic objectives with respect to the IT industry and envisioned future.	
Remark	The developed vision and mission statements will be communicated to all employees of the organisation, its customers, and related business partners, if necessary.	

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

1. Title	Formulate business strategies and policies	
2. Code	ITSWSM602A	
3. Range	Formulate the business strategies and policies for an organisation in alignment with its approved vision and mission statements including considerations for Business-IT alignment and enablement [Strategic Management – Strategic Formulation]	
4. Level	6	
5. Credit	4	
6. Competency		<p>Performance Requirement</p> <p>6.1 Understand core ideology and envisioned future of an organisation</p> <p>Be able to</p> <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> <p>Be able to</p> <ul style="list-style-type: none"> ▪ understand the issues related to both business and IT perspectives of the industry ▪ have basic insight of information technology trends and viability of technology products under market forces <p>6.3 Understand the current development trends of a business</p> <p>Be able to summarize the business trends related to the organisation</p> <p>6.4 Understand the ICT applications related to a business</p> <p>Be able to summarize the ICT applications related to the business of the organisation</p> <p>6.5 Analyse the strengths, weaknesses, opportunities and threats (SWOT) of an organisation</p> <p>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> <p>6.6 Formulate strategies and policies for the sustainability of the business</p> <p>Be able to</p> <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 in accordance with organisation's business goals, objectives, policies and guidelines as well as any (local and international) laws and regulatory requirements, where applicable

	6.7 Formulate ideas where IT can help the growth of the business	Be able to formulate ideas where IT can help the growth of business in accordance with organisation's business goals, objectives, policies and guidelines as well as any (local and international) laws and regulatory requirements, where applicable
7. Assessment Criteria	The integrated requirements of this UoCs are the abilities to formulate business strategies and policies for an organisation in alignment with its approved vision and mission statements to support its sustainable development with appropriate use of IT through Business-IT alignment and enablement.	
Remark	Pre-requisite: ITSWSM601A The developed business strategies and policies will be communicated to all employees of the organisation.	

**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 organisation to support its approved business strategies and policies and to cover areas including resource optimization, business alignment, and information security [Strategic Management – Strategic Formulation]	
4. Level	6	
5. Credit	4	
6. Competency	<p>6.1 Understand the business strategies and policies of an organisation</p> <p>6.2 Understand international standards and regulatory requirements</p> <p>6.3 Understand related issues in information security and related laws of intellectual property</p> <p>6.4 Formulate IT strategies and policies of an organisation</p>	<p><u>Performance Requirement</u> Be able to know the business strategies and policies of an organisation with respect to business-IT alignment and enablement</p> <p>Be able to understand international standards and regulatory requirements</p> <p>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</p> <p>Be able to formulate IT strategies and policies for an organisation 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</p>
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to formulate IT strategies and policies for an organisation 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	

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

1. Title	Formulate relevant tactical plans based on the approved IT strategies and policies	
2. Code	ITSWSM604A	
3. Range	Formulate relevant tactical plans for an organisation based on the approved IT strategies and policies for managing their implementation [Strategic Management – Strategic Execution and Review]	
4. Level	6	
5. Credit	5	
6. Competency	<p>6.1 Have knowledge about the functions of the tactical plans</p> <p>6.2 Have knowledge about the mission statement and the goals on IT strategies of the corporation</p> <p>6.3 Define relevant tactical plans according to the approved IT strategies in a professional manner</p> <p>6.4 Identify the criteria for each individual tactical plan in a professional manner</p>	<p><u>Performance Requirement</u> Be able to state the objectives of formulating tactical plans for supporting the pre-defined strategic plan.</p> <p>Be able to list the corporation's mission statement and their related goals accurately.</p> <p>Be able to formulate respective tactical plans according to each particular goal with distinct objectives</p> <p>Be able to convert each individual plan into project items and give clear project information such as</p> <ul style="list-style-type: none"> ▪ Objectives ▪ Background ▪ References to IT strategic plan goal ▪ Deliverables ▪ Dependencies and impacts ▪ Stakeholders to be involved with roles and responsibilities ▪ Means of Assessment Criteria for Success ▪ Timeline ▪ Resources ▪ Use of Results
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) formulate appropriate tactical plans for an organisation according to its vision and mission statements as well as goals; (ii) develop concise tactical projects in achieving the goals; and (iii) provide a detailed connection between tactical projects for project management.	
Remark	Pre-requisite: ITSWSM603A	

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

1. Title	Execute, monitor and review the approved IT strategies and plans
2. Code	ITSWSM605A
3. Range	Execute, monitor and review the approved IT strategies and plans of the organisation [Strategic Management – Strategic Execution and Review]
4. Level	6
5. Credit	5
6. Competency	<p style="text-align: right;"><u>Performance Requirement</u></p> <p>6.1 Have knowledge in the execution of the tactical plans Be able to understand the purpose of each individual tactical plan in achieving the strategic plan</p> <p>6.2 Coordinate the execution of approved IT strategies and plans Be able to</p> <ul style="list-style-type: none"> ▪ develop a resource management plan for the related materials, human resources, equipment as required in each tactical action plan ▪ arrange the required resources for the execution of tactical plan in fulfilling the goals and objectives as stated in the strategic plan <p>6.3 Execute the approved tactical plans in a professional manner Be able to ensure all the tactical action plans are carried out within the specified timeline</p> <p>6.4 Monitor and review the progress of each tactical plan Be able to</p> <ul style="list-style-type: none"> ▪ carry out regular checks according to the milestones, regarding any assumptions made in the creation of the action plan including skills, time, finance and materials ▪ establish oversight mechanisms that assist in balancing strategic objectives with the tactical action plan and ensuring on-time implementation <p>6.5 Report the progress on the action plans Be able to</p> <ul style="list-style-type: none"> ▪ identify potential obstacles as well as change management, cultural and organisational issues ▪ report to the senior management regarding the updating of the plans so as to respond to changing events, if necessary
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) facilitate the resources and execute the tactical action plans in achieving the organisation's mission; (ii) develop systematic monitoring and review of the action plans; and (iii) recommend adjustments of action plans.
Remark	Pre-requisites: ITSWSM603A and ITSWSM604A

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

1. Title	Evaluate the effectiveness of the execution of the approved IT plans
2. Code	ITSWSM606A
3. Range	Evaluate the effectiveness of the execution of the approved IT strategies and plans of the organisation [Strategic Management – Strategic Execution and Review]
4. Level	6
5. Credit	5
6. Competency	<p style="text-align: right;"><u>Performance Requirement</u></p> <p>6.1 Have knowledge in various methods to measure the effectiveness of the execution</p> <p>6.2 Evaluate the effectiveness of the executions of the strategies and plans in a professional manner</p> <p>6.3 Provide professional suggestions to improve the effectiveness of the execution of the strategies and plans</p> <p>Be able to list out all the measure mechanisms in evaluating the effectiveness of the execution</p> <p>Be able to compare the results from the action plan with already established performance criteria attached to them. The accomplishments need to be consistent with the organisation’s mission and vision statement, values and goals and objectives. Measurements of performance include, but are not limited to</p> <ul style="list-style-type: none"> ▪ Net profit ▪ Earning per share ▪ Market share ▪ Sales ▪ Dividend rate ▪ Return on capital ▪ Productivity ▪ Costs ▪ Staff turnover <p>Be able to recommend goal target improvements related to the organisation’s proposed evolution for meeting the organisation’s mission</p>
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) judge the effectiveness of the execution; and (ii) suggest ways of improving the execution of the action plans to achieve the organisation’s mission and goals.
Remark	Pre-requisite: ITSWSM605A

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

1. Title	Establish the IT governance framework and process	
2. Code	ITSWSM607A	
3. Range	Establish and define the IT governance framework and process to support the establishment of Corporate Governance from the IT perspective [Strategic Management – Information Technology Governance]	
4. Level	6	
5. Credit	4	
6. Competency		<p style="text-align: center;"><u>Performance Requirement</u></p> <p>6.1 Keep abreast of local and international IT governance framework Be able to understand the local and international IT governance framework, local and international standards as well as regulatory requirements related to IT</p> <p>6.2 Define IT governance framework Be able to help collect, research and compile the definition of IT governance framework</p> <p>6.3 Establish IT governance structure, practices and process Be able to jumpstart and establish IT governance structure, practices and process to support the establishment of the Corporate Governance from the IT perspective</p> <p>6.4 Secure management buy-in and enough resources Be able to secure management buy-in and enough resource to support the establishment of the IT governance framework and process to support the establishment of the Corporate Governance from IT perspective</p> <p>6.5 Establish and define the IT governance framework and process to support the establishment of the Corporate Governance from the IT perspective in a professional manner Be able to establish and define the IT governance framework and process to support the establishment of the Corporate Governance from the IT perspective and in compliance with</p> <ul style="list-style-type: none"> ▪ industry best practices ▪ organisation's policies and procedures ▪ local and international IT as well as corporate governance framework
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to establish and define the IT governance framework and process to support the establishment of the Corporate Governance from the IT perspective.	
Remark		

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

1. Title	Evaluate and review the execution of the approved IT plans
2. Code	ITWSM608A
3. Range	Evaluate and review the effectiveness of the execution of the approved IT strategies and plans for the IT governance of an organisation [Strategic Management – Information Technology Governance]
4. Level	6
5. Credit	4
6. Competency	<p style="text-align: right;"><u>Performance Requirement</u></p> <p>6.1 Understand various compliance and performance management techniques Be able to know various compliance and performance metric techniques to measure the effectiveness of the execution of the approved IT strategies and plans quantitatively</p> <p>6.2 Evaluate the effectiveness of the execution of the approved IT strategies and plans Be able to use the compliance and performance metric techniques to measure and evaluate the effectiveness of the execution of the approved IT strategies and plans quantitatively</p> <p>6.3 Suggest ways to increase the effectiveness of the execution of the IT governance processes Be able to</p> <ul style="list-style-type: none"> ▪ identify areas of ineffectiveness in the execution of the IT governance processes ▪ suggest ways to improve the effectiveness of the execution of the IT governance processes <p>6.4 Follow up the improvements made Be able to follow up the suggestions made to improve the IT governance processes</p> <p>6.5 Evaluate the effectiveness of the execution of the approved IT strategies and plans Be able to evaluate the effectiveness of the execution of the approved IT strategies and plans for the IT governance framework in compliance with industry best practices, organisation's policies, procedures and 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 are the abilities to: (i) effectively execute the approved IT strategies and plans for the IT governance framework; and (ii) ensure that the IT governance processes are continually evaluated and improved.
Remark	

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

1. Title	Develop business continuity plans and disaster recovery plans related to IT	
2. Code	ITSWSM609A	
3. Range	Develop business continuity plans (BCPs) and disaster recovery plans (DRPs) for the organisation related to its IT [Strategic Management – Contingency Management]	
4. Level	6	
5. Credit	7	
6. Competency		<p style="text-align: center;"><u>Performance Requirement</u></p> <p>6.1 Have knowledge of different types of contingency plans related to IT</p> <p>6.2 Integrate the contingency planning at all phases of the computer system life cycle</p> <p>6.3 Prepare contingency planning policy</p> <p>6.4 Understand the business impact and preventive controls</p>
		<p>Be able to</p> <ul style="list-style-type: none"> ▪ list the purpose and scope of different types of contingency-related plans <ul style="list-style-type: none"> ➢ Business Continuity Plan (BCP) ➢ Business Recovery (or Resumption) Plan (BRP) ➢ Continuity of Operations Plan (COOP) ➢ Continuity of Support Plan/IT Contingency Plan ➢ Crisis Communications Plan ➢ Cyber Incident Response Plan ➢ Occupant Emergency Plan (OEP) ▪ describe the interrelationships among these various types of contingency-related plans and how the various plans relate to each other <p>Be able to associated the contingency planning to the activities in the system life cycle including the initiation phase, development/acquisition phase, implementation phase, operation/maintenance phase and disposal phase for reducing the overall contingency planning costs, enhances contingency capabilities and reduces impacts to system operations</p> <p>Be able to develop contingency planning policy including</p> <ul style="list-style-type: none"> ▪ identify statutory or regulatory requirements for contingency plans ▪ develop IT contingency planning policy statement ▪ obtain approval of policy ▪ publish policy <p>Be able to conduct business impact analysis including the following steps</p> <ul style="list-style-type: none"> ▪ identify critical IT resources ▪ identify outage impacts and allowable outage times ▪ develop recovery priorities <p>identify preventive controls and integrate them into the system architecture including uninterruptible power supplies, air-conditioning systems, fire suppression system, water sensors, heat resistant and waterproof containers for backup media and vital non-electronic records, frequent and scheduled backups</p>

	<p>6.5 Develop contingency plan in a professional manner</p> <p>6.6 Make estimate on the cost involved for a recovery process</p>	<p>Be able to prepare contingency plan for recovery strategies including</p> <ul style="list-style-type: none"> ▪ recovery methods including backup methods for data, alternate site arrangement including cold sites, warm sites, hot sites, mobile site, mirrored sites ▪ a Contingency Planning Coordinator ▪ the roles and responsibilities of each official during the recovery process ▪ the recovery strategy <p>Be able to</p> <ul style="list-style-type: none"> ▪ calculate the cost implication of each alternative with professional judgement ▪ summarise the estimates and check that they are within the planned budget ▪ notify management on the variance calculated and the cost implication of each alternative
7.Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) develop a detailed and effective contingency plan for a disaster recovery; (ii) implement the preventive measures; and (iii) list the steps for disaster recovery.	
Remark		

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

1. Title	Transform information into business knowledge and value	
2. Code	ITSWSM610A	
3. Range	Explore the hidden value from the voluminous information and transform the information into business knowledge and value [Strategic Management – Information Management]	
4. Level	6	
5. Credit	2	
6. Competency	<p>6.1 Understand how information was created</p> <p>6.2 Transform information into business knowledge and value</p> <p>6.3 Ensure integrity of information</p> <p>6.4 Transform information into business knowledge and value in a professional manner</p>	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify the source of information, its relevance to specific operational process and the paths of information flow within organisation ▪ conversant with the steps in business process <p>Be able to</p> <ul style="list-style-type: none"> ▪ retrieve information in physical or electronic form from the storage media ▪ classify, organize and use information in context to produce actionable knowledge ▪ integrate knowledge from disparate sources into a useful format suitable as the building block of knowledge base ▪ quantify value of knowledge from narrative information if necessary ▪ identify business critical issues needed to be tackled and criteria for the solutions ▪ search the knowledge base and prioritize the results for recommendations to fulfil criteria as illustrated in the critical issues <p>Be able to verify the integrity of information and confirm that it meets business rules</p> <p>Be able to transform information into business knowledge and value in accordance with the organisation'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 are the abilities to transform information into business knowledge and value for reliable and informed business decision.	
Remark		

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

1. Title	Set policy to control data security and privacy	
2. Code	ITSWSM611A	
3. Range	Establish corporate policy to control data security and privacy of an organisation [Strategic Management – Information Management]	
4. Level	6	
5. Credit	4	
6. Competency		<p style="text-align: center;"><u>Performance Requirement</u></p> <p>6.1 Understand legal requirements on data security and privacy</p> <p>6.2 Observe standards, guidelines and procedures published by professional bodies</p> <p>6.3 Set corporate policy to control data security and privacy</p> <p>6.4 Keep the policy up to date</p> <p>6.5 Set policy to control data security and privacy in a professional manner</p>
		<p>Be able to</p> <ul style="list-style-type: none"> ▪ locate and make reference to sources of legislation applicable to local business entities (See remark) ▪ seek professional advices on issues relating to security and privacy <p>Be able to comprehend the standards, guidelines and procedures published by professional bodies in the trade and extract the sections relevant to organisational operation as reference</p> <p>Be able to formulate control policies to</p> <ul style="list-style-type: none"> ▪ cover stages from data capture and processing, information flow and distribution, storage and access to retirement ▪ ensure that information is relevant, accurate and timely and its management is an integral part of strategic management ▪ maintain confidentiality, integrity, and reliability throughout the stages to comply with administrative, audit and legal requirements <p>Be able to</p> <ul style="list-style-type: none"> ▪ perform regular review on the policy 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>Be able to establish the required policies in accordance with organisation'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 are the abilities to produce a policy document addressing the control of data security and privacy.	
Remark	Some reference sources of legislation applicable to local business entities are: a) Bilingual Laws Information System http://www.legislation.gov.hk/eng/index.htm b) Personal Data (Privacy) Ordinance http://www.pcpd.org.hk/english/ordinance/ordfull.html	

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

1. Title	Identify and evaluate information technologies that support the objectives of an organisation
2. Code	ITSWSM612A
3. Range	Identify and evaluate the applicability and appropriateness of information technologies that support the organisation's objectives within an organisation or for an external client [Strategic Management – IT Consulting]
4. Level	6
5. Credit	2
6. Competency	<p style="text-align: right;"><u>Performance Requirement</u></p> <p>6.1 Understand the organisation's objectives</p> <p style="margin-left: 40px;">Be able to</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 information technologies <p>6.2 Have broad knowledge of the information technologies applicable to the organisation's industry</p> <p style="margin-left: 40px;">Be able to understand the applicability, advantages and disadvantages, constraints and limitations of various information technologies available for the specific industry of the organisation</p> <p>6.3 Identify and evaluate information technologies that support the organisation's objectives with a high degree of expertise and professionalism</p> <p style="margin-left: 40px;">Be able to</p> <ul style="list-style-type: none"> ▪ identify and evaluate the appropriate information technologies for the organisation using standard guidelines and methodologies ▪ make appropriate references to industry sources, such as magazines and journals, vendors and their customers, experts and consultants in the industry, etc
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to ensure that the information technologies identified and evaluated are the most appropriate to support the organisation's objectives.
Remark	

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

1. Title	Select appropriate information technologies for business purposes		
2. Code	ITWSM613A		
3. Range	Select appropriate information technologies for the business of an organisation and/or an external client [Strategic Management – IT Consulting]		
4. Level	6		
5. Credit	1		
6. Competency	<table border="0" style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> <p>6.1 Understand the business purposes for the particular projects</p> <p>6.2 Select appropriate information technologies for the business purposes with a high degree of expertise and professionalism</p> </td> <td style="width: 50%; vertical-align: top;"> <p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify the business purposes for the particular projects involving information technologies ▪ seek clarification on the business purposes from relevant people if necessary ▪ understand the implications of the business purposes on the criteria for selecting information technologies <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify the selection criteria for information technologies suitable for the specific business purposes, in accordance to standard guidelines where applicable ▪ recommend appropriate information technologies to stakeholders in a manner that is clear and easy to understand ▪ obtain approval and support for the recommendations from stakeholders </td> </tr> </table>	<p>6.1 Understand the business purposes for the particular projects</p> <p>6.2 Select appropriate information technologies for the business purposes with a high degree of expertise and professionalism</p>	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify the business purposes for the particular projects involving information technologies ▪ seek clarification on the business purposes from relevant people if necessary ▪ understand the implications of the business purposes on the criteria for selecting information technologies <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify the selection criteria for information technologies suitable for the specific business purposes, in accordance to standard guidelines where applicable ▪ recommend appropriate information technologies to stakeholders in a manner that is clear and easy to understand ▪ obtain approval and support for the recommendations from stakeholders
<p>6.1 Understand the business purposes for the particular projects</p> <p>6.2 Select appropriate information technologies for the business purposes with a high degree of expertise and professionalism</p>	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify the business purposes for the particular projects involving information technologies ▪ seek clarification on the business purposes from relevant people if necessary ▪ understand the implications of the business purposes on the criteria for selecting information technologies <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify the selection criteria for information technologies suitable for the specific business purposes, in accordance to standard guidelines where applicable ▪ recommend appropriate information technologies to stakeholders in a manner that is clear and easy to understand ▪ obtain approval and support for the recommendations from stakeholders 		
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to select the most appropriate information technologies for the specific business purposes of an organisation or a client, and make sure that the chosen technologies are endorsed by the stakeholders.		
Remark			

Appendix D.2 UoCs in Project Management

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

1. Title	Prepare the project schedule
2. Code	ITSWPM401A
3. Range	Prepare the project schedule in order to ensure timely completion of a project. [Project Management – Project Time Management]
4. Level	4
5. Credit	1
6. Competency	<p><u>Performance Requirement</u></p> <p>6.1 Know the project requirements Be able to</p> <ul style="list-style-type: none"> ▪ understand the activities in a project, the input and expected output requirements ▪ identify key project milestones <p>6.2 Estimate a reasonable timeframe from preliminary identified activities Be able to</p> <ul style="list-style-type: none"> ▪ identify customer expectations with the timing of deliverables ▪ identify internal and external schedule constraints and influences ▪ identify key project milestones <p>6.3 Assemble a preliminary project management plan highlighting the time aspect of the project elements Be able to define context, set up project control points, and plan an initiation stage in explaining the time-critical elements</p> <p>6.4 Exercise due care in the preparation of the project schedule Be able to fully collect project requirements and relate them to project activities without ambiguity</p>
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to establish and document a preliminary project management plan with respect to the time aspect of the project elements, addressing items such as project milestone plans and time critical project commitments and checkpoints.
Remark	Documentation is assumed to be a generic skill.

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

1. Title	Execute and manage the project schedule	
2. Code	ITSWPM402A	
3. Range	Execute the baseline project schedule and manage issues related to project scheduling in order to ensure timely completion of a project. [Project Management – Project Time Management]	
4. Level	4	
5. Credit	1	
6. Competency	<p style="text-align: center;"><u>Performance Requirement</u></p> <p>6.1 Understand the developed project schedule</p> <p style="margin-left: 40px;">Be able to</p> <ul style="list-style-type: none"> ▪ comprehend the details as documented in the developed project schedule ▪ list the possible allowance for delay of each activity <hr/> <p>6.2 Implement the project schedule</p> <p style="margin-left: 40px;">Be able to</p> <ul style="list-style-type: none"> ▪ implement the mechanisms to measure, record and report the progress of the activities in relation to the agreed schedule and plans ▪ conduct ongoing analysis of options, identify variances and forecast the impact of changes on the schedule ▪ review progress throughout the project life cycle and implement agreed schedule changes to ensure consistency with changing scope, objectives, and constraints related to time and resources availability ▪ develop and implement agreed responses to perceived, potential, or actual schedule changes to maintain project objectives <hr/> <p>6.3 Catch up with delayed activities</p> <p style="margin-left: 40px;">Be able to adjust resource allocation to compensate for any delay in an activity so that the overall schedule could be fulfilled</p>	
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to effectively execute the baseline project schedule with adaptive solutions to meet field changes.	
Remark	Pre-requisites: ITSWPM401A, ITSWPM609A	

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

1. Title	Establish project communications documentation requirements
2. Code	ITSWPM403A
3. Range	Prepare and establish project communications documentation requirements of the project so as to set project communications documentation standards to ensure timely and appropriate communication of project information [Project Management - Project Communications Management]
4. Level	4
5. Credit	2
6. Competency	<p style="text-align: right;"><u>Performance Requirement</u></p> <p>6.1 Understand project requirements</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify project stakeholders, i.e. sponsors, business users/customers, team members, suppliers, etc. ▪ comprehend the workflow as stated in the project communications plan <p>6.2 Investigate and establish the project documentation requirements</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ search from historical records for potential reusable template ▪ skeletonise forms, reports and documentation holding historical records as reference template for current given project ▪ adopt, modify and reformat reference template according to corresponding needs in project management activities ▪ devise appropriate reference format if necessary ▪ bring forward standard templates and documentation guidelines for project communication and document deliverables <p>6.3 Check the consistence and completeness of the documentation</p> <p>Be able to</p> <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 project requirements ▪ issue the developed templates and guidelines to stakeholders for review and feedback ▪ incorporate feedback from stakeholders and management to finalise the project documentation standards
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) establish project report and documentation format; and (ii) ensure consistency and completeness in the communication documentation.
Remark	

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

1. Title	Perform information distribution	
2. Code	ITSWPM404A	
3. Range	Collect and distribute project information and reports to support project activities and to ensure timely and appropriate communication of project information [Project Management – Project Communication Management]	
4. Level	4	
5. Credit	2	
6. Competency	<p>6.1 Know the source of information</p> <p>6.2 Establish and manage an information distribution system</p> <p>6.3 Collect and distribute reliable information</p>	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify the stakeholders in a project (e.g. sponsors, business users/customers, vendors, and suppliers) ▪ locate the authorised information sources ▪ comprehend the established project communication plan with special note on the timeliness of the communication ▪ master the tools and techniques for information distribution <p>Be able to</p> <ul style="list-style-type: none"> ▪ set up and implement a project information distribution system to aid subsequent project communication ▪ implement a project information retrieval system in association with the information distribution system ▪ respond to expected and unexpected information requests ▪ maintain project records <p>Be able to</p> <ul style="list-style-type: none"> ▪ collect information and reports from authorised information sources ▪ distribute timely information and reports to concerned parties
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to enforce the agreed communication plan for the exchange and distribution of information and reports, while conducting regular and ad-hoc meetings, during the project execution.	
Remark		

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

1. Title	Implement project time reporting	
2. Code	ITSWPM405A	
3. Range	Perform project time reporting to ensure timely and appropriate communication of project information [Project Management - Project Communication Management]	
4. Level	4	
5. Credit	1	
6. Competency	<p>6.1 Know the tools and techniques in time reporting</p> <p>6.2 Implement project time reporting</p> <p>6.3 Serve time reporting to clients</p>	<p><u>Performance Requirement</u> Be able to</p> <ul style="list-style-type: none"> ▪ understand the operating principles of project management information tools ▪ demonstrate proper techniques in the operation of the tools ▪ identify stakeholders (e.g. sponsors, business users/customers, and suppliers) relating to time reporting <p>Be able to</p> <ul style="list-style-type: none"> ▪ execute requirements and processes for time reporting and keep all project stakeholders informed ▪ include time-reporting data in regular progress reports for budget and cost control, schedule baseline and progress, resources management, performance tracking, document filing. <p>Be able to deliver project time reporting punctually to clients</p>
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to use different project management information tools effectively to help communicate concisely and precisely with clients.	
Remark		

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

1. Title	Communicate with stakeholders at project checkpoints		
2. Code	ITSWPM406A		
3. Range	Communicate with project stakeholders at project checkpoints so as to strengthen the communication between the project team and support stakeholders, and enhance the management of the project progress [Project Management – Project Communication Management]		
4. Level	4		
5. Credit	2		
6. Competency	<table border="0" style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> <p>6.1 Locate stakeholders and relevant information</p> <p>6.2 Establish and conduct formal communication at checkpoints</p> <p>6.3 Regulate information flow</p> </td> <td style="width: 50%; vertical-align: top;"> <p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ locate stakeholders at project checkpoints ▪ comprehend the established project communication plan with special note on checkpoint activities <p>Be able to</p> <ul style="list-style-type: none"> ▪ initiate the defined communication process at project checkpoints ▪ consolidate relevant information for reviews and meetings ▪ conduct formal meetings and reviews at the end of each project stage and project-end ▪ formulate notification procedure and follow-up action plan ▪ develop formal communication document as defined for the project <p>Be able to</p> <ul style="list-style-type: none"> ▪ check the integrity of the set of formal documents for reviews and meetings before deadline ▪ ensure the completeness and timely distribution of information to stakeholders before reviews or meetings ▪ maintain proper log on information collection and distribution </td> </tr> </table>	<p>6.1 Locate stakeholders and relevant information</p> <p>6.2 Establish and conduct formal communication at checkpoints</p> <p>6.3 Regulate information flow</p>	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ locate stakeholders at project checkpoints ▪ comprehend the established project communication plan with special note on checkpoint activities <p>Be able to</p> <ul style="list-style-type: none"> ▪ initiate the defined communication process at project checkpoints ▪ consolidate relevant information for reviews and meetings ▪ conduct formal meetings and reviews at the end of each project stage and project-end ▪ formulate notification procedure and follow-up action plan ▪ develop formal communication document as defined for the project <p>Be able to</p> <ul style="list-style-type: none"> ▪ check the integrity of the set of formal documents for reviews and meetings before deadline ▪ ensure the completeness and timely distribution of information to stakeholders before reviews or meetings ▪ maintain proper log on information collection and distribution
<p>6.1 Locate stakeholders and relevant information</p> <p>6.2 Establish and conduct formal communication at checkpoints</p> <p>6.3 Regulate information flow</p>	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ locate stakeholders at project checkpoints ▪ comprehend the established project communication plan with special note on checkpoint activities <p>Be able to</p> <ul style="list-style-type: none"> ▪ initiate the defined communication process at project checkpoints ▪ consolidate relevant information for reviews and meetings ▪ conduct formal meetings and reviews at the end of each project stage and project-end ▪ formulate notification procedure and follow-up action plan ▪ develop formal communication document as defined for the project <p>Be able to</p> <ul style="list-style-type: none"> ▪ check the integrity of the set of formal documents for reviews and meetings before deadline ▪ ensure the completeness and timely distribution of information to stakeholders before reviews or meetings ▪ maintain proper log on information collection and distribution 		
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) establish checkpoints for communication; and (ii) provide timely reports to stakeholders at predefined checkpoints.		
Remark			

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

1. Title	Define project scope	
2. Code	ITSWPM501A	
3. Range	Define project scope as the baseline for project execution while conducting scope definition for project scope planning of an IT project [Project Management – Project Scope Management]	
4. Level	5	
5. Credit	4	
6. Competency		<u>Performance Requirement</u>
	6.1 Have knowledge in various inputs for scope planning and definition	Be able to collect all related inputs of the IT project for planning and defining the project scope
	6.2 Have knowledge in the tools and techniques for scope planning and definition	Be able to utilize tools and techniques for scope planning and definition
	6.3 Have knowledge in various outputs of scope planning and definition	Be able to prepare suitable documents for the outputs of scope planning and definition
	6.4 Have knowledge in scope statement and a scope management plan	Be able to <ul style="list-style-type: none"> ▪ understand a scope statement as documentation of the agreement between the project team and customers or other stakeholders by focusing on key project deliverables and objectives ▪ understand the differences between a scope management plan and a scope statement
	6.5 Have knowledge in different types of Work Breakdown Structure (WBS)	Be able to select and develop an appropriate WBS for an IT project based on the characteristics and nature of the project
	6.6 Develop a scope management plan	Be able to <ul style="list-style-type: none"> ▪ identify and evaluate the components of a scope management plan ▪ identify and evaluate the inputs to the scope management plan ▪ develop a scope management plan
	6.7 Develop a work breakdown structure	Be able to <ul style="list-style-type: none"> ▪ determine the appropriate level of decomposition details for various WBS ▪ develop a WBS, including the proper use of decomposition techniques ▪ communicate the difference between a WBS and other types of breakdown structures ▪ determine the utility of a WBS from similar past projects and standardized templates ▪ verify the correctness of the WBS, including its Dictionary meaning

	<p>6.8 Manage the scope definition process</p> <p>6.9 Define project scope in a professional manner, and deliver problem management services in accordance with organisation's guidelines as well as any (local and international) laws and regulatory requirements, if applicable</p>	<p>Be able to</p> <ul style="list-style-type: none"> ▪ determine the inputs of the project scope definition process ▪ identify specific scope inclusions and exclusions ▪ identify and evaluate criteria for classifying and integrating project scope changes <p>Be able to define project scope as the baseline for project execution of an IT project according to the organisation's policies and guidelines, industry standards, any (local and international) laws and regulatory requirements, if applicable</p>
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) conduct scope planning with appropriate documentations; and (ii) manage scope definition with work breakdown structure.	
Remark		

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

1. Title	Execute and manage the project scope	
2. Code	ITSWPM502A	
3. Range	Execute the baseline project scope and manage the delivery of items in the scope and requirements of the project [Project Management – Project Scope Management]	
4. Level	5	
5. Credit	2	
6. Competency	<p>6.1 Have knowledge in scope planning tools concept</p> <p>6.2 Execute project scope</p> <p>6.3 Analyse dependencies and review processes</p> <p>6.4 Manage each phase of execution</p> <p>6.5 Manage the delivery of items in a professional manner</p>	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ understand the structure of a Work Breakdown Structure (WBS) ▪ understand how to set a baseline for measurement <p>Be able to</p> <ul style="list-style-type: none"> ▪ utilize the WBS to manage project deliverables ▪ conduct work scope according to the scope management plan <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify activities and dependencies as planned ▪ define and analyse products ▪ establish review/approval process for project deliverables <p>Be able to</p> <ul style="list-style-type: none"> ▪ deliver work packages ▪ obtain work package acceptance ▪ handle respective project issues appropriately with respect to the deliverable requirements <p>Be able to</p> <ul style="list-style-type: none"> ▪ ensure delivery of items on schedule ▪ manage the delivery of items according to the organisation's policies and guidelines
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) establish project baseline for scope; and (ii) manage scope implementation with respect to deliverable requirements.	
Remark		

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

1. Title	Articulate the time and effort requirements needed for product-based planning	
2. Code	ITSWPM503A	
3. Range	Communicate time and activity relationship in order to ensure timely completion of a project [Project Management – Project Time Management]	
4. Level	5	
5. Credit	1	
6. Competency		<u>Performance Requirement</u>
	6.1 Understand proper presentation format	Be able to <ul style="list-style-type: none"> ▪ comprehend the required format and characteristics of inputs and outputs to activities ▪ identify the appropriate tool for different activities
	6.2 Formulate product-based planning	Be able to <ul style="list-style-type: none"> ▪ produce a product breakdown structure ▪ identify products and key criteria ▪ write product descriptions ▪ produce a product flow diagram
	6.3 Properly specify schedule	Be able to clearly state the time and effort relationship in a format that meets general practice
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to demonstrate project time management via the use of different tools in conjunction with activity based planning for the project.	
Remark		

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

1. Title	Monitor, control and update project schedule								
2. Code	ITSWPM504A								
3. Range	Monitor and control project schedule, and update the project schedule accordingly, in order to ensure timely completion of a project [Project Management – Project Time 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 Understand the critical path in schedule</td> <td>Be able to know the possible critical path in a schedule and the corresponding control factors</td> </tr> <tr> <td>6.2 Conduct schedule control</td> <td> Be able to <ul style="list-style-type: none"> ▪ define the procedure by which the project schedule may be changed ▪ implement a schedule change control system ▪ integrate schedule activities with the overall change control system ▪ determine the need for a schedule change ▪ determine the magnitude of the schedule change and the need for re-establishing the baseline ▪ determine overall plan adjustments resulting from schedule updates ▪ determine the need for schedule fast tracking or crashing ▪ initiate corrective actions to ensure that additional schedule changes are minimized ▪ integrate approved schedule changes with other project control processes </td> </tr> <tr> <td>6.3 Control progress in respect to the plan</td> <td>Be able to define/monitor/review/measure tolerance, product descriptions, work package authorization, quality control, project issues, project change control, risk log, checkpoints, and so on</td> </tr> </table>		<u>Performance Requirement</u>	6.1 Understand the critical path in schedule	Be able to know the possible critical path in a schedule and the corresponding control factors	6.2 Conduct schedule control	Be able to <ul style="list-style-type: none"> ▪ define the procedure by which the project schedule may be changed ▪ implement a schedule change control system ▪ integrate schedule activities with the overall change control system ▪ determine the need for a schedule change ▪ determine the magnitude of the schedule change and the need for re-establishing the baseline ▪ determine overall plan adjustments resulting from schedule updates ▪ determine the need for schedule fast tracking or crashing ▪ initiate corrective actions to ensure that additional schedule changes are minimized ▪ integrate approved schedule changes with other project control processes 	6.3 Control progress in respect to the plan	Be able to define/monitor/review/measure tolerance, product descriptions, work package authorization, quality control, project issues, project change control, risk log, checkpoints, and so on
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6.3 Control progress in respect to the plan	Be able to define/monitor/review/measure tolerance, product descriptions, work package authorization, quality control, project issues, project change control, risk log, checkpoints, and so on								
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) monitor project progress; and (ii) exercise adaptive controls to minimize time variance.								
Remark	Co-requisites: ITSWPM605A, ITSWPM607A, ITSWPM508A, ITSWPM510A, ITSWPM520A								

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

1. Title	Conduct project closure with respect to time	
2. Code	ITSWPM505A	
3. Range	Conduct project closure in the context of Project Time Management [Project Management – Project Time Management]	
4. Level	5	
5. Code	1	
6. Competency		<u>Performance Requirement</u>
	6.1 Understand the boundary of project phases	<p>Be able to</p> <ul style="list-style-type: none"> ▪ recognise the terminal activity of a project phase ▪ know the outputs from the last activity
	6.2 Conduct project closure with regard to time	<p>Be able to</p> <ul style="list-style-type: none"> ▪ document lessons learned, including causes of activities leading to schedule changes, types of schedule changes, reasons for selecting specific corrective actions ▪ classify schedule change causes for further analysis ▪ perform review based on context, process description, responsibilities, information needs and key criteria with respect to the time related project elements and commitment
	6.3 Review activities performed in the project phases	<p>Be able to critically review project elements and commitment based on context, process description, responsibilities, information needs and key criteria with respect to the time</p>
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) consolidate causes and solution to time variance project closure; and (ii) review actual time schedule against planned schedule to aid better time management in subsequent projects.	
Remark	Co-Requisites: ITSWPM606A, ITSWPM608A, ITSWPM612A, ITSWPM615A, ITSWPM518A, ITSWPM620A	

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

1. Title	Articulate the project costing requirements						
2. Code	ITSWPM506A						
3. Range	Articulate, if necessary, the project costing requirements needed for the product based planning so that a project can be completed within an approved budget. [Project Management – Project Cost Management						
4. Level	5						
5. Credit	2						
6. Competency	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;"></td> <td style="text-align: center;"><u>Performance Requirement</u></td> </tr> <tr> <td>6.1 Have knowledge in product breakdown structure (PBS)</td> <td>Be able to list all key criteria elements of the PBS for the project being developed</td> </tr> <tr> <td>6.2 Identify costs for the product items</td> <td>Be able to assign a good estimated cost to each key element in the PBS</td> </tr> </table>		<u>Performance Requirement</u>	6.1 Have knowledge in product breakdown structure (PBS)	Be able to list all key criteria elements of the PBS for the project being developed	6.2 Identify costs for the product items	Be able to assign a good estimated cost to each key element in the PBS
	<u>Performance Requirement</u>						
6.1 Have knowledge in product breakdown structure (PBS)	Be able to list all key criteria elements of the PBS for the project being developed						
6.2 Identify costs for the product items	Be able to assign a good estimated cost to each key element in the PBS						
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) build up a complete Product Breakdown Structure (PBS) for the project; and (ii) make good estimation of each component in the PBS to minimize future discrepancies.						
Remark							

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

1. Title	Execute and manage the project cost
2. Code	ITSWPM507A
3. Range	Execute the baseline project cost and manage issues related to project costing so that a project can be completed within an approved budget [Project Management – Project Cost Management]
4. Level	5
5. Credit	2
6. Competency	<p style="text-align: right;"><u>Performance Requirement</u></p> <p>6.1 Have knowledge in various cost analysis methods</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ select a cost analysis method that is appropriate to the IT project being developed ▪ choose relevant tools to record cost spending and identify cost variation <p>6.2 Execute cost baseline</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ implement the cost analysis tool for cost recording ▪ integrate the cost analysis method with the financial management procedures and processes in monitoring the proper consumption of resources ▪ collect appropriate timely data for comparisons with the budgeted amount at each project milestone <p>6.3 Execute the project cost as part of designing a plan</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ implement the pre-defined measures to maintain financial and overall project objectives throughout the project development life cycle ▪ analyse the costing requirements and spending for the inputs to other activities and dependencies when the project further proceeds
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) take effective cost measures during the project time; (ii) supply sufficient inputs for the project cost monitoring and controlling processes; and (iii) provide information for a better estimation of other activities and dependencies within the project development.
Remark	

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

1. Title	Monitor and control the project cost
2. Code	ITSWPM508A
3. Range	Monitor and control the project cost, and update the project cost accordingly so that a project can be completed within an approved budget [Project Management – Project Cost Management]
4. Level	5
5. Credit	2
6. Competency	<p style="text-align: right;"><u>Performance Requirement</u></p> <p>6.1 Have knowledge in cost monitoring process Be able to design an effective cost monitoring system for checking against planned resources as well as setting up appropriate monitoring checkpoints</p> <p>6.2 Measure cost deviation Be able to</p> <ul style="list-style-type: none"> ▪ measure, monitor and control the cost incurred regarding product development, quality control and deadlines fulfillment ▪ alert top management authority at the appropriate time when the cost incurred exceeds its tolerant limit <p>6.3 Evaluate remedial action on cost change when necessary Be able to</p> <ul style="list-style-type: none"> ▪ identify and evaluate the factors of cost changes ▪ revise cost estimates ▪ evaluate the impact on cost baseline <p>6.4 Handle the cost changes Be able to</p> <ul style="list-style-type: none"> ▪ define a cost change control system ▪ ensure that the cost change procedure is properly followed ▪ integrate approved cost changes with other project control mechanisms
7. Assessment Criteria	The integrated requirements of this UoCs are the abilities to: (i) design an effective monitoring system for the cost incurred during project development; (ii) take proper control of the expenses involved in the project; and (iii) maintain the implementation of the standard cost change procedure as well as to incorporate the change with all other related control systems.
Remark	Co-requisites: ITSWPM605A, ITSWPM607A, ITSWPM504A, ITSWPM510A, ITSWPM520A

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

1. Title	Manage the execution of a project quality management plan	
2. Code	ITSWPM509A	
3. Range	Execute the project quality management plan and manage issues related to project quality to ensure that a project will satisfy the needs for which it was undertaken [Project Management – Project Quality Management]	
4. Level	5	
5. Credit	2	
6. Competency	<p>6.1 Understand the principles and techniques of project quality management and project quality assurance</p> <p>6.2 Conduct quality assurance</p> <p>6.3 Report quality and related issues together with documentation as needed</p> <p>6.4 Exhibit professionalism</p>	<p><u>Performance Requirement</u> Be able to execute a project quality management plan</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ perform project quality control testing and measurement ▪ determine the benefits/costs of project quality efforts ▪ document project quality outcomes in a format suitable for comparison and analysis ▪ identify and implement actions needed to increase project effectiveness and efficiency ▪ document lessons learned for improved performance ▪ implement quality improvements using the project change control processes ▪ execute project quality control, assurance, and improvement processes <p>Be able to</p> <ul style="list-style-type: none"> ▪ report the quality review and incident report, and capture in a quality log such as Change Log and Risk Log ▪ provide sufficient and appropriate details in the respective document such as Exception Report, Follow-on Action Recommendations <p>Be able to formulate an appropriate approach in conducting quality assurance based on practical requirements of an organisation's specific environment</p>
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) conduct quality control and assurance in accordance with the project quality management plan; (ii) document project quality outcomes for comparison and analysis; and (iii) identify and implement quality improvements.	
Remark	Pre-requisites: ITSWPM614A	

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

1. Title	Monitor and control the project quality	
2. Code	ITSWPM510A	
3. Range	Manage and control the project quality to ensure that a project will satisfy the needs for which it was undertaken [Project Management – Project Quality Management]	
4. Level	5	
5. Credit	1	
6. Competency	<p>6.1 Understand the principles and techniques of project quality management, quality assurance activities and quality standards</p> <p>6.2 Conduct quality control</p> <p>6.3 Exhibit professionalism</p>	<p><u>Performance Requirement</u> Be able to perform various quality assurance activities and report the quality of the items under quality review</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ monitor specific project results to ensure compliance with requirements and relevant quality standards using appropriate checklists ▪ perform inspection, review, and walkthroughs to ensure that items are properly documented as accepted, rejected or identified for rework ▪ utilize standard analysis and sampling techniques for analysis and inspections ▪ implement process adjustments to ensure quality improvement efforts ▪ complete all quality-related documentation <p>Be able to formulate best practices to conduct quality monitoring and control in an organisation's specific environment</p>
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) conduct project quality monitoring and control to ensure compliance with requirements and relevant standards; and (ii) document project quality results.	
Remark	Co-requisites: ITSWPM605A, ITSWPM607A, ITSWPM504A, ITSWPM508A, ITSWPM520A	

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

1. Title	Define the organisational structure of a project	
2. Code	ITSWPM511A	
3. Range	Conduct organisational definition of a project so as to fit the purposes of the project into the mission of the organisation and make the most effective use of the people involved in the project [Project Management – Project Human Resources Management]	
4. Level	5	
5. Credit	3	
6. Competency	<p>6.1 Understand project requirements and prepare ground work for organisation definition</p> <p>6.2 Identify the organisational structure</p> <p>6.3 Identify responsibility assignment processes</p> <p>6.4 Conduct project team definition in a professional manner</p>	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ comprehend requirements of scheduling and resource planning ▪ formulate skill inventory to facilitate effective searching for team members ▪ complete stakeholder needs analysis as a guide to the project planning process <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify the organisational structure (See Remark) ▪ determine project effects according to the structure <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify specific processes for organisation role assignment ▪ identify specific processes for organisation responsibility assignment <p>Be able to define the roles of the project management team in accordance with professional standards</p> <ul style="list-style-type: none"> ▪ define the responsibilities of the roles in accordance with the organisation's policies and guidelines
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) identify organisational structure and responsibility assignment processes; and (ii) define project management team according to an organisation's guidelines.	
Remark	Examples of organisational structure are strong matrix, weak matrix, project-wise and functional structures.	

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

1. Title	Establish organisational plan
2. Code	ITSWPM512A
3. Range	Establish organisational plan in the area of project and programme management team structure 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	3
6. Competency	<p style="text-align: center;"><u>Performance Requirement</u></p> <p>6.1 Comprehend organisation components for the project Be able to</p> <ul style="list-style-type: none"> ▪ provide an overview of the organisation components ▪ explain the programme organisation of which the project is belonged to (see Remark) <p>6.2 Estimate and allocate project resources Be able to</p> <ul style="list-style-type: none"> ▪ estimate resource requirements using standard tools and methodology ▪ assign sufficient team members with relevant skills and experience to complete the project on schedule <p>6.3 Complete overall organisational planning processes Be able to</p> <ul style="list-style-type: none"> ▪ develop an organisational chart for project work ▪ describe project effects of organisational units, technical interfaces and the presence of different technical disciplines ▪ utilize an organisational breakdown structure (OBS) to evaluate unit responsibilities for specific work items on the project ▪ develop a staffing management plan ▪ develop project team policies and procedures <p>6.4 Develop alternative structures Be able to</p> <ul style="list-style-type: none"> ▪ define programme executives as project board members as needed ▪ list common programme support as needed ▪ identify project support staffing requirements <p>6.5 Plan organisational structure in a professional manner Be able to conduct resource estimation and organisational planning process according to organisational guidelines and policies</p>
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) conduct professional resource estimation and allocation to the project; and (ii) complete overall organisational planning processes within the context of corresponding programme in the organisation.
Remark	Programme organisation includes the programme director, change manager, design authority and programme manager.

**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	<p style="text-align: right;"><u>Performance Requirement</u></p> <p>6.1 Understand staff acquisition and team development</p> <p style="padding-left: 20px;">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 <p>6.2 Plan for staff acquisition</p> <p style="padding-left: 20px;">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 organisation, structure and directory to align individual and group competencies with project tasks <p>6.3 Execute staff acquisition</p> <p style="padding-left: 20px;">Be able to</p> <ul style="list-style-type: none"> ▪ allocate project staff to and within the project or within the organisation 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 <p>6.4 Plan for team development</p> <p style="padding-left: 20px;">Be able to</p> <ul style="list-style-type: none"> ▪ define project team policies and procedures ▪ develop rewards and recognition plan <p>6.5 Conduct team development</p> <p style="padding-left: 20px;">Be able to</p> <ul style="list-style-type: none"> ▪ perform team building activities ▪ establish a collocated team if possible ▪ implement programmes that enhance project team performance, including use of conflict / stress reduction techniques ▪ implement rewards and recognitions according to plan 	

	<p>6.6 Establish and develop the project team in a professional manner</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ acquire quality staff according to organisational policies and regulatory requirements ▪ develop project team according to organisational procedures and policies
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities 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%; vertical-align: top;">6.1 Comprehend the monitoring tools</td> <td style="vertical-align: top;"> <p><u>Performance Requirement</u> Be able to</p> <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 the project is on schedule </td> </tr> <tr> <td style="vertical-align: top;">6.2 Monitor and measure performance</td> <td style="vertical-align: top;"> <p>Be able to</p> <ul style="list-style-type: none"> ▪ monitor results of team building activities ▪ monitor effectiveness of programmes for enhancing project team performance ▪ monitor rewards and recognition plan </td> </tr> <tr> <td style="vertical-align: top;">6.3 Manage and control changes in a professional manner</td> <td style="vertical-align: top;"> <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify if changes in organisational 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 organisational guidelines and regulatory requirements if any </td> </tr> </table>	6.1 Comprehend the monitoring tools	<p><u>Performance Requirement</u> Be able to</p> <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 the project is on schedule 	6.2 Monitor and measure performance	<p>Be able to</p> <ul style="list-style-type: none"> ▪ monitor results of team building activities ▪ monitor effectiveness of programmes for enhancing project team performance ▪ monitor rewards and recognition plan 	6.3 Manage and control changes in a professional manner	<p>Be able to</p> <ul style="list-style-type: none"> ▪ identify if changes in organisational 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 organisational guidelines and regulatory requirements if any
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6.2 Monitor and measure performance	<p>Be able to</p> <ul style="list-style-type: none"> ▪ monitor results of team building activities ▪ monitor effectiveness of programmes for enhancing project team performance ▪ monitor rewards and recognition plan 						
6.3 Manage and control changes in a professional manner	<p>Be able to</p> <ul style="list-style-type: none"> ▪ identify if changes in organisational 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 organisational 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	Establish a preliminary project communications plan
2. Code	ITSWPM515A
3. Range	Establish a preliminary project communications plan to ensure timely and appropriate communication of project information [Project Management – Project Communications Management]
4. Level	5
5. Credit	1
6. Competency	<p style="text-align: right;"><u>Performance Requirement</u></p> <p>6.1 Know the relationship between communication management with other aspects in project management</p> <p style="margin-left: 20px;">Be able to</p> <ul style="list-style-type: none"> ▪ understand the role of communications in various project management activities ▪ identify stakeholders in a project, i.e. sponsors, business users, team members, suppliers, etc. ▪ demonstrate the knowledge of <ul style="list-style-type: none"> ➢ inputs to communication planning ➢ tools and techniques utilised for communication planning ➢ outputs of communication planning <p>6.2 Conduct preliminary communications planning</p> <p style="margin-left: 20px;">Be able to</p> <ul style="list-style-type: none"> ▪ identify the benefits and processes of project communications management ▪ match the appropriate project process group to each management process in a given project ▪ draft a preliminary communications plan and documentation templates as initial reference for further development <p>6.3 Observe criteria for effective communications</p> <p style="margin-left: 20px;">Be able to match project communications policies within the working organisation to the communication activities in a given project</p>
7. Assessment Criteria	The integrated outcome requirement of this UoCs are the abilities to: (i) relate organisational communications policies to a target project; and (ii) develop supporting details for project communications management.
Remark	

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

1. Title	Develop a project communications plan
2. Code	ITSWPM516A
3. Range	Develop a detailed project communications plan to ensure timely and appropriate communication of project information [Project Management – Project Communications Management]
4. Level	5
5. Credit	2
6. Competency	<p style="text-align: right;"><u>Performance Requirement</u></p> <p>6.1 Understand the needs for effective communications</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify the benefits of effective communications in managing a project ▪ recognise potential barriers to effective communications <p>6.2 Conduct communications planning</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ determine the detailed information requirements from the project stakeholders and the project/organisation ▪ establish a project information storage system ▪ document stakeholder logistics issues ▪ identify external information needs ▪ determine format of the information needs ▪ develop feedback routines to ensure two-way communications ▪ identify the immediacy of the need ▪ determine the technologies or methods used to transmit information ▪ identify the project team experience in order to conduct communications technology-related training ▪ identify the methods needed to transmit non-routine communications ▪ determine the requirements for project time reporting ▪ select a suitable time-reporting mechanism ▪ determine policies, systems, and procedures of controls for documents and facilities ▪ articulate the purpose, composition, derivation and quality criteria for the project communication and relate them to the project stakeholders and the team members <p>6.3 Develop an achievable project communications plan</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ establish project status reporting process and cycle ▪ develop a project communications plan for management
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to set up and confirm the following: (i) communication and information distribution channels; (ii) main interface between project team and user team; and (iii) reporting frequency.
Remark	

**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 specifications and make follow-up recommendations 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 the effectiveness of the 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 documents ▪ 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 organisation 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	Conduct project closure with respect to project communications	
2. Code	ITSWPM518A	
3. Range	Conduct project closure with respect to project communications [Project Management - Project Communications Management]	
4. Level	5	
5. Credit	2	
6. Competency	<p>6.1 Identify the criteria of project closure</p> <p>6.2 Conduct administrative closeout</p> <p>6.3 Properly conclude the project</p>	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ comprehend the criteria of project closure from document ▪ locate the key stakeholders (e.g. sponsors, business users/customers, vendors, and suppliers) responsible for the project ▪ identify inputs to a phase and output requirements <p>Be able to</p> <ul style="list-style-type: none"> ▪ define and implement closure at the end phase of the project by collecting all project records, documenting the degree to which each project phase was properly closed after its completion, and verifying all project results in preparation for formal acceptance ▪ document performance measures resulting from performance reviews, as well as variance, trend, and earned value analyses ▪ document the final project scope ▪ perform final appraisal reviews of team members ▪ archive relevant project documentation <p>Be able to</p> <ul style="list-style-type: none"> ▪ review final specifications and analyse project success and effectiveness ▪ document lessons learned ▪ formalise the acceptance or sign-off the product by the sponsor, client, or customer
7. Assessment Criteria	The integrated outcome requirements of UoCs are the abilities to: (i) review any communication issue at project closure; and (ii) document lesson learnt and update communication plan for future adoption.	
Remark	Co-Requisites: ITSWPM606A, ITSWPM608A, ITSWPM505A, ITSWPM612A, ITSWPM616A, ITSWPM620A	

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

1. Title	Execute the risk management and response plans	
2. Code	ITSWPM519A	
3. Range	Conduct project risk management of a project and manage the required changes as a response to risk events based on the agreed baseline project risk management plan in order to minimize negative risks while maximizing positive risks [Project Management – Project Risk Management]	
4. Level	5	
5. Credit	2	
6. Competency	<p>6.1 Understand the project risk management plan</p> <p>6.2 Understand the project risk response plan</p> <p>6.3 Execute risk response plan</p> <p>6.4 Exhibit professionalism</p>	<p><u>Performance Requirement</u></p> <p>Be able to comprehend a risk management plan in respect of the possible project risks, impact and preventive measures, roles and responsibility, change management requirements and procedures and budget with the risk factor</p> <p>Be able to comprehend a risk response plan in respect of risk responses, contingency plans, implementation criteria, alternative strategies, insurance coverage needs, risk events warranting responses, risk owners, the price of non-conformance to identified risks, specific risk event strategies</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ implement risk response plan including preventive actions as necessary ▪ initiate and manage change requests as a response to risk events ▪ manage change to risk response plan as a result of evolving circumstances <p>Be able to judge whether to initiate change requests as a response to risk events depending on practical circumstances</p>
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to (i) execute the baseline risk management and response plans; and (ii) manage changes in response to risk events.	
Remark	Pre-requisites: ITSWPM618A	

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

1. Title	Monitor and control the risks of a project	
2. Code	ITSWPM520A	
3. Range	Monitor and control the risks of a project through regular reporting based on the project risk management plan in order to minimize negative risks while maximizing positive risks [Project Management – Project Risk Management]	
4. Level	5	
5. Credit	2	
6. Competency	<p>6.1 Understand project risk management plans</p> <p>6.2 Understand project risk response plans</p> <p>6.3 Conduct risk monitoring and control</p>	<p>Performance Requirement</p> <p>Be able to comprehend risk management plans in relation to the possible project risks, impact and preventive measures, roles and responsibility, change management requirements and procedures and budget with the risk factor</p> <p>Be able to comprehend risk response plans in relation to risk responses, contingency plans, implementation criteria, alternative strategies, insurance coverage needs, risk events warranting responses, risk owners, the price of non-conformance to identified risks, specific risk event strategies</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ issue project issue report according to risk alert ▪ conduct impact analysis ▪ find solution options ▪ follow change management procedures and seek approval ▪ create workarounds for unplanned risk events ▪ implement workarounds for unplanned risk events ▪ quantify actual risk events for comparison and evaluation with the risk plan ▪ complete risk event updates as part of the project control process ▪ complete risk response plan updates, including adjustments to risk probabilities and risk values ▪ document and communicate the risk issues using appropriate documents
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to monitor and control project risks through regular reports and communication upon any risk issues.	
Remark	Co-requisites: ITSWPM605A, ITSWPM607A, ITSWPM504A, ITSWPM508A, ITSWPM510A	

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

1. Title	Conduct solicitation planning
2. Code	ITSWPM521A
3. Range	Prepare and specify tender details for an organisation to outsource a particular project (whole or some of its part) [Project Management – Project Procurement and Contract Management]
4. Level	5
5. Credit	7
6. Competency	<p style="text-align: right;"><u>Performance Requirement</u></p> <p>6.1 Have knowledge in the market condition Be able to collect information about the products and services available in the marketplace</p> <p>6.2 Prepare complete procurement documents Be able to</p> <ul style="list-style-type: none"> ▪ design structured procurement documents that are used to solicit proposals from prospective sellers such as <ul style="list-style-type: none"> ➢ invitation for Bid (IFB) ➢ request for Proposal (RFP) ➢ request for Quotation (RFQ) ➢ initiation for Negotiation ➢ contractor Initial Response ▪ ensure the documents can facilitate accurate and complete responses from prospective sellers as well as rigorous enough to ensure consistent, comparable but flexible responses to allow sellers to make suggestions for better ways in achieving the requirements <p>6.3 Define the evaluation criteria in a professional manner Be able to define evaluation criteria for rating or scoring proposals including the bidders'</p> <ul style="list-style-type: none"> ▪ background ▪ financial capability ▪ past track record ▪ technical knowledge/skill ▪ resources availability <p>6.4 Form a tender board Be able to formulate the tender board with suitable members for the tender evaluation process</p>
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) develop effective procurement documents for the tender bidders submitting bid/quotation; and (ii) set up an accurate evaluation process for rating and scoring the submitted bids.
Remark	

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

1. Title	Conduct solicitation	
2. Code	ITSWPM522A	
3. Range	Initialize tender procedure and conduct solicitation of returns from vendors [Project Management – Project Procurement and Contract Management]	
4. Level	5	
5. Credit	5	
6. Competency		<u>Performance Requirement</u>
	6.1 Have knowledge in sourcing prospective sellers	Be able to locate the appropriate prospective bidders who are capable in providing the services
	6.2 Have knowledge in placing advertisements in general circulation publications	Be able to expand the existing lists of potential sellers through placing advertisements in newspaper or in professional journals
	6.3 Conduct bidder's conference	Be able to establish key principles for conducting a bidder's conference and make clarification on bidder's concerns
	6.4 Establish protocols for communicating with prospective sellers	Be able to ensure that all prospective sellers have a clear, common understanding of the technical requirements
	6.5 Make amendments on procurement documents	Be able to incorporate the responses to bidder's questions about the procurement into the procurement documents
	6.6 Collect proposals from perspective sellers	Be able to receive seller-prepared proposals under confidentiality control
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) carry out the solicitation process smoothly; and (ii) provide a fair treatment to each individual perspective seller with appropriate level of information and assistance.	
Remark	Pre-requisites: ITSWPM521A	

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

1. Title	Conduct source selection and/or contract development	
2. Code	ITSWPM523A	
3. Range	Conduct source selection and further contract development in project outsourcing [Project Management – Project Procurement and Contract Management]	
4. Level	5	
5. Credit	5	
6. Competency		<u>Performance Requirement</u>
	6.1 Have knowledge of various evaluation methods	Be able to apply an appropriate evaluation system to the received proposals such as weighting system, screening system and independent estimates.
	6.2 Identify contract concerns	Be able to use appropriate methods to identify: <ul style="list-style-type: none"> ■ project warranties ■ liabilities ■ indemnity ■ insurance clause-related activities
	6.3 Rank order all proposals in a professional manner	Be able to give ranking to each proposal according to the criteria as listed in the procurement management plan
	6.4 Make contract negotiation with the bidders according to the rank sequence	Be able to clarify any unclear points in the received proposal from the bidders and negotiate with them on the terms and conditions according to the local laws
	6.5 Reach mutual agreement with the bidder	Be able to make agreement on the structure and requirements of the contract prior to the signing of the contract (See remark)
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) make a fair selection for a successfully bidder; and (ii) get consensus and understandings on those important terms with the successful bidder for drafting the contract.	
Remark	Subjects covered generally include, but not limited to, responsibilities and authorities, applicable terms and law, technical and business management approaches, contract financing and price.	

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

1. Title	Award Contract	
2. Code	ITSWPM524A	
3. Range	Award contract to successful vendor and ensure its proper start-up [Project Management – Project Procurement and Contract Management]	
4. Level	5	
5. Credit	4	
6. Competency		<u>Performance Requirement</u>
	6.1 Prepare the contract for the successful bidder	Be able to draft a legally binding contract for the outsourcing project as well as to ensure the contract language describes the project well and satisfies the needs identified
	6.2 Arrange the signing of the contract	Be able to prepare the signing of the contract by the appropriate person who can sign agreements on behalf of the organisation with the successful bidder
	6.3 Assign procurement liaison between both parties	Be able to include procurement staff as the point of contact for delivering the plans, assumptions and review schedule, and incorporating comments and recommendations into the project plan
	6.4 Arrange kick off of the project	Be able to ensure the project starts up in time
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) ensure a proper and legally binding contract is signed between both parties; and (ii) kick off the project in time with appropriate levels of liaison supports.	
Remark		

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

1. Title	Conduct contract administration and contract monitoring	
2. Code	ITSWPM525A	
3. Range	Conduct contract administration and contract monitoring [Project Management – Project Procurement and Contract Management]	
4. Level	5	
5. Credit	5	
6. Competency		<p style="text-align: center;"><u>Performance Requirement</u></p> <p>6.1 Have knowledge on contract/ procurement control</p> <p>6.2 Follow the contract administration</p> <p>6.3 Monitor and ensure the contractor's performance meets the contractual requirements</p> <p>6.4 Manipulate change requests</p> <p>6.5 Arrange payment to the contractor</p>
		<p>Be able to use the appropriate tools and techniques to control contracts/procurements</p> <p>Be able to carry out project management processes including</p> <ul style="list-style-type: none"> ▪ project plan execution – to authorize the contractor's work at the appropriate time ▪ performance reporting – to monitor contractor cost, schedule and technical performance ▪ quality control – to inspect and verify the adequacy of the contractor's product <p>Be able to integrate and coordinate at multiple levels of the outputs from different processes and from different sellers</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ ensure that changes are properly approved and those with a need to know are aware of such changes ▪ update the contract for any legal implications of actions due to the changes <p>Be able to follow the payment terms as defined in the contract as well as trace the linkage between progress made and compensations paid</p>
7. Assessment Criteria	<p>The integrated outcome requirements of this UoCs are the abilities to:</p> <p>(i) execute the contract administration processes to ensure the contractor's performance meets with the requirement stipulated in the contract;</p> <p>(ii) manage changes in the contracts; and</p> <p>(iii) when administrating the contract, be acutely aware of the legal implications of actions taken due to the changes.</p>	
Remark		

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

1. Title	Conduct contract closeout	
2. Code	ITSWPM526A	
3. Range	Conduct contract closure in an outsourced project [Project Management – Project Procurement and Contract Management]	
4. Level	5	
5. Credit	5	
6. Competency		<p style="text-align: center;"><u>Performance Requirement</u></p> <p>6.1 Have knowledge in the contract administration</p> <p>6.2 Complete contract documentation</p> <p>6.3 Stock take deliverables</p> <p>6.4 Provide formal acceptance and closure to the seller</p> <p>6.5 Perform a “lessons learned” analysis in a professional manner</p>
		<p>Be able to incorporate the administrative closeout into the contract closeout process</p> <p>Be able to check all documentation are completed:</p> <ul style="list-style-type: none"> ▪ the contract itself ▪ supporting schedules ▪ requested and approved contract changes ▪ any seller-developed technical documentation ▪ seller performance reports ▪ financial documents such as invoices and payment records ▪ results of any contract-related inspections <p>Be able to</p> <ul style="list-style-type: none"> ▪ verify the completion of all deliverables related to the contract (see Remark) ▪ identify any outstanding items from, for example, an enhancement list <p>Be able to execute a confirmation on the requirements for formal acceptance and closure as defined in the contract and arrange to provide the seller with a formal written notice on contract completion from the contract administration</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ perform a structured procurement audit review on the procurement process from procurement planning through contract administration ▪ identify successes and failures that warrant transfer to other procurement items on the developing project or to other projects within the performing organisation
7. Assessment Criteria	<p>The integrated outcome requirements of this UoCs are the abilities to:</p> <p>(i) conduct a formal acceptance and contract closeout procedure as defined in the contract; and</p> <p>(ii) carry out a structured procurement audit review for transferring the experience to other projects.</p>	
Remark	Examples of deliverables are source codes, handover list or user training.	

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

1. Title	Perform an initial project feasibility study
2. Code	ITSWPM601A
3. Range	Perform an initial project feasibility study and analysis to determine if the project should go ahead so that the chances of project success are maximized. [Project Management – Project Integration Management]
4. Level	6
5. Credit	2
6. Competency	<p><u>Performance Requirement</u></p> <p>6.1 Identify project needs Be able to determine product/service characteristics using expert judgement as needed</p> <p>6.2 Develop project-related product or service descriptions in accordance with the project requirements Be able to identify constraints and assumptions including boundaries</p> <p>6.3 Perform an initial project feasibility study and analysis in a professional manner Be able to</p> <ul style="list-style-type: none"> ▪ utilize project selection methods / decision models (see Remark) ▪ evaluate historical information for projects involving similar product and service deliverables ▪ perform high-level assessment of the organisational resources for the project ▪ perform high-level assessment of the technical and non-technical requirements of the project
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to perform a feasibility study and analysis that adequately summarize the product/service characteristics, constraints and assumptions, assessment of organisational resources required and the technical and non-technical requirements.
Remark	Project selection methods/decision models include, but are not limited to: a) Benefit measurement methods; and b) Constrained optimized methods.

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

1. Title	Prepare a project charter and kick-off package as well as information	
2. Code	ITSWPM602A	
3. Range	Prepare a project charter and kick-off package as well as information such as various project interfaces so that a project is well prepared at the start. [Project Management – Project Integration Management]	
4. Level	6	
5. Credit	1	
6. Competency	<p>6.1 Understand the requirements of a project charter and project interfaces</p> <p>6.2 Develop the project charter and kick-off package in accordance with the organisation's requirements</p> <p>6.3 Identify project interfaces</p> <p>6.4 Conduct kick-off meeting</p> <p>6.5 Develop the project charter and project interfaces in a professional manner</p>	<p><u>Performance Requirement</u></p> <p>Be able to define the primary components of the project charter and project interfaces</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ produce a project charter that formally documents and links the project to the ongoing work of the organisation and in accordance with the organisation's guidelines ▪ provide details of the purpose, composition, derivations and quality criteria of the project mandate ▪ define the responsibilities of the project manager and other organisational managers ▪ identify how project budget concerns and resource availability affect the project and how to interface with the project sponsor or others ▪ define project phases of the project life cycle ▪ establish project purposes, descriptions, assumptions and constraints ▪ define project business benefits and benefit measurements ▪ define critical success factors of the project ▪ identify project stakeholders, i.e. sponsors, key users/customers, team members, suppliers, etc. <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify organisational, processes and technical interfaces ▪ define the basic inputs and outputs <p>Be able to organise and conduct the project kick-off meeting in accordance with the organisation's guidelines and practices</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ produce the project charter and project interfaces in an efficient and effective manner ▪ obtain approval from sponsors for the project charter and project interfaces
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) produce project charter and project interfaces that are approved by sponsors; and (ii) conduct a kick-off meeting before the start of the project.	
Remark		

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

1. Title	Prepare an initial project plan	
2. Code	ITSWPM603A	
3. Range	Prepare an initial project plan to be used as the baseline for project execution so that various elements of a project are better coordinated [Project Management – Project Integration Management]	
4. Level	6	
5. Credit	2	
6. Competency		<p style="text-align: center;"><u>Performance Requirement</u></p> <p>6.1 Comprehend the different methodologies for project plan development</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ understand the different methodologies available for project plan development ▪ describe the differences between dynamically updating the project plan and preserving the project performance measurement baseline <p>6.2 Conduct project plan development</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ determine the project plan development methodology that best suits the organisation ▪ identify the project stakeholders (such as, sponsors, business users/customers, team members, vendors, and suppliers) and project/organisation responsibility relationships ▪ identify the interface points with other projects within the organisation ▪ develop a stakeholder management plan ▪ define and utilize a Project Management Information System to assist in the gathering, integration, interpretation, and dissemination of the inputs and outputs of all project processes ▪ identify and develop an integrated project plan (see Remark) ▪ determine the overall project management plan for use in managing and controlling project execution <p>6.3 Establish the Project Management Team, programme/project organisation and the alternative structures as needed</p> <p>Be able to provide an overview of the organisation components and the team structure for the project</p> <p>6.4 Define project governance and steering organisation</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ appoint project board executive or steering committee ▪ create or identify the project governance body <p>6.5 Design controls for the project</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ focus on design and development planning ▪ identify the organisational and technical interfaces, i.e. define and design input, output, review, verification, validation and changes

	<p>6.6 Develop an initial project plan in a professional manner</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ develop an initial project plan in an efficient and effective manner, and in accordance with the adopted project plan development methodology ▪ obtain approval from stakeholders
7. Assessment Criteria	<p>The integrated outcome requirements of this UoCs are the abilities to:</p> <ul style="list-style-type: none"> (i) produce a project plan in accordance with the adopted project plan development methodology; and (ii) obtain approval from stakeholders.
Remark	<p>The integrated project plan includes:</p> <ul style="list-style-type: none"> a) Project charter; b) Scope statement; c) Work breakdown structure (WBS); d) Responsibility assignments; e) Schedules; f) Milestones; g) Key staffing requirements; h) Budgets; i) Performance measurement baselines; j) Lists of key risks; k) Risk response plans; l) Management review plans outlining the project management approach; m) Project execution plan; and n) Other subsidiary management plans.

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

1. Title	Execute the project plan	
2. Code	ITSWPM604A	
3. Range	Execute the defined project works according to the project plan so that all elements of the project are properly carried out [Project Management – Project Integration Management]	
4. Level	6	
5. Credit	1	
6. Competency	<p>6.1 Understand the various skills and techniques required in project plan execution</p> <p>6.2 Conduct project plan execution</p> <p>6.3 Direct and manage project execution in a professional manner</p>	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ understand the structured approach for identifying and executing preventive actions or modifications ▪ understand structured communication methods ▪ have knowledge of project information systems ▪ understand negotiating strategies ▪ understand problem-solving techniques ▪ understand influencing skills ▪ have knowledge of work authorization systems and procedures <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify and execute preventive actions or modifications to the project plan using a structured approach ▪ utilize structured communication methods ▪ utilize regularly scheduled project status reviews ▪ utilize project information systems to provide project information ▪ utilize negotiating strategies ▪ apply problem-solving techniques in managing the project ▪ implement methods to influence behaviour and preventive action ▪ manage various project-related technical and/or organisational interfaces ▪ utilize work authorization systems and procedures for approving project work to ensure proper work sequencing ▪ know the products and services, and have the ability to monitor/react to project changes initiated by the sponsor ▪ document work results and quality outcomes, including completion of project deliverables ▪ identify change requests during work processes, and determine potential project scope changes <p>Be able to</p> <ul style="list-style-type: none"> ▪ lead the project team in directing the performance of the planned project activities ▪ manage organisational and technical interfaces to achieve the defined project outcomes
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to conduct project plan execution in accordance with the project plan developed.	
Remark	Pre-requisites: ITSWPM603A	

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

1. Title	Monitor and control project execution	
2. Code	ITSWPM605A	
3. Range	Monitor and control project execution, and update the project plan accordingly so that all elements of the project are properly carried out [Project Management – Project Integration Management]	
4. Level	6	
5. Credit	1	
6. Competency		<p style="text-align: center;"><u>Performance Requirement</u></p> <p>6.1 Understand the requirements of integrated change control</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ understand change request procedures and documentation ▪ understand the functions of change control board or other governing bodies ▪ understand change management procedures ▪ have knowledge of change control system ▪ understand configuration management procedures <p>6.2 Conduct integrated change control</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ verify that a change has occurred ▪ determine that a change is needed and the change request documentation has been properly completed in accordance with the defined procedure ▪ adhere to the steps by which official project documents may be changed ▪ determine whether variances from the plan require corrective actions, need new or revised cost estimates, result in a modification of activity sequences, or require the development of additional risk response alternatives ▪ utilize the power and responsibilities of the change control board or other governing bodies ▪ document and implement procedures to process changes that may be accepted without prior change control board review or other governing body ▪ employ proactive, structured change management procedures to properly influence a variety of project stakeholders ▪ utilize the organisation's change control system ▪ complete project plan modifications, including integration with various project baselines ▪ utilize configuration management or equivalent procedures to integrate change across all areas of the project ▪ provide definition on the process, authority levels, integrity of change (see Remark 1) <p>6.3 Direct a project with the focus on controlling project work</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ provide controls overview ▪ define controls for project start-up, progress and closure ▪ review and assess project progress and status, and report highlights ▪ capture, examine and escalate project issues ▪ take corrective actions

	<p>6.4 Conduct integrated change control in a professional manner</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ perform the activities of integrated change control in an efficient and effective manner ▪ obtain approval from stakeholders
7. Assessment Criteria	<p>The integrated outcome requirements of this UoCs are the abilities to:</p> <ul style="list-style-type: none"> (i) monitor and control the execution of project plan in accordance with the project plan developed; and (ii) manage changes in accordance with the organisation's change request procedure.
Remark	<ul style="list-style-type: none"> 1. Integrity of change includes but not limited to: <ul style="list-style-type: none"> a) Benefit/business case driven b) Risk log c) Time/cost/risk function balance; and d) Whether the change is part of a business programme. 2. Co-requisites: ITSWPM607A, ITSWPM504A, ITSWPM508A, ITSWPM510A, ITSWPM520A.

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

1. Title	Conduct project closure with regard to integration	
2. Code	ITSWPM606A	
3. Range	Conduct project closure so that all elements of the project are closed out properly. [Project Management – Project Integration Management]	
4. Level	6	
5. Credit	1	
6. Competency	<p>6.1 Understand the requirements of integrated project closure</p> <p>6.2 Conduct project closure with regard to integration</p> <p>6.3 Conduct integrated project closure in a professional manner</p>	<p><u>Performance Requirement</u></p> <p>Be able to identify the components of integrated project closure</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ document lessons learned from project integration, including <ul style="list-style-type: none"> ➤ causes of activities requiring corrective action(s) ➤ types of activities requiring corrective action(s) ➤ reasons for selecting certain corrective actions ➤ classification of changes for subsequent analysis ▪ define the context, together with emphasis on decommissioning a project and identifying follow-on actions <p>Be able to</p> <ul style="list-style-type: none"> ▪ perform the activities of integrated project closure in an efficient and effective manner ▪ obtain approval from stakeholders
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to conduct project closure in accordance with the adopted project management methodology.	
Remark	Co-Requisites: ITSWPM608A, ITSWPM505A, ITSWPM612A, ITSWPM615A, ITSWPM518A, ITSWPM620A	

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

1. Title	Monitor and control the project scope
2. Code	ITSWPM607A
3. Range	Manage the project within the defined scope and ensure it meets the business users' specifications [Project Management – Project Scope Management]
4. Level	6
5. Credit	2
6. Competency	<p style="text-align: right;"><u>Performance Requirement</u></p> <p>6.1 Have knowledge in concepts for scope monitoring and control</p> <p>6.2 Execute scope verification</p> <p>6.3 Plan for scope change control</p> <p>6.4 Manage the actual scope changes</p> <p>6.5 Manage and control project scope in a professional manner</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ master monitoring techniques including inspections, reviews, audits and walkthroughs ▪ understand mechanisms for scope change control <p>Be able to</p> <ul style="list-style-type: none"> ▪ participate in project inspections, reviews, audits and walkthroughs ▪ determine whether product/results complies with the scope ▪ document product acceptance by business users <p>Be able to</p> <ul style="list-style-type: none"> ▪ evaluate the degree to which changes would affect the project scope ▪ evaluate alternative to scope modifications ▪ implement a scope change control system <p>Be able to</p> <ul style="list-style-type: none"> ▪ implement approved changes and manage related work tasks ▪ integrate approved scope changes into other control processes ▪ focus on control aspects of delivering a work package and handle respective project issues appropriately <p>Be able to</p> <ul style="list-style-type: none"> ▪ ensure monitoring are conducted periodically ▪ manage the delivery of items according to organisation's policies and guidelines
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to monitor and control project scope in terms of: (i) achievement of project scope; (ii) acceptance by business users; and (iii) update of project scope if necessary.
Remark	Co-requisites: ITSWPM605A, ITSWPM504A, ITSWPM508A, ITSWPM510A, ITSWPM520A

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

1. Title	Conduct project closure with regard to project scope	
2. Code	ITSWPM608A	
3. Range	Conduct project closure and administrative tasks in relation to project scope management [Project Management – Project Scope Management]	
4. Level	6	
5. Credit	3	
6. Competency		<p style="text-align: center;"><u>Performance Requirement</u></p> <p>6.1 Have knowledge in concepts for project closures</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ understand schedule variance and cost variance ▪ interpret the variance and performance index for schedule and cost <p>6.2 Analyse scope variances and the chosen corrective actions</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify different variances in project scope ▪ identify causes of variances in project scope ▪ list all corrective actions implemented ▪ justify the rationale behind the corrective actions chosen through scope change control <p>6.3 Archive lessons learnt</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ determine the lessons learnt with regard to scope ▪ document the lessons learnt <p>6.4 Conduct reviews</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ review based on context, process description, responsibilities and information needs ▪ perform post-mortem analysis ▪ archive all relevant project data, lessons learnt and post-mortem analysis in the organisation's project database <p>6.5 Conduct project closure with regard to scope in a professional manner</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ ensure both administrative and contract closure if applicable ▪ manage the closure according to the organisation's policies and guidelines and regulatory requirements if any
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to review the stages in project scope with focus on: (i) scope variance and corrective action analysis; (ii) lessons learnt; and (iii) post-project review.	
Remark	Co-Requisites: ITSWPM606A, ITSWPM505A, ITSWPM612A, ITSWPM615A, ITSWPM518A, ITSWPM620A	

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

1. Title	Develop a project schedule	
2. Code	ITSWPM609A	
3. Range	Develop a project schedule as the baseline for project execution in order to ensure timely completion of a project [Project Management - Project Time Management]	
4. Level	6	
5. Credit	4	
6. Competency		<p style="text-align: center;"><u>Performance Requirement</u></p> <p>6.1 Understand the sequence of activities</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify inputs to activities and their arrival sequence ▪ know the characteristics of tools useful for scheduling <p>6.2 Conduct activity definition</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ create an activity list using decomposition to the preliminary project management plan down to the lowest level of the Work Breakdown Structure (WBS) ▪ identify the appropriate level of WBS details for the activity list ▪ determine the inputs to the project activity definition process ▪ validate the WBS by ensuring that performing all activities is within the project scope and that the WBS is correct ▪ utilize activity lists to verify that all activities are within the project scope and that the WBS is correct ▪ identify missing deliverables or deliverables requiring clarification, using the WBS as part of the verification process <p>6.3 Conduct activity sequencing</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ determine interactivity dependencies ▪ identify the relationships between project activities for activity sequencing ▪ identify and document the types of interactivity dependencies within the project ▪ construct a project network diagram ▪ identify appropriate diagramming techniques ▪ determine inputs to the activity sequencing process ▪ complete activity lists and WBS updates, as well as updates of related supporting documentation ▪ define missing activities or activities requiring clarification in the activity list during the development of the project network diagram <p>6.4 Conduct activity duration estimating</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ develop activity duration estimates for project scheduling using various tools, such as analogous estimation techniques ▪ estimate the number of work periods and possible work duration ranges ▪ utilize simulation technique to study the time behaviour of different work flows

		<ul style="list-style-type: none"> ▪ document the basis for activity duration estimates ▪ develop activity duration estimates
	6.5 Conduct schedule development	<p>Be able to</p> <ul style="list-style-type: none"> ▪ formulate project and resource calendars ▪ identify activity leads, lags and constraints ▪ determine inputs to the project schedule development process ▪ select and apply appropriate mathematical analysis, e.g., critical path method ▪ identify the needs for applying various programme evaluation and review techniques such as Programme Evaluation and Review Technique ▪ understand the advantages and disadvantages of the different types of project schedule formats ▪ determine the completeness of a project schedule ▪ develop a schedule management plan, including establishing a schedule baseline, documenting how schedule variances will be managed, identifying schedule change control system procedures, and defining appropriate performance measures ▪ produce a baseline project schedule
	6.6 Exercise professional judgement	Be able to exercise professional judgement in the estimation of the duration
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) decompose the preliminary project management plan into manageable modules and cross check the details for completeness within project boundary; and (ii) develop a project schedule as the baseline for project execution.	
Remark		

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

1. Title	Prepare a preliminary cost model										
2. Code	ITSWPM610A										
3. Range	Prepare and assemble a preliminary cost model so that a project can be completed within an approved budget [Project Management – Project Cost Management]										
4. Level	6										
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 Have knowledge in principles and concepts of various cost models</td> <td>Be able to state the features of all different cost analysis models applicable to the software project management</td> </tr> <tr> <td>6.2 Identify available budget resources</td> <td>Be able to <ul style="list-style-type: none"> ▪ carry out a preliminary cost benefit analysis for project proposal substantiation ▪ identify any constraints for the proposed project </td> </tr> <tr> <td>6.3 Develop a business case</td> <td>Be able to develop a valuable business case from the identified constraints</td> </tr> <tr> <td>6.4 Develop a cost model for the proposed project in a professional manner</td> <td>Be able to select a cost analysis model addressing the following items clearly <ul style="list-style-type: none"> ▪ project context ▪ preliminary cost breakdown in group items in the project ▪ project control milestones </td> </tr> </table>		<u>Performance Requirement</u>	6.1 Have knowledge in principles and concepts of various cost models	Be able to state the features of all different cost analysis models applicable to the software project management	6.2 Identify available budget resources	Be able to <ul style="list-style-type: none"> ▪ carry out a preliminary cost benefit analysis for project proposal substantiation ▪ identify any constraints for the proposed project 	6.3 Develop a business case	Be able to develop a valuable business case from the identified constraints	6.4 Develop a cost model for the proposed project in a professional manner	Be able to select a cost analysis model addressing the following items clearly <ul style="list-style-type: none"> ▪ project context ▪ preliminary cost breakdown in group items in the project ▪ project control milestones
	<u>Performance Requirement</u>										
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7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: <ul style="list-style-type: none"> (i) collect accurately those cost implications and budget constraints for a proposed project; (ii) develop professional cost breakdown, cost benefit analysis and business case; and (iii) build up an effective and measurable cost model to fulfil the project requirements. 										
Remark											

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

1. Title	Develop the project cost	
2. Code	ITSWPM611A	
3. Range	Develop the project cost as the baseline for project execution so that a project can be completed within an approved budget [Project Management – Project Cost Management]	
4. Level	6	
5. Credit	4	
6. Competency		<p><u>Performance Requirement</u></p> <p>6.1 Have knowledge of resource planning</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ understand the inputs of resources planning, cost estimating and budgeting ▪ understand the tools and techniques utilized for the planning ▪ understand the output requirements of resources planning, cost estimating and budgeting <p>6.2 Collect the availability of the resources in the organisation for supporting the proposed project</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ make a study on the resources requirements from similar historical projects ▪ identify the resources support for the proposed project from the organisation ▪ identify the availability of staff resources at each skill level for the proposed project ▪ comply the project resource requirements with the organisational policies regarding resource usage and selection <p>6.3 Develop a resource management plan</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ qualify the needs of the physical resources including project materials and equipment ▪ develop human resources usage patterns ▪ develop staff responsibility assignment matrix ▪ develop resource histogram ▪ design the resource requirement document ▪ keep track of the individual resource requirements <p>6.4 Make appropriate levels of cost estimates</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ understand the differences between cost estimating and cost pricing ▪ utilize a resource requirement statement for an estimate of other activities and their related resources. ▪ develop a resource management plan ▪ develop a breakdown of the cost estimate on each consumable item with appropriate level of details ▪ select and document appropriate cost-estimating methods ▪ utilize multiple cost baselines to evaluate different aspects of project cost performance over time ▪ verify that the cost estimates are complete and associated with specific resource requirements

	<p>6.5 Conduct cost budgeting in a professional manner</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ allocate costs to each individual item ▪ develop a cost baseline for cost performance ▪ develop a chart of accounts to associate qualitative cost assessment with the corresponding resource requirements ▪ choose an effective performance measurement technique
<p>7. Assessment Criteria</p>	<p>The integrated outcome requirements of this UoCs are the abilities to:</p> <ul style="list-style-type: none"> (i) develop an effective resource management plan; (ii) build up a cost baseline for project; and (iii) include a thorough cost management plan for future performance measuring.
<p>Remark</p>	

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

1. Title	Conduct cost review upon project completion	
2. Code	ITSWPM612A	
3. Range	Conduct project closure with regard to cost [Project Management – Project Cost Management]	
4. Level	6	
5. Credit	2	
6. Competency		<p style="text-align: center;"><u>Performance Requirement</u></p> <p>6.1 Have knowledge and understanding of cost control</p> <p>6.2 Check completion of all related cost documentation</p> <p>6.3 Study the variance between the budget and the actual</p> <p>6.4 Review whether the expenses in meeting the project goals is worthwhile</p> <p>6.5 Document the cost review process</p>
		<p>Be able to understand</p> <ul style="list-style-type: none"> ▪ input to cost control ▪ tools and techniques utilized for controlling changes to the cost baseline or budget ▪ outputs of cost control <p>Be able to</p> <ul style="list-style-type: none"> ▪ prepare a checklist for a full set of cost documentation ▪ collect all the stipulated documents for review <p>Be able to</p> <ul style="list-style-type: none"> ▪ locate the cause of cost deviation ▪ identify the types of cost change ▪ evaluate the selection of corrective action leading to cost change and study of any alternatives <p>Be able to review that the spending are worthwhile in terms of</p> <ul style="list-style-type: none"> ▪ meeting the project context ▪ meeting the project timeline ▪ consumption of manpower ▪ smoothness of process <p>Be able to record the cost review items in details for future reference</p>
7. Assessment Criteria	<p>The integrated outcome requirements of this UoCs are the abilities to:</p> <p>(i) conduct an effective cost review process for the completed project and make an appropriate appraisal on the cost consumption; and</p> <p>(ii) maintain a good record of the cost review on the completed project for the reference of the forthcoming projects.</p>	
Remark	Co-Requisites: ITSWPM606A, ITSWPM608A, ITSWPM505A, ITSWPM615A, ITSWPM518A, ITSWPM620A	

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

1. Title	Determine quality policies and define quality requirements for a project
2. Code	ITSWPM613A
3. Range	Determine quality policies and define quality requirements for a project to ensure that a project will satisfy the needs for which it was undertaken [Project Management – Project Quality Management]
4. Level	6
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirement</u></p> <p>6.1 Understand principles and techniques of project quality management</p> <p>6.2 Determine project quality requirements</p> <p>6.3 Define quality for the project environment</p> <p>6.4 Exhibit professionalism</p> <p>Be able to initiate a project quality management exercise for an organisation's project</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ determine quality objectives, standards, and levels, with input from stakeholders and guidance of higher project authorities, to establish the basis for quality outcomes ▪ determine the organisation's quality policy ▪ develop project quality policies <p>Be able to define quality management in covering product quality criteria and measures, quality review (checkpoints), and the application of industrial standards where applicable</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ consider an organisation's business and practical constraints and requirements ▪ define appropriate quality requirements and quality policies to suit an organisation's specific environment
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to form a set of quality policies and quality requirements for project quality management of an organisation's project.
Remark	

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

1. Title	Develop a project quality management plan for project execution	
2. Code	ITSWPM614A	
3. Range	Develop a project quality management plan for an organisation to ensure that a project will satisfy the needs for which it was undertaken [Project Management – Project Quality Management]	
4. Level	6	
5. Credit	4	
6. Competency		<u>Performance Requirement</u>
	6.1 Understand principles and techniques of project quality management, standard methodologies and performance metrics	Be able to plan a project quality management exercise for an organisation's project
	6.2 Understand the business process analysis methodologies	Be able to have practical knowledge of business environments and requirements
	6.3 Understand project quality tools and techniques	Be able to master project quality tools and techniques for project quality planning
	6.4 Establish the quality path (road map) for the project and the project environment	Be able to articulate what and why is special about quality in the given project environment, and emulate activities to make project quality work
	6.5 Define quality review techniques and the quality review procedure	Be able to <ul style="list-style-type: none"> ▪ understand the fundamental principles and context of quality and review ▪ define the involved partnerships for the review, and the deliverables ▪ explain the quality review procedure including objectives, steps in the procedure, responsibilities, the review results and the key criteria
	6.6 Conduct project quality planning	Be able to <ul style="list-style-type: none"> ▪ develop project quality policies and ensure they are aligned with the organisation's quality policy ▪ utilize standard project quality tools and techniques ▪ develop project quality metrics and performance checklists ▪ develop a project quality management plan ▪ evaluate project quality control, assurance, improvement issues ▪ understand the business process analysis methodologies, business process re-engineering, and modelling of business process ▪ evaluate business process implementation and identify areas for continuous improvements ▪ communicate quality-related inputs of the

	<p>project, the project's product, and the related effects on other project planning processes to the project's stakeholders</p> <ul style="list-style-type: none"> ▪ define and develop the quality system, in particular the quality requirements, using the given methodology approach. The plan is composed of the purpose, composition, derivation and quality criteria
	<p>6.7 Exhibit professionalism</p> <p>Be able to consider an organisation's specific environment in developing a project quality plan to suit its requirements</p>
7. Assessment Criteria	<p>The integrated outcome requirements of this UoCs are the abilities to produce a project quality management plan documenting:</p> <ul style="list-style-type: none"> (iii) quality policies; (iv) quality performance metrics; (v) quality path for the project environment; and (vi) quality review and assurance procedure.
Remark	

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

1. Title	Conduct project closure with regard to quality
2. Code	ITSWPM615A
3. Range	Conduct project closure in relation to project quality management [Project Management – Project Quality Management]
4. Level	6
5. Credit	2
6. Competency	<p style="text-align: right;"><u>Performance Requirement</u></p> <p>6.1 Understand principles and techniques of project quality management</p> <p>6.2 Conduct project closure with regard to quality</p> <p>Be able to conduct project closure with regard to quality</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ document lessons learned, including causes of activities leading to quality changes, types of quality changes, reasons for selecting specific corrective actions, and classification of quality change causes for further analysis ▪ analyse all quality related documents and indirect information such as project change requests, risk log, issue log and stage report to review the final results from the project quality perspective ▪ produce a closure report
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) conduct project closure with regard to quality management; and (ii) document lessons learned and the final project quality management results.
Remark	Co-Requisites: ITSWPM606A, ITSWPM608A, ITSWPM505A, ITSWPM612A, ITSWPM518A, ITSWPM620A

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

1. Title	Conduct project closure with respect to the project team	
2. Code	ITSWPM616A	
3. Range	Conduct project closure with respect to the project team [Project Management – Project Human Resources Management]	
4. Level	6	
5. Credit	2	
6. Competency		<p style="text-align: center;"><u>Performance Requirement</u></p> <p>6.1 Have knowledge on project closure processes</p> <p>6.2 Review resource utilization</p> <p>6.3 Document project data and lessons learnt</p> <p>6.4 Provide feedback to improve future organisational projects</p> <p>6.5 Conduct transition activities in a professional manner</p>
		<p>Be able to</p> <ul style="list-style-type: none"> ▪ understand the processes of resource utilization review ▪ understand the activities for archiving information and transition <p>Be able to</p> <ul style="list-style-type: none"> ▪ review planned and actual project resources utilized at project closure ▪ track and report the differences <p>Be able to</p> <ul style="list-style-type: none"> ▪ document causes of events that leads to changes ▪ list types of changes introduced ▪ explain reasons for selecting specific corrective actions <p>Be able to</p> <ul style="list-style-type: none"> ▪ classify change causes for further analysis ▪ update resources estimation factors as feedback for future projects <p>Be able to</p> <ul style="list-style-type: none"> ▪ implement transition activities to empower local champions for continuous operations and maintenance according to organisational procedures and guidelines ▪ execute transition activities to return resources to parent organisation according to organisational policies
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) conduct key resources review and documentations; and (ii) implement transition activities to release resources.	
Remark		

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

1. Title	Establish a risk management approach and process for a project		
2. Code	ITSWPM617A		
3. Range	Establish a risk management approach and process to set up a project risk management plan for a project in order to minimize negative risks while maximizing positive risks [Project Management – Project Risk Management]		
4. Level	6		
5. Credit	2		
6. Competency	<table border="0" style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> <p>6.1 Understand principles and techniques of project risk management</p> <p>6.2 Conduct preliminary risk planning</p> <p>6.3 Establish risk management approach and process for the project</p> <p>6.4 Exhibit professionalism</p> </td> <td style="width: 50%; vertical-align: top;"> <p><u>Performance Requirement</u></p> <p>Be able to establish a project risk management approach and process for an organisation's project</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify and review organisation's risk management policies and procedures ▪ identify risk tolerance levels of stakeholders ▪ identify preliminary risk <p>Be able to</p> <ul style="list-style-type: none"> ▪ define types of risk (e.g. Business Risk and Project Risk) ▪ include guidelines and appropriate documentation <p>Be able to establish an appropriate approach and process for project management which best suit an organisation's specific environment</p> </td> </tr> </table>	<p>6.1 Understand principles and techniques of project risk management</p> <p>6.2 Conduct preliminary risk planning</p> <p>6.3 Establish risk management approach and process for the project</p> <p>6.4 Exhibit professionalism</p>	<p><u>Performance Requirement</u></p> <p>Be able to establish a project risk management approach and process for an organisation's project</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify and review organisation's risk management policies and procedures ▪ identify risk tolerance levels of stakeholders ▪ identify preliminary risk <p>Be able to</p> <ul style="list-style-type: none"> ▪ define types of risk (e.g. Business Risk and Project Risk) ▪ include guidelines and appropriate documentation <p>Be able to establish an appropriate approach and process for project management which best suit an organisation's specific environment</p>
<p>6.1 Understand principles and techniques of project risk management</p> <p>6.2 Conduct preliminary risk planning</p> <p>6.3 Establish risk management approach and process for the project</p> <p>6.4 Exhibit professionalism</p>	<p><u>Performance Requirement</u></p> <p>Be able to establish a project risk management approach and process for an organisation's project</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify and review organisation's risk management policies and procedures ▪ identify risk tolerance levels of stakeholders ▪ identify preliminary risk <p>Be able to</p> <ul style="list-style-type: none"> ▪ define types of risk (e.g. Business Risk and Project Risk) ▪ include guidelines and appropriate documentation <p>Be able to establish an appropriate approach and process for project management which best suit an organisation's specific environment</p>		
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to establish an appropriate approach to project risk management and effective process for an organisation's project.		
Remark			

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

1. Title	Develop a risk management plan	
2. Code	ITSWPM618A	
3. Range	Develop a project risk management framework of a project in order to minimize negative risks while maximizing positive risks [Project Management – Project Risk Management]	
4. Level	6	
5. Credit	2	
6. Competency		<p style="text-align: center;"><u>Performance Requirement</u></p> <p>Be able to plan a project risk management exercise for an organisation's project</p>
	6.1 Understand principles and techniques of project risk management	
	6.2 Conduct risk management plan	<p>Be able to</p> <ul style="list-style-type: none"> ▪ identify roles, responsibilities, and levels of authority for risk management decision-making ▪ review and expand preliminary risk assessment matrix ▪ develop risk management plan ▪ develop the process by which risk identification and quantification will be maintained
	6.3 Conduct risk identification	<p>Be able to</p> <ul style="list-style-type: none"> ▪ identify potential project risk events ▪ identify the sources of possible internal/external risk events ▪ develop flowcharts to determine the causes and effects of risk ▪ classify potential risk events, the ranges of possible outcomes and risk interactions anticipated during various project phases ▪ identify risk symptoms or triggers
	6.4 Conduct qualitative risk analysis	<p>Be able to</p> <ul style="list-style-type: none"> ▪ document the manifestations of risk events ▪ confirm stakeholders' risk tolerances ▪ estimate risk event probability, consequence and frequency ▪ estimate risk event value and related range of possible project costs ▪ develop probability/impact risk ranking for the project ▪ develop a list of prioritized risks ▪ determine overall risk ranking for the project
	6.5 Conduct quantitative risk analysis	<p>Be able to</p> <ul style="list-style-type: none"> ▪ conduct risk interviews with project stakeholders and subject-matter experts to support quantitative risk analysis ▪ conduct sensitivity analysis on probable risk events ▪ utilize simulation to analyse the behaviour/performance of the project system ▪ develop analysis techniques to depict key interactions

	<ul style="list-style-type: none"> ▪ communicate the limitations of risk quantification in order to avoid false impressions of risk assessment reliability prepare a probabilistic risk analysis for the project <p>6.6 Exhibit professionalism</p> <p>Be able to consider an organisation's business and practical constraints and requirements when developing a risk management plan in light of the organisation's specific environment</p>
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to compile a risk management plan documenting the possible project risks, impact and preventive measures, roles and responsibility, change management requirements and procedures and budget with the risk factor.
Remark	

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

1. Title	Develop a risk response plan
2. Code	ITSWPM619A
3. Range	Develop a risk management plan for a project in order to minimize negative risks while maximizing positive risks [Project Management – Project Risk Management]
4. Level	6
5. Credit	2
6. Competency	<p style="text-align: right;"><u>Performance Requirement</u></p> <p>6.1 Understand principles and techniques of project risk management Be able to plan a risk response exercise for an organisation's project</p> <p>6.2 Understand a project risk management plan Be able to comprehend a risk management plan in respect of the possible project risks, impact and preventive measures, roles and responsibility, change management requirements and procedures and budget with the risk factor</p> <p>6.3 Conduct risk response planning Be able to</p> <ul style="list-style-type: none"> ▪ work with stakeholders to develop risk responses ▪ determine procurement feasibility as a risk reduction tool ▪ develop contingency plans, implementation criteria, and alternative strategies ▪ determine insurance coverage needs ▪ determine risk events warranting responses ▪ assign risk owners ▪ identify other processes affected by risk planning iterations ▪ estimate the price of non-conformance to identified risks ▪ determine and document the appropriateness of specific risk event strategies ▪ describe potential differences in risk event estimates depending on the project phase ▪ determine contingency reserve amounts needed ▪ develop a risk response plan <p>6.4 Exhibit professionalism Be able to consider stakeholders' views, the organisation's business and practical constraints and requirements when develop a risk response plan in light of its specific environment</p>
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to produce a risk response plan documenting risk responses, contingency plans, implementation criteria, alternative strategies, insurance coverage needs, risk events warranting responses, risk owners, the price of non-conformance to identified risks, specific risk event strategies.
Remark	

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

1. Title	Conduct project closure with respect to project risk management	
2. Code	ITSWPM620A	
3. Range	Perform project evaluation with respect to project risk management during the closing stage of a project [Project Management – Project Risk Management]	
4. Level	6	
5. Credit	1	
6. Competency	<p>6.1 Understand project risk management plans</p> <p>6.2 Understand a project risk response plan</p> <p>6.3 Conduct project closure with regard to risk management</p>	<p><u>Performance Requirement</u></p> <p>Be able to comprehend risk management plans in relation to the possible project risks, impact and preventive measures, roles and responsibility, change management requirements and procedures and budget with the risk factor</p> <p>Be able to comprehend a risk response plan in relation to</p> <ul style="list-style-type: none"> ▪ risk responses, contingency plans, and implementation criteria ▪ alternative strategies, insurance coverage needs, risk events warranting responses, risk owners, the price of non-conformance to identified risks, and specific risk event strategies <p>Be able to</p> <ul style="list-style-type: none"> ▪ review project risks and solutions and lessons learnt ▪ review project outcomes to determine the effectiveness of risk management processes and procedures ▪ identify, document and report risk issues to recommend improvements to a higher project authority for application in future projects add new risk factors and preventive measures for future risk management plan, if necessary
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) conduct project closure with regard to risk management; and (ii) document review of project risks and solutions, lessons learned and recommendations of improvement based in risk issue reports.	
Remark	Co-Requisites: ITSWPM606A, ITSWPM608A, ITSWPM505A, ITSWPM612A, ITSWPM616A, ITSWPM518A	

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

1. Title	Establish preliminary procurement policies and procedures
2. Code	ITSWPM621A
3. Range	Establish preliminary procurement policies and procedures for an organisation to outsource a particular project (or part of it) [Project Management – Project Procurement and Contract Management]
4. Level	6
5. Credit	5
6. Competency	<p style="text-align: right;"><u>Performance Requirement</u></p> <p>6.1 Have knowledge in the corporate resource allocation scheme Be able to collect the corporate resources and their consumption details</p> <p>6.2 Establish preliminary procurement policies in a professional manner Be able to draft the policies and criteria guidelines for procurement requisition in the following areas</p> <ul style="list-style-type: none"> ▪ level of resource requirement in monetary term ▪ level of technical difficulties and complexity ▪ amount of manpower required ▪ risk factor <p>6.3 Define the procurement requisition procedure Be able to develop detailed procedures for submitting applications for tender bidding or request for quotation</p> <p>6.4 Establish complete general guidelines for legal concerns Be able to draft a preliminary guidelines concerning the legal terms and conditions for the procurement of contracts including</p> <ul style="list-style-type: none"> ▪ confidentiality ▪ liabilities ▪ penalty clause for project abortion ▪ insurance coverage
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) set up criteria for outsourcing project; (ii) develop concise procedure guidelines for making procurement requests; and (iii) provide general legal concerns for procurement management.
Remark	

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

1. Title	Conduct project procurement planning	
2. Code	ITSWPM622A	
3. Range	Prepare and specify a project procurement plan for an	
4. Level	6	
5. Credit	6	
6. Competency		<p style="text-align: center;"><u>Performance Requirement</u></p> <p>6.1 Have knowledge in identifying which particular project needs can best be met by procuring services outside the organisation</p> <p>6.2 Define the project scope statement</p> <p>6.3 Produce a product description</p> <p>6.4 Identify the procurement expertise</p> <p>6.5 Conduct make-or-buy analysis</p> <p>6.6 Develop a procurement management plan and a statement of work in a professional manner</p>
		<p>Be able to evaluate the following considerations on</p> <ul style="list-style-type: none"> ▪ whether to procure ▪ how to procure ▪ what to procure ▪ how much to procure ▪ when to procure <p>Be able to write a project scope statement that describes the project boundaries with sufficient information about project needs and strategies which must be considered during procurement planning</p> <p>Be able to write a product description that describes the ultimate end-product of the project, statement of work from the contractor and information about any technical issues or concerns</p> <p>Be able to identify the expertise in the organisation to support project procedure activities</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ determine whether in-house development would be more cost-effective than outsourcing based on direct costs and indirect costs comparison ▪ acquire expert judgment from consultants, professional and technical associations and industry groups if necessary <p>Be able to work out a procurement management plan addressing</p> <ul style="list-style-type: none"> ▪ types of contracts to be used ▪ evaluation criteria ▪ procurement documents ▪ management of multiple providers if being adopted ▪ coordination in the procurement process
7. Assessment Criteria	<p>The integrated outcome requirements of this UoCs are the abilities to:</p> <p>(i) develop a procedure management plan describing how the remaining procurement processes (from solicitation planning through contract close-out) are to be managed; and</p> <p>(ii) write a clear, complete and concise statement of work as reference during the procurement process management.</p>	
Remark		

Appendix D.3 UoCs in Architecture

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

1. Title	Document the abstracted layer design of the network architecture						
2. Code	ITSWAR401A						
3. Range	Document the abstracted layer design of the network architecture and its constraints, including both the current baseline model and the targeted network architecture [Architecture – Network Architecture]						
4. Level	4						
5. Credit	2						
6. Competency	<table border="0"> <tr> <td></td> <td style="text-align: right;"><u>Performance Requirement</u></td> </tr> <tr> <td>6.1 Understand the basic building blocks of a network architecture design</td> <td>Be able to describe and identify the building blocks of a network architecture design and its basic components See Remark 1 for examples of building blocks.</td> </tr> <tr> <td>6.2 Document the design of a network architecture in a professional manner</td> <td>Be able to properly document the design of a network architecture aligning with the organisation's policies as well as industry standards and practices See Remark 2 for items of a network technology architecture document</td> </tr> </table>		<u>Performance Requirement</u>	6.1 Understand the basic building blocks of a network architecture design	Be able to describe and identify the building blocks of a network architecture design and its basic components See Remark 1 for examples of building blocks.	6.2 Document the design of a network architecture in a professional manner	Be able to properly document the design of a network architecture aligning with the organisation's policies as well as industry standards and practices See Remark 2 for items of a network technology architecture document
	<u>Performance Requirement</u>						
6.1 Understand the basic building blocks of a network architecture design	Be able to describe and identify the building blocks of a network architecture design and its basic components See Remark 1 for examples of building blocks.						
6.2 Document the design of a network architecture in a professional manner	Be able to properly document the design of a network architecture aligning with the organisation's policies as well as industry standards and practices See Remark 2 for items of a network technology architecture document						
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to properly document the design of a network architecture following the organisation's policies as well as industry standards and practices.						
Remark	<ol style="list-style-type: none"> 1. Examples of building blocks are network layers, communication protocols, and circuit specifications. 2. The items in network technology architecture design document are <ol style="list-style-type: none"> a) the architecture design, its constraints, vision and principles of network technology architecture (See Remark 3 for examples of these principles); and b) the building blocks and their interfaces of the network architecture and their rationale for the decision made (See Remark 1 for examples of building blocks). 3. Network technology architecture principles should at least include the following aspects <ol style="list-style-type: none"> a) resilience level; b) Quality of service (QoS) especially for multimedia applications, e.g. jitter on interactive voice applications, colouring or weighed queuing model for different class of services; c) network bandwidth and rate limits; d) network performance requirements at different mobility models; and e) roaming. 						

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

1. Title	Maintain a library of reusable application components
2. Code	ITSWAR402A
3. Range	Form a library of reusable application components from the applications to be used as building blocks for future application software architecture or for future ICT infrastructure of an organisation [Architecture – Application Software Architecture]
4. Level	4
5. Credit	1
6. Competency	<p style="text-align: center;"><u>Performance Requirement</u></p> <p>6.1 Understand the functions of each building block and the relationship between different building blocks under the adopted application software architecture</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ determine whether a building block is part of a certain application software architecture ▪ identify whether a building block conforms to the requirements of a certain application software architecture ▪ justify whether a building block is commonly reusable by the other similar applications <p>6.2 Maintain a common library of reusable application software components</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ set up a common framework for application development ▪ maintain and update a common library of reusable application software components (to be used as software architecture building blocks in the future) as part of the ICT infrastructure of an organisation for reuse ▪ ensure that each building block in the library conforms to the adopted application software architecture standards <p>6.3 Devise a mechanism to facilitate the update of the library of reusable application software components</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ develop guidelines for other applications to adopt the library of reusable application software components ▪ devise a feedback mechanism for the application project teams to submit comments and suggestions to the library of reusable application software components ▪ manage the configuration of the components in the common library to ensure their proper integration with application software to be developed in the future
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to maintain and update a common library of reusable application software components to be used in future software development and to become part of the ICT infrastructure of an organisation for reuse.
Remark	

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

1. Title	Evaluate and select architecture design options and related architecture artefacts
2. Code	ITSWAR501A
3. Range	Adopt a set of guidelines for evaluating, trading-off and making decisions for selecting architecture design options and related architecture artefacts to aid the development of IT solutions in an organisation [Architecture – Architecture Framework and Vision]
4. Level	5
5. Credit	2
6. Competency	<p style="text-align: right;"><u>Performance Requirement</u></p> <p>6.1 Understand various methods for evaluating architecture tools, repositories and repository management process Be able to evaluate the suitability of different tools, repositories and repository management processes to support architecture design, implementation and maintenance efforts</p> <p>6.2 Understand the scope and components of the architecture effort Be able to define the scope of, and to identify and prioritise the components of, the architecture effort</p> <p>6.3 Adopt a set of guidelines/criteria for evaluating architecture tools, repositories and repository management processes Be able to define and adopt a set of guidelines/criteria for evaluating the following items to be used to capture, publish, and maintain architecture artefacts such as</p> <ul style="list-style-type: none"> ▪ architecture tools ▪ architecture repositories ▪ architecture repository management processes <p>6.4 Align the chosen guidelines for evaluating architecture tools, repositories and repository management processes with the organisation's policies and mandates Be able to adopt a set of guidelines so that it aligns with the organisation's policies and mandates in areas including</p> <ul style="list-style-type: none"> ▪ procurement management ▪ asset management ▪ partnership development ▪ strategic alliance development
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to adopt a set of guidelines for evaluating, trading-off and making decisions for selecting architecture design options and related architecture artefacts to aid the development of IT solutions in an organisation.
Remark	Pre-requisite: ITSWAR601A

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

1. Title	Review and make improvements to the relevant architecture development initiatives
2. Code	ITSWAR502A
3. Range	Investigate, evaluate, adopt and make improvements to the relevant architecture development initiatives, including technology architecture designs, undertaken by the IT industry [Architecture – Architecture Framework and Vision]
4. Level	5
5. Credit	2
6. Competency	<p style="text-align: right;"><u>Performance Requirement</u></p> <p>6.1 Understand various architecture frameworks Be able to evaluate and apply current trends in architecture design and the mainstream technologies used to support such design frameworks and styles</p> <p>6.2 Determine and select a suitable framework Be able to</p> <ul style="list-style-type: none"> ▪ Investigate, analyse and evaluate the relative merits of different architecture frameworks ▪ select the most appropriate architecture framework taking into consideration the developmental trends in the industry <p>6.3 Improve the selected architecture framework Be able to modify and adapt the selected architecture framework to improve its technology components, processes and underlying structures for maximum benefits to the organisation</p> <p>6.4 Investigate, analyse, evaluate, adopt and make improvements to the relevant architecture development initiatives in a professional manner Be able to systematically investigate, analyse, evaluate, adopt, and make improvements to the relevant architecture development initiatives while observing local (organisation or industry), national as well as international best practices and current trends in architecture design and implementation work</p>
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to review the adopted framework with possible improvements being made on the relevant architecture development initiatives including the technology components to best suit the needs of the organisation.
Remark	Pre-requisite: ITSWAR601A

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

1. Title	Define and develop various architecture design building blocks (components) for an organisation	
2. Code	ITSWAR503A	
3. Range	Adopt a framework including its well-defined steps for the development of various architectural design building blocks (components) for an organisation [Architecture – Architecture Framework and Vision]	
4. Level	5	
5. Credit	2	
6. Competency	<p>6.1 Understand the relationship of the architecture framework and the business requirements of the organisation</p> <p>6.2 Adopt a selected architecture framework</p> <p>6.3 Adopt suitable methods to implement the architecture</p> <p>6.4 Adopt an architecture framework in a professional manner</p>	<p><u>Performance Requirement</u></p> <p>Be able to understand the architecture framework so as to evaluate the suitability of the framework with respect to the business needs of the organisation</p> <p>Be able to systematically and objectively evaluate and select an appropriate architecture framework to support the IT development of the organisation</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ decompose the adopted framework into coherent building blocks to facilitate their integration ▪ identify the interfaces between these building blocks ▪ specify the functionalities of the components in each building block ▪ define suitable methodologies used to develop the building blocks and integrate them into the desired architecture <p>Be able to systematically and objectively evaluate and select an appropriate architecture framework in compliance with the organisation's policies as well as any applicable laws and regulatory requirements</p>
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to systematically and objectively define and develop an architecture framework for the organisation.	
Remark	Pre-requisite: ITSWAR502A	

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

1. Title	Perform gap analysis of the current business architecture against the target business architecture
2. Code	ITSWAR504A
3. Range	Perform gap analysis of the current baseline against the target business architecture so as to find out components (e.g. services, functions) that need to be developed in the target business architecture and/or removed from the current baseline [Architecture – Business Architecture]
4. Level	5
5. Credit	3
6. Competency	<p style="text-align: right;"><u>Performance Requirement</u></p> <p>6.1 Understand the basic components and viewpoints of a business architecture Be able to understand the basic components and viewpoints in a business architecture (See Remark 1 for the examples of business architecture components)</p> <p>6.2 Identify the architecture building blocks in the existing business architecture and the target business architecture Be able to define a gap analysis matrix between all building blocks in existing business architecture and all building blocks in the target business architecture</p> <p>6.3 Identify and analyse the gaps between the baseline and target business architecture Be able to systematically identify the building blocks (e.g. services, functions) that need to be developed in the target business architecture and/or removed from the current baseline business architecture (See Remark 2 for examples of potential sources of gaps)</p> <p>6.4 Reason why certain building blocks are removed from the existing business architecture and some new building blocks are included in the target business architecture Be able to</p> <ul style="list-style-type: none"> ▪ clearly explain the reasons to exclude those building blocks (e.g. services, functions) from the existing business architecture so that the target business architecture aligns with the business goals ▪ clearly explain the reasons to include new building blocks (e.g. services, functions) so that the target business architecture aligns with the business goals
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) identify and analyse the gaps between the baseline and target business architectures; and (ii) explain the rationale behind the elimination and introduction of building blocks for the target business architecture.

Remark	<ol style="list-style-type: none">1. Examples of business architecture components and viewpoints are:<ol style="list-style-type: none">a) organisation structure;b) business goals and objectives;c) business functions;d) business services;e) business processes, including measures and deliverables;f) business roles, including development and modification of skills requirements;g) business data model; andh) correlation of organisation and functions.(source: http://www.opengroup.org/architecture/togaf8-doc/arch/toc.html) 2. Examples of potential sources of gaps are:<ol style="list-style-type: none">a) people gaps;b) process gaps;c) tools gaps;d) information gaps;e) measurement gaps;f) financial gaps; andg) facilities gaps.(source: http://www.opengroup.org/architecture/togaf8-doc/arch/toc.html) 3. Pre-requisite: ITSWAR605A 4. Co-requisites: ITSWAR606A, ITSWAR505A
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**Information and Communications Technology Industry Training Advisory Committee
Software Products and Software Services (SW) branch
Unit of Competencies**

1. Title	Define metrics and methodologies to measure business performance of applying new technologies
2. Code	ITSWAR505A
3. Range	Define metrics and methodologies for evaluating the business performance under the existing and new technology architectures [Architecture – Business Architecture]
4. Level	5
5. Credit	3
6. Competency	<p style="text-align: right;"><u>Performance Requirement</u></p> <p>6.1 Understand various metrics and methodologies Be able to understand various metrics and methodologies for evaluating the business performance for adopting existing and new technologies See Remark 1 for examples of metrics and methodologies.</p> <p>6.2 Understand the business impact of adopting new technologies Be able to perform impact and risk analysis on the usage of existing technologies and new technologies in the business architecture See Remark 2 for examples of related methods.</p> <p>6.3 Perform the cost-benefit analysis of adopting new technologies Be able to use appropriate metrics and methodologies to measure the costs and benefits of adopting a new technology in the business architecture See Remark 2 for examples of related methods.</p> <p>6.4 Correlate the business performance indicators to technology capability metrics Be able to map the technology capability metrics (e.g. transaction throughput) to business performance indicators (e.g. transaction cost) for establishment of possible improvement via the use of new technologies</p>
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) perform the cost-benefit analysis of adopting new technologies to the business architecture; (ii) continuously monitor the business performance of using the existing technologies; and (iii) continuously seek improvement on business performance via new technologies.
Remark	<p>1. Examples of metrics and methodologies are: a) Key Performance Indicators b) Return on investment analysis c) Internal rate of return d) Balanced scorecard</p> <p>2. Examples of related methods are cost-benefit analysis and force field analysis.</p> <p>3. Pre-requisite: ITSWAR605A</p> <p>4. Co-requisites: ITSWAR504A, ITSWAR606A</p>

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

1. Title	Promote and explain the new business architecture to stakeholders in an organisation
2. Code	ITSWAR506A
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 [Architecture – Business Architecture]
4. Level	5
5. Credit	2
6. Competency	<p style="text-align: center;">Performance Requirement</p> <p>6.1 Communicate the new business architecture to the stakeholders Be able to clearly document the new business architecture and communicate the new business architecture to the stakeholders</p> <p>6.2 Facilitate stakeholders to review and provide feedback on the new business architecture Be able to establish an organisational structure for different stakeholders to</p> <ul style="list-style-type: none"> ▪ review new business architecture ▪ collect comments on new business architecture from stakeholders ▪ amend the new business architecture according to feedback ▪ approve the new business architecture <p>6.3 Educate stakeholders on new business architecture Be able to</p> <ul style="list-style-type: none"> ▪ clearly explain new business architecture to the stakeholders in the organisation ▪ promote new business architecture to the stakeholders for their buy-in and support ▪ provide training to the stakeholders on new business architecture
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) communicate the new business architecture to the stakeholders; (ii) facilitate stakeholders to review and provide feedback on the new business architecture; and (iii) educate stakeholders on the new business architecture.
Remark	Pre-requisite: ITSWAR607A

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

1. Title	Model technology architecture	
2. Code	ITSWAR507A	
3. Range	Model technology architecture using architecture building blocks and by considering appropriate architecture viewpoints for the particular problem domain or industry [Architecture – Technology Architecture]	
4. Level	5	
5. Credit	4	
6. Competency	<p>6.1 Understand technology architecture viewpoints</p> <p>6.2 Identify, evaluate and apply technology architecture tools and techniques</p> <p>6.3 Develop technology architecture tools and techniques</p> <p>6.4 Use a building block approach to model the architecture</p> <p>6.5 Understand the inter-relationships of the various viewpoints</p> <p>6.6 Develop an initial technology architecture using building block approach</p>	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify relevant stakeholders of the technology architecture ▪ select technology architecture viewpoints to address stakeholders' concerns <p>See Remark 1 for examples of technology architecture viewpoints.</p> <p>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> <p>Be able to abstract the technology architecture based on the relevant viewpoints into architecture building blocks</p> <p>Be able to integrate the various viewpoints in the architecture model in order to</p> <ul style="list-style-type: none"> ▪ facilitate the building blocks decomposition and ▪ enhance the understanding of the audience <p>Be able to develop and document the initial technology architecture through the use of appropriate architecture building blocks</p>
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities 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.	
Remark	<p>1. Examples of technology architecture viewpoints include hardware, communication, processing, standards, cost, and integration.</p> <p>2. Pre-requisite: ITSWAR614A</p>	

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

1. Title	Define metrics to ensure that a technology architecture meets the business goals										
2. Code	ITSWAR508A										
3. Range	Define metrics to evaluate and analyse technology architectures to ensure that it can support the business goals and objectives. [Architecture – Technology Architecture]										
4. Level	5										
5. Credit	3										
6. Competency	<table border="0"> <tr> <td></td> <td style="text-align: right;"><u>Performance Requirement</u></td> </tr> <tr> <td>6.1 Understand the principles of quality assurance</td> <td>Be able to articulate the needs for quality assurance to ensure that the resulting technology architecture really meets the required quality standards</td> </tr> <tr> <td>6.2 Understand the purposes of relevant metrics for quality standards</td> <td>Be able to define relevant metrics for quality standards which reflects the business goals and objectives in a quality assurance exercise.</td> </tr> <tr> <td>6.3 Define metrics for quality standards</td> <td>Be able to define appropriate and measurable metrics to evaluate the ability of a technology architecture to meet the business goals and objectives (See Remark)</td> </tr> <tr> <td>6.4 Exhibit professional skills</td> <td>Be able to <ul style="list-style-type: none"> ▪ conduct a formal checkpoint review of the architecture model and building blocks with stakeholders, validating that the business goals are met ▪ document all findings </td> </tr> </table>		<u>Performance Requirement</u>	6.1 Understand the principles of quality assurance	Be able to articulate the needs for quality assurance to ensure that the resulting technology architecture really meets the required quality standards	6.2 Understand the purposes of relevant metrics for quality standards	Be able to define relevant metrics for quality standards which reflects the business goals and objectives in a quality assurance exercise.	6.3 Define metrics for quality standards	Be able to define appropriate and measurable metrics to evaluate the ability of a technology architecture to meet the business goals and objectives (See Remark)	6.4 Exhibit professional skills	Be able to <ul style="list-style-type: none"> ▪ conduct a formal checkpoint review of the architecture model and building blocks with stakeholders, validating that the business goals are met ▪ document all findings
	<u>Performance Requirement</u>										
6.1 Understand the principles of quality assurance	Be able to articulate the needs for quality assurance to ensure that the resulting technology architecture really meets the required quality standards										
6.2 Understand the purposes of relevant metrics for quality standards	Be able to define relevant metrics for quality standards which reflects the business goals and objectives in a quality assurance exercise.										
6.3 Define metrics for quality standards	Be able to define appropriate and measurable metrics to evaluate the ability of a technology architecture to meet the business goals and objectives (See Remark)										
6.4 Exhibit professional skills	Be able to <ul style="list-style-type: none"> ▪ conduct 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 UoCs requirements of this UoCs are the abilities to validate that the business goals and other objectives of implementing the technology architecture are met.</p> <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>										
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										

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

1. Title	Define, review and validate network architecture principles
2. Code	ITSWAR509A
3. Range	Define, review and validate architecture principles for the network resources of an organisation to meet its business and application objectives based on geographic and physical constraints [Architecture – Network Architecture]
4. Level	5
5. Credit	2
6. Competency	<p style="text-align: right;"><u>Performance Requirement</u></p> <p>6.1 Understand various network technology architecture principles</p> <p style="margin-left: 40px;">Be able to</p> <ul style="list-style-type: none"> ▪ identify the interrelationships between various network technology architecture principles (See Remark 1) ▪ apply tools and technique to define their implications with business and application objectives <p>6.2 Develop a set of network technology architecture principles for the network resources in a professional manner</p> <p style="margin-left: 40px;">Be able to</p> <ul style="list-style-type: none"> ▪ understand the requirements of a network technology architecture to meet business and application objectives based on geographic and physical constraints ▪ review, define, validate and develop a set of network technology architecture principles for network resources of an organisation to support its business and application objectives ▪ ensure that the developed network technology architecture principles are in compliance with the organisation's guidelines as well as any (local and international) laws and regulatory requirements, if applicable
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to develop a set of network technology architecture principles for the network resources of an organisation to meet its business and application objectives based on geographic and physical constraints.
Remark	1. Network technology architecture principles should at least include the following aspects <ul style="list-style-type: none"> a) resilience level; b) Quality of service (QoS) especially for multimedia applications, e.g. jitter on interactive voice applications, colouring or weighed queuing model for different class of services; c) network bandwidth and rate limits; d) network performance requirements at different mobility models; and e) roaming.

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

1. Title	Develop a network technology architecture model	
2. Code	ITSWAR510A	
3. Range	Develop and recommend a network technology architecture model that is applicable to the needs of various stakeholders in an organisation [Architecture – Network Architecture]	
4. Level	5	
5. Credit	5	
6. Competency		<p style="text-align: center;"><u>Performance Requirement</u></p> <p>6.1 Understand various network technology architecture models</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ select the appropriate network technology architecture models for the business ▪ select the appropriate industry-based reference models for the business <p>6.2 Develop a network technology architecture model in a professional manner</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ develop an appropriate network architecture model based on the network technology architecture principles and business requirements in accordance with the organisation's policies and procedures ▪ systematically identify the building blocks that are needed in the target network architecture and/or should be removed from the current baseline network architecture ▪ clearly explain the reasons to exclude those building blocks to be removed from the baseline network architecture ▪ clearly explain the reasons to include those building blocks (e.g. services, functions) that are needed to support the target network architecture in alignment with the business needs ▪ clearly explain that the reasons to include those building blocks in the target network architecture is to align with the business goals ▪ select the appropriate industry-based reference model(s) for the business ▪ develop a network technology architecture model to meet the requirements as stated in the network technology architecture principles <p>6.3 Validate the network technology architecture model</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ test the network technology architecture model to ensure that it addresses the requirements for completeness ▪ conduct a formal checkpoint review of the architecture model and its building blocks with stakeholders, ensuring the business goals are met <p>perform final cross check to ensure the overall architecture model addresses the business requirements</p>

7. Assessment Criteria	The integrated outcome UoCs requirements of this UoCs are the abilities to develop a network technology architecture model that addresses the business requirements based on the stakeholder needs.
Remark	Pre-requisite: ITSWAR509A

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

1. Title	Perform gap analysis of the current network architecture against the business requirements
2. Code	ITSWAR511A
3. Range	Perform gap analysis of the current network architecture baseline against the relevant business requirements so as to find out the components (e.g. services, functions) that are needed to be developed in the target network architecture and/or to be removed from the current baseline [Architecture – Network Architecture]
4. Level	5
5. Credit	3
6. Competency	<p align="center"><u>Performance Requirements</u></p> <p>6.1 Understand the basic building blocks of a network architecture Be able to identify the building blocks of a network architecture and its basic components</p> <p>6.2 Identify the gaps between the baseline network architecture and the needs of new business requirements Be able to</p> <ul style="list-style-type: none"> ▪ identify the gaps between the baseline network architecture model based on the network technology architecture principles and the needs of business requirements in accordance with the organisation's policies and procedures ▪ identify the requirements in compliance of both local and international laws as well as regulatory requirements, if applicable <p>6.3 Perform gap analysis of the current baseline against the target business architecture in a professional manner Be able to</p> <ul style="list-style-type: none"> ▪ perform gap analysis of the current baseline and the target business architecture objectively in accordance with the organisation's guidelines, laws and regulatory requirements, if any ▪ design methodologies and define network architecture principles to close the gaps
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to perform gap analysis of the current baseline against the relevant business requirements so as to identify those building blocks that are needed to be developed in the target network architecture and/or to be removed from the current baseline, subject to stakeholder's needs.
Remark	Pre-requisite: ITSWAR509A

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

1. Title	Design and construction of network architecture
2. Code	ITSWAR512A
3. Range	Define, evaluate and apply appropriate international, national, industry, de-facto, and corporate standards for the design and construction of network architecture [Architecture – Network Architecture]
4. Level	5
5. Credit	3
6. Competency	<p style="text-align: right;"><u>Performance Requirement</u></p> <p>6.1 Understand international, national, industry, de-facto, corporate standards of network architecture</p> <p style="margin-left: 40px;">Be able to</p> <ul style="list-style-type: none"> ▪ lead and oversee the design, deployment and implementation of the network architecture for an organisation ▪ be aware of the compliance requirements of those related local and international laws as well as regulatory, if applicable <p>6.2 Define standards for the design and construction of network architecture</p> <p style="margin-left: 40px;">Be able to select relevant standards or adapt those in designing, deploying and implementing the network architecture for an organisation’s specific environment</p> <p>6.3 Evaluate standards for the design and construction of network architecture</p> <p style="margin-left: 40px;">Be able to</p> <ul style="list-style-type: none"> ▪ understand the impact of new technologies to the existing network architecture ▪ identify the pros and cons of different standards to support the target network architecture ▪ ensure that the following views are considered in the selection of standards: <ul style="list-style-type: none"> ➢ Hardware View ➢ Communications View ➢ Processing View ➢ Standards View ➢ Cost View <p>6.4 Apply standards for the design and construction of network architecture</p> <p style="margin-left: 40px;">Be able to employ defined standards in the design and construction of an organisation’s target network architecture</p> <p>6.5 Exhibit strong professionalism in performing this task</p> <p style="margin-left: 40px;">Be able to define appropriate standards for an organisation’s target network architecture to support its business functions in a highly professional manner</p>
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to apply appropriate standards in the design and construction of network architecture for the design and construction network architecture.
Remark	Pre-requisites: ITSWAR510A, ITSWAR511A, ITSWAR513A

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

1. Title	Model and analyse network architecture
2. Code	ITSWAR513A
3. Range	Apply appropriate tools for the modelling and analysis of various views of the network architecture [Architecture – Network Architecture]
4. Level	5
5. Credit	3
6. Competency	<p style="text-align: right;"><u>Performance Requirement</u></p> <p>6.1 Understand the tools and techniques for modelling and analysis of various views of the network architecture Be able to master modelling tools and techniques for the analysis of various views of the network architecture</p> <p>6.2 Develop, evaluate and apply appropriate tools for the modelling and analysis of various views of the network architecture Be able to</p> <ul style="list-style-type: none"> ▪ select relevant tools and techniques based on the types of various views ▪ determine whether the tools and techniques are sufficient for modelling and analysis of various views ▪ use appropriate tools and techniques to model and analyse different views of a network architecture ▪ ensure all views of a network architecture have been included in the modelling and analysis <p style="text-align: right;">See Remark for different views of a network architecture</p>
7. Assessment Criteria	The integrated outcome UoCs requirements of this UoCs are the abilities to apply appropriate tools to model and analyse various views of the network architecture.
Remark	Different views of a network architecture include hardware view, communications view, processing view, standards view and cost view

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

1. Title	Perform lifecycle management of the network architecture
2. Code	ITSWAR514A
3. Range	Ensure that the network architecture is capable of meeting current and future needs of an organisation [Architecture – Network Architecture]
4. Level	5
5. Credit	3
6. Competency	<p style="text-align: right;"><u>Performance Requirement</u></p> <p>6.1 Understand principles and techniques of life cycle management of the network architecture Be able to describe and document the appropriate life cycle for an adopted network architecture to ensure that the requirements based on Network Technology Architecture principles are met</p> <p>6.2 Understand the latest network technology development Be able to understand the trends of new technology and identify their impacts on the current network technologies</p> <p>6.3 Perform life cycle management of the network architecture Be able to perform tasks of different stages in the life cycle of the network architecture</p> <ul style="list-style-type: none"> ▪ Assessment ▪ Procurement ▪ Deployment ▪ Management ▪ Retirement <p>6.4 Perform life cycle management of the network architecture in a professional manner Be able to determine whether to update or to retire the adopted architecture with the latest network technologies during the management of the life cycle of the network architecture in the light of the organisation's specific environment</p>
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to ensure that the current and future needs of the organisation are met with the support of the adopted network architecture using the latest network technologies.
Remark	Pre-requisite: ITSWAR509A

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

1. Title	Establish guidelines for the adoption of application integration architecture	
2. Code	ITSWAR515A	
3. Range	Establish standards, best practices, verification processes and guidelines for the application integration architecture design(s) chosen by the organisation [Architecture – Application Integration Architecture]	
4. Level	5	
5. Credit	1	
6. Competency		<u>Performance Requirement</u>
	6.1 Understand industry standards and best practices	Be able to establish clear and enforceable standards and best practices, based on the (local and international) industry standards and best practices, for an organisation to use with the adopted application integration architecture
	6.2 Understand verification processes	Be able to create compliance verification processes for application systems to be integrated through the adopted application integration architecture based on the (local and international) industry standards and best practices
	6.3 Create usage guidelines	Be able to create usage guidelines for an organisation on standards, best practices and verification processes for the implementation of the adopted application integration architecture
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to establish a set of guidelines on the principles, standards, best practices and verification processes of the adopted application integration architecture.	
Remark		

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

1. Title	Ensure operable application integration architecture is in place	
2. Code	ITSWAR516A	
3. Range	Evaluate and define requirements for any necessary application monitoring and audit functions, and implement these functions on the adopted application integration architecture [Architecture – Application Integration Architecture]	
4. Level	5	
5. Credit	1	
6. Competency		<u>Performance Requirement</u>
	6.1 Establish application auditing requirements	Be able to <ul style="list-style-type: none"> ▪ define and establish application auditing requirements and checkpoints based on the adopted application integration architecture ▪ incorporate defined requirements and checkpoints into development methodology
	6.2 Create application audit functions	Be able to <ul style="list-style-type: none"> ▪ create quality assurance and audit functions and procedures to ensure the application integration architecture is of high quality ▪ incorporate those defined procedures into relevant documents such as development methodology
	6.3 Implement the audit functions	Be able to <ul style="list-style-type: none"> ▪ operate the application quality assurance and audit functions ▪ evaluate the outcomes of the quality assurance and audit functions against the relevant requirements
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to ensure that the application integration architecture is executable, manageable and auditable via setting up and implementing audit functions into the adopted application integration architecture.	
Remark	Application audit includes application monitor as it checks the operation of application integration against the requirements of the adopted application integration architecture.	

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

1. Title	Manage application integration architecture life cycle
2. Code	ITSWAR517A
3. Range	Define, manage and maintain resources to upkeep application in integration architecture in the most current status. [Architecture – Application Integration Architecture]
4. Level	5
5. Credit	1
6. Competency	<p style="text-align: right;"><u>Performance Requirement</u></p> <p>6.1 Understand the life cycle concept of application integration</p> <p>6.2 Define a life cycle management policy</p> <p>6.3 Identify the resource requirements to meet the life cycle management policy</p> <p>6.4 Maintain the life cycle management policy</p> <p>Be able to understand and document the life cycle of application integration including the relationships with other architecture models</p> <p>Be able to define a life cycle management policy including maintenance and change procedures of the adopted application integration architecture</p> <p>Be able to identify the resource requirements needed to review, maintain and change the life cycle of the application integration architecture</p> <p>Be able to utilize available resources to perform life cycle management of the application integration architecture work to ensure that the adopted architecture is</p> <ul style="list-style-type: none"> ▪ correctly reflecting the current and future needs of the organisation ▪ in-line with the technology advancement and availability of such technologies from the industry
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to ensure the application integration architecture is properly managed and maintained.
Remark	

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

1. Title	Understand the key characteristics of various application software architecture models
2. Code	ITSWAR518A
3. Range	Demonstrate clear understanding of the key characteristics of various application software architecture models for evaluating the feasibility of adopting those models to the software designed for an organisation [Architecture – Application Software Architecture]
4. Level	5
5. Credit	1
6. Competency	<p style="text-align: right;"><u>Performance Requirement</u></p> <p>6.1 Comprehend various application software architecture models and patterns, their variants and the various technologies behind them Be able to explain the assumptions, key features, underlying mechanisms, strengths and weaknesses of different application software architecture models See Remark for some examples of application software architecture models.</p> <p>6.2 Understand the similarities and differences between various application software architecture models Be able to contrast and name the pros and cons of using different application software architecture models under given requirements</p> <p>6.3 Understand the trends and paradigms, and the underlying reasons supporting the shift of paradigms of adopting various application software architecture models Be able to analyse the trend, name the driving forces and the restraining forces of the adoption of various application software architecture models</p>
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to (i) understand the key characteristics of various application software architecture models; (ii) understand the pros and cons of those models; and (iii) understand the background driving forces of those architecture models.
Remark	Examples of application software architecture models are JEE5, dot.Net, SAA, Client/Server, multi-Tier, and SOA.

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

1. Title	Develop application software architecture models	
2. Code	ITSWAR519A	
3. Range	Evaluate, perform trade-offs and recommend application software architecture models and patterns for an organisation or for solving existing problems related to software architecture in an organisation [Architecture – Application Software Architecture]	
4. Level	5	
5. Credit	2	
6. Competency	<p>6.1 Comprehend various application software architecture models and patterns, their variants and various technologies behind them</p> <p>6.2 Select and recommend the most appropriate application software architecture model</p> <p>6.3 Select and/or develop necessary application software architecture resources</p> <p>6.4 Select, recommend and develop appropriate application software architecture model(s) in a professional manner</p>	<p><u>Performance Requirement</u> Be able to explain the assumptions, key features, underlying mechanisms, strengths and weaknesses of different application software architecture models</p> <p>See Remark for some examples of application software architecture models.</p> <p>Be able to review, perform comparison and trade-offs and propose the most appropriate application software architecture model(s) for the software systems to be developed for an organisation or to solve existing problems related to software architecture in an organisation</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ select relevant application software architecture resources (e.g. standards and tools) based on the business drivers and their best fitness for intended purposes ▪ develop and implement application software architecture resources so as to <ul style="list-style-type: none"> ➢ support the application software architecture ➢ be included as part of the ICT infrastructure for an organisation <p>Be able to</p> <ul style="list-style-type: none"> ▪ review, select and recommend appropriate application software architecture model(s), standards and tools with professional judgement ▪ ensure that the adopted application software architecture(s) supports good software design and development practices and are in compliance with organisation's guidelines as well as any (local and international) laws and regulatory requirements, where applicable
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to develop the most appropriate application software architecture models for application software systems that satisfy the needs of all stakeholders.	
Remark	Examples of application software architecture models are JEE5, dot.Net, SAA, Client/Server, n-Tier, and SOA.	

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

1. Title	Keep in-house practices in line with industry best practices
2. Code	ITSWAR520A
3. Range	Develop and maintain methodologies, standards, practices and procedures in synchronisation with business, data and technology architectures and applicable to all software development projects in an organisation [Architecture – Application Software Architecture]
4. Level	5
5. Credit	2
6. Competency	<p style="text-align: center;"><u>Performance Requirement</u></p> <p>6.1 Understand which are the elements of good software design and development practices, and which are the pitfalls and traps in software development under the adopted application software architecture</p> <p>6.2 Develop methodologies, processes, and best practices</p> <p>6.3 Document the methodologies, processes, standards and best practices for the architecture model adopted</p> <p>6.4 Create templates to facilitate the enforcement of the methodologies, processes, standards and best practices developed</p> <p>6.5 Enforce the compliance of templates</p> <p>Be able to name the elements of good software design practices, and the pitfalls and traps in terms of usability, testability, extensibility, maintainability and manageability of the development work, under the assumption and constraints imposed by the adopted application software architecture</p> <p>Be able to develop methodologies, processes, and best practices for application software design, development and testing, which are in compliance with the organisation's guidelines as well as any (local and international) laws and regulatory requirements, where applicable</p> <p>Be able to clearly document the defined methodologies, processes, standards and best practices</p> <p>Be able to create templates on the architecture model adopted for enforcement of the developed methodologies, standards and best practices adopted by the organisation</p> <p>Be able to push the adoption through influencing, motivating and / or enforcing the use of the developed methodologies, processes, standards, best practices and templates in various development stages, for example, coding convention and source code management practice</p>
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to ensure that software development methodologies, standards, practices and procedures are maintained throughout the development life cycle and in-line with the technology advancement and availability of such technologies in the ICT industry.
Remark	Co-requisites: ITSWAR607A, ITSWAR611A, ITSWAR615A

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

1. Title	Understand the key characteristics of embedded software systems	
2. Code	ITSWAR521A	
3. Range	Demonstrate clear understanding of the key characteristics of embedded software systems through the application of suitable principles in the design of such software systems [Architecture – Embedded Software Architecture]	
4. Level	5	
5. Credit	3	
6. Competency		<p style="text-align: center;"><u>Performance Requirement</u></p> <p>6.1 Understand the key characteristics of embedded software systems Be able to explain the key characteristics of embedded software systems and their effects on the design of embedded software systems See Remark 1 for some examples of key characteristics of embedded software systems</p> <p>6.2 Understand the overall design requirements of embedded software systems Be able to explain the overall design requirements of embedded software systems See Remark 2 for some examples of design requirements of embedded software systems</p> <p>6.3 Understand the design principles applicable to embedded software systems Be able to explain the various design principles and how they are applicable to embedded software systems</p> <p>6.4 Apply the suitable principles in the design of embedded software systems Be able to use the suitable design principles in the design of embedded software system</p> <p>6.5 Design the embedded software system in a professional way Be able to demonstrate a high degree of professionalism and competence in the design of embedded software systems</p>
7. Assessment Criteria	The integrated outcome requirement of this UoCs are the abilities to apply suitable principles professionally in designing embedded software systems.	

Remark	<ol style="list-style-type: none">1. Some examples of the key characteristics of embedded software systems are<ol style="list-style-type: none">a) high dependence on hardware platform;b) small software footprints and code efficiency;c) many are real-time in nature;d) purpose-built for very specific problems;e) high reliability and robustness (self diagnostics and self correction are common requirements); andf) extremely high software quality (as distribution of software corrections after production release can be prohibitively costly). 2. The overall design requirements of embedded system might include:<ol style="list-style-type: none">a) purpose of the system;b) input and output specifications;c) performance criteria;d) usage patterns and environment;e) usability requirements and constraints;f) hardware platform; andg) physical constraints and footprints.
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**Information and Communications Technology Industry Training Advisory Committee
Software Products and Software Services (SW) branch
Unit of Competencies**

1. Title	Define, prioritise and document architecture vision and principles for an organisation
2. Code	ITSWAR601A
3. Range	For an organisation that requires agreement and adoption of suitable IT architecture vision and principles to support its (business) missions [Architecture – Architecture Framework and Vision]
4. Level	6
5. Credit	4
6. Competency	<p style="text-align: center;"><u>Performance Requirement</u></p> <p>6.1 Understand different IT architecture vision and principles</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ analyse the business requirements and drivers of the organisation ▪ understand various architecture vision and principles that can be used to support the organisation's business missions <p>6.2 Know various potential stakeholders and understand their needs and concerns</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify stakeholders and their needs ▪ analyse and understand their concerns for the formulation of suitable architecture vision and principles to optimize business opportunities <p>6.3 Define and prioritise the architecture vision and principles</p> <p>Be able to, and in accordance with the guidelines of the organisation as well as any (international and local) laws and regulatory requirements that may apply</p> <ul style="list-style-type: none"> ▪ define the architecture vision and principles that <ul style="list-style-type: none"> ➢ can address key business requirements and business drivers ➢ can deal with the constraints in the architecture effort ➢ will inform about the constraints of the architecture work ▪ define the relevant stakeholders and prioritise their concerns and objectives ▪ define the "architecture footprint" (See Remark) for the organisation ▪ define the scope and assumptions of the architecture effort ▪ articulate an architectural vision that demonstrates a response to those requirements and constraints, which includes the following <ul style="list-style-type: none"> ➢ the definition of benefits to be derived from the architecture ➢ the mapping of these benefits to business objectives <p>6.4 Document the architecture vision and principles in a professional manner</p> <p>Be able to compile and document the architecture vision and principles in an industry preferred form and format, in accordance with the guidelines of the organisation as well as any international and local laws and regulatory requirements that may apply</p>
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) rationally define, prioritise and document the architecture vision and principles for an organisation to support its business missions; and (ii) solicit management buy-in to implement the architecture vision and principles.

Remark	The architecture footprint refers to the people and resources that can be mobilized to perform architecture work at where they are located, and their responsibilities.
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**Information and Communications Technology Industry Training Advisory Committee
Software Products and Software Services (SW) branch
Unit of Competencies**

1. Title	Advocate and explain the adopted architecture design methodology to stakeholders
2. Code	ITSWAR602A
3. Range	Recommend and explain the adopted architecture design methodology, its underlying principles and expected benefits to the stakeholders in the organisation to obtain their buy-in and support [Architecture – Architecture Framework and Vision]
4. Level	6
5. Credit	2
6. Competency	<p style="text-align: right;"><u>Performance Requirement</u></p> <p>6.1 Have expert level understanding of the adopted IT architecture vision and principles of the organisation</p> <p style="margin-left: 40px;">Be able to</p> <ul style="list-style-type: none"> ▪ have thorough understanding of the business requirements and drivers of the organisation ▪ understand various architecture vision and principles that are relevant to the organisation's business missions ▪ have expert level understanding of the adopted architecture vision and principles of the organisation <p>6.2 Have in-depth understanding of the stakeholders' needs and their concerns</p> <p style="margin-left: 40px;">Be able to</p> <ul style="list-style-type: none"> ▪ identify stakeholders and their current and future needs ▪ analyse and understand their concerns articulate the ways by which the adopted architecture vision and principles can address their needs and concerns <p>6.3 Advocate and explain the adopted architecture design methodology, their underlying principles and expected benefits</p> <p style="margin-left: 40px;">Be able to</p> <ul style="list-style-type: none"> ▪ explain how the adopted architecture vision and principles can address key business requirements and business drivers of the organisation ▪ demonstrate to the relevant stakeholders that their concerns and objectives can be satisfied by the adopted architecture vision and principles ▪ articulate the adopted architectural vision accurately and proactively at all levels of the organisation and to obtain their buy-in and support ▪ ensure that the evolution of the adopted architecture and the resulting development cycles have proper recognition and endorsement from the executives of the organisation, and the support and commitment of the necessary line management
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to explain and recommend the adopted architecture design methodology, its underlying principles and expected benefits to the stakeholders in the organisation so as to obtain collective buy-in and support.
Remark	

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

1. Title	Establish processes to monitor the adopted architecture principles, design guidelines and resultant designs
2. Code	ITSWAR603A
3. Range	Establish processes to monitor the adopted architecture principles, design guidelines and resulting designs to ensure their fitness for the business purpose and conform to organisational vision [Architecture – Architecture Framework and Vision]
4. Level	6
5. Credit	2
6. Competency	<p style="text-align: center;"><u>Performance Requirement</u></p> <p>6.1 Understand the adopted architecture framework in the context of the business domain and other related constraints</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ understand the relationship between the adopted architecture framework and its underlying assumptions, pre-requisites and other business and environmental conditions ▪ analyse the impacts on the adopted architecture framework resulting from the changes in these conditions <p>6.2 Set up processes to ensure that the adopted architecture framework is fit for the purpose</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ define the validation process, that is, the steps required to confirm that the defined architecture framework is fit for the purpose in a changing environment ▪ define who is responsible for the validation process design the monitoring process, that is, process to perform the regular and / or event-driven validation of the architecture <p>6.3 Ensure that the adopted architecture framework is fit for the purpose</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ conduct systematic reviews of the adopted architecture framework and to validate its ability in adequately addressing the business principles, business goals and strategic business drivers of the organisation ▪ make necessary enhancements and changes to the adopted architecture framework to ensure its fitness for the purpose <p>6.4 Set up and execute the required monitoring and confirmation processes in a professional manner</p> <p>Be able to set up and execute the monitoring and confirmation processes for the architecture framework in accordance with the organisation's policies and guidelines</p>
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) define and establish the necessary processes to monitor and confirm that the adopted architecture framework is fit for the purpose of the organisation; (ii) execute these monitoring and confirmation processes to ensure the adopted architecture framework is evolving to meet the changing environment of the organisation; and (iii) communicate with the relevant stakeholders to obtain their support of the confirmation and monitoring processes.
Remark	

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

1. Title	Establish processes to manage the implementation of the adopted architecture designs
2. Code	ITSWAR604A
3. Range	Establish the necessary processes to manage the implementation of the adopted architecture designs in the organisation [Architecture – Architecture Framework and Vision]
4. Level	6
5. Credit	2
6. Competency	<p style="text-align: right;">Performance Requirement</p> <p>6.1 Define the most suitable governance structure for the implementation of the adopted architecture framework and designs Be able to define the governance structure to oversee and guide the implementation of the adopted architecture framework and designs</p> <p>6.2 Establish the necessary governance structure for the implementation of the adopted architecture framework and design Be able to set up the necessary governance structure consisting of key stakeholders to oversee and guide the implementation of the adopted architecture framework and designs</p> <p>6.3 Establish the necessary processes within this governance structure to oversee and guide the implementation of the adopted architecture designs in the organisation Be able to</p> <ul style="list-style-type: none"> ▪ establish the necessary operating procedures, including processes within the governance structure for effective decision-making ▪ share and distribute information effectively among members of the governance structure
7. Assessment Criteria	The integrated outcome UoCs requirements of this UoCs are the abilities to establish the processes to guide the implementation of the adopted architecture framework and designs, such processes include a governance structure with operating procedures and processes
Remark	

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

1. Title	Review the current baseline and develop a target business architecture for an organisation												
2. Code	ITSWAR605A												
3. Range	Review, analyse and document the current baseline and develop a target business architecture for an organisation based on its business principles, business goals, and strategic drivers [Architecture – Business Architecture]												
4. Level	6												
5. Credit	5												
6. Competency	<table border="0"> <tr> <td></td> <td style="text-align: center;">Performance Requirement</td> </tr> <tr> <td>6.1 Understand various tools and techniques of defining business architecture</td> <td>Be able to identify and apply various tools and techniques for defining a business architecture See Remark 1 for examples of tools and techniques of defining business architecture</td> </tr> <tr> <td>6.2 Understand various business principles, business goals, and strategic drivers</td> <td>Be able to identify the business principles, business goals and strategic drivers in the business architecture</td> </tr> <tr> <td>6.3 Understand the basic components and viewpoints in a business architecture</td> <td>Be able to understand the basic components and viewpoints in a business architecture See Remark 2 for the examples of business architecture components</td> </tr> <tr> <td>6.4 Review, analyse and document the current baseline business architecture</td> <td>Be able to review, analyse and document the current baseline business architecture by inventorying existing architecture building blocks, e.g. principles, models, standards, and current inventory (bottom-up approach)</td> </tr> <tr> <td>6.5 Develop a target business architecture</td> <td>Be able to identify the architecture building blocks and to develop a target business architecture based on the business principles, business goals, and strategic drivers (top-down approach)</td> </tr> </table>		Performance Requirement	6.1 Understand various tools and techniques of defining business architecture	Be able to identify and apply various tools and techniques for defining a business architecture See Remark 1 for examples of tools and techniques of defining business architecture	6.2 Understand various business principles, business goals, and strategic drivers	Be able to identify the business principles, business goals and strategic drivers in the business architecture	6.3 Understand the basic components and viewpoints in a business architecture	Be able to understand the basic components and viewpoints in a business architecture See Remark 2 for the examples of business architecture components	6.4 Review, analyse and document the current baseline business architecture	Be able to review, analyse and document the current baseline business architecture by inventorying existing architecture building blocks, e.g. principles, models, standards, and current inventory (bottom-up approach)	6.5 Develop a target business architecture	Be able to identify the architecture building blocks and to develop a target business architecture based on the business principles, business goals, and strategic drivers (top-down approach)
	Performance Requirement												
6.1 Understand various tools and techniques of defining business architecture	Be able to identify and apply various tools and techniques for defining a business architecture See Remark 1 for examples of tools and techniques of defining business architecture												
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6.5 Develop a target business architecture	Be able to identify the architecture building blocks and to develop a target business architecture based on the business principles, business goals, and strategic drivers (top-down approach)												
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) review, analyse and document the current baseline business architecture; and (ii) develop target business architecture with reference to the business principles, business goals and strategic drivers.												
Remark	<p>1. Examples of tools and techniques are:</p> <ol style="list-style-type: none"> a) Resource-Event-Agent business models; b) Zachman framework; c) Open Applications Group; and d) Universal Business Language. <p>2. Examples of business architecture components and viewpoints are:</p> <ol style="list-style-type: none"> a) Organisation structure; b) Business goals and objectives; c) Business functions; d) Business services; e) Business processes, including measures and deliverables; f) Business roles, including development and modification of skills requirements; g) Business data model; and h) Correlation of organisation and functions. <p>(source: http://www.opengroup.org/architecture/togaf8-doc/arch/toc.html)</p>												

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

1. Title	Capture, analyse and model various viewpoints of a business architecture	
2. Code	ITSWAR606A	
3. Range	Evaluate, develop and apply appropriate tools to capture, analyse and model various viewpoints of a business architecture so as to determine whether the stakeholders' concerns have been properly addressed [Architecture – Business Architecture]	
4. Level	6	
5. Credit	5	
6. Competency		Performance Requirement
	6.1 Understand different business modelling tools and techniques	Be able to select appropriate modelling tools to capture, analyse and model various viewpoints of business architecture (See Remark 1 for examples of tools and techniques)
	6.2 Evaluate and select modelling tools	Be able to evaluate and select appropriate tools for capture, model, and analyse stakeholders' viewpoints based on selected viewpoints and the degree of sophistication
	6.3 Develop modelling tools	Be able to develop new tools that can describe the viewpoints which cannot be supported by the current tools, e.g. spreadsheets and macros for measuring business performance, e.g. Return On Investment, ROI
	6.4 Apply modelling tools	Be able to apply appropriate tools to capture, model and analyse the business architecture building blocks
	6.5 Model and document business architecture to meet business principles, business goals and strategic drivers	Be able to exercise professional judgment to select appropriate modelling tools in capturing, modelling and analysing stakeholders' viewpoints
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to correctly capture, model and analyse all stakeholders' viewpoints of a business architecture so as to ensure stakeholders' concerns have been properly addressed.	
Remark	<p>1. Examples of tools and techniques for business modelling are:</p> <ul style="list-style-type: none"> a) Activity models (e.g. UML activity diagrams, flowcharts, Business Process Management Initiative (www.bpmi.org)) b) UML Use case models c) UML class models d) Organisation chart e) Data exchange matrix f) Document engineering (cde.berkeley.edu) <p>2. Pre-requisite: ITSWAR605A</p> <p>3. Co-requisites: ITSWAR504A, ITSWAR505A</p>	

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

1. Title	Review, design and re-engineer business processes to form a new business architecture
2. Code	ITSWAR607A
3. Range	Review, re-engineer and design business processes for optimal achievements of the agreed business goals and strategic drivers via adoption of new technologies [Architecture – Business Architecture]
4. Level	6
5. Credit	3
6. Competency	<p style="text-align: right;">Performance Requirement</p> <p>6.1 Define business performance indicators to meet with business goals Be able to define business performance indicators to meet with strategic drivers and stakeholders' concerns (See Remark 1 for examples of metrics and methodologies)</p> <p>6.2 Identify, design, and re-engineer business processes of an organisation with new technologies to improve business performance 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> <p>6.3 Continuously measure and monitor the business performance of using the existing technologies. Be able to</p> <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>(See Remark 1 for examples of metrics and methodologies)</p> <p>6.4 Establish management structure to continuously improve business performance with new technologies Be able to design and establish management structure</p> <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 <p>formulate a new business architecture</p>
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) identify, design, and re-engineer business processes of an organisation with new technologies to improve business performance; (ii) continuously monitor the business performance of using the existing technologies; and (iii) design and establish management structure and guidelines to continuously improve business performance with new technologies.
Remark	<p>1. Examples of metrics and methodologies are: a) Key Performance Indicators; b) Return on investment (ROI) analysis; c) Internal rate of return (IRR); and d) Balanced scorecard</p> <p>2. Prerequisite: ITSWAR505A</p>

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

1. Title	Define data management policies and architecture principles	
2. Code	ITSWAR608A	
3. Range	Define data management policies, architecture principles and scope of data assets for the establishment of data architecture to support the development of information systems [Architecture – Data Architecture]	
4. Level	6	
5. Credit	3	
6. Competency	<p>6.1 Understand various data management principles</p> <p>6.2 Define data management requirements and policies for different data assets</p> <p>6.3 Define architecture principles for different data assets</p>	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ understand different models of data management policies (see Remark 1) ▪ identify the standards, practices and regulatory requirements on the use of data in the organisation and the business environment <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify different data assets at strategic, tactical, and operational levels (see Remark 2) ▪ define data management requirements and policies for different data assets to align with the standards, practices, and regulatory requirements on the use of data <p>Be able to define architecture principles (i.e. how data should be organized, accessed and processed) for different data assets to align with their data management requirements and policies</p>
7. Assessment Criteria	The integrated outcome UoCs requirements of this UoCs are the abilities to define data management policies and architecture principles for an organisation's data assets for establishing the data architecture.	
Remark	<p>1. Five models of information politics are suggested by Davenport, Robert, and Prusak, Information Politics, Sloan Management Review</p> <ol style="list-style-type: none"> a) Technocratic Utopianism – an organisation categorizes and models its full data assets and the IS department maintains their entire data inventory; b) Anarchy – individual employees manage their own data; c) Feudalism – individual departments manage their own data and report limited data to the overall organisation; d) Monarchy – data management policies are defined by one executive and data control is centralized; and e) Federalism – data management is accomplished through negotiation and consensus. <p>2. Data assets can be identified from different information resources. Strategic data assets can be gathered from the organisational strategy documents. Tactical data assets can be gathered from market and product information. Operational data assets can be gathered from existing operational systems, procedures and documents.</p>	

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

1. Title	Build a data architecture registry	
2. Code	ITSWAR609A	
3. Range	Apply and develop appropriate tools to capture and model data assets into data architecture artefacts and to perform lifecycle management of the artefacts in the data architecture registry [Architecture – Data Architecture]	
4. Level	6	
5. Credit	6	
6. Competency		<p>Performance Requirement</p> <p>Be able to identify different tools used for</p> <ul style="list-style-type: none"> ▪ capturing data structures in existing data assets ▪ analysing existing data structures and data models ▪ developing data models from different viewpoints <p>(See Remark 1 for examples of required tools)</p> <p>6.1 Understand various tools for data modelling and specification</p> <p>6.2 Evaluate and select appropriate tools to capture and model data assets into data architecture artefacts</p> <p>6.3 Apply and develop selected tools to capture and model data assets into data architecture artefacts</p> <p>6.4 Understand the life cycle of data architecture artefacts</p> <p>6.5 Evaluate and select appropriate tools to build a registry of data architecture artefacts to perform lifecycle management of the artefacts</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ evaluate different tools based on the required viewpoints to address the stakeholders' needs and information requirements ▪ select appropriate tools to model data assets into data architecture artefacts <p>Be able to</p> <ul style="list-style-type: none"> ▪ apply selected tools and techniques to capture and model data assets into data architecture artefacts to satisfy stakeholders' needs and information requirements ▪ customize the existing tools or develop new tools if existing ones cannot address the needs, e.g. spreadsheet software, database scripts <p>Be able to</p> <ul style="list-style-type: none"> ▪ understand the life cycle of different data architecture artefacts, from creation to approval to upgrade to deprecation ▪ understand the roles and responsibilities of various parties in developing and using the artefacts throughout the life cycle <p>Be able to</p> <ul style="list-style-type: none"> ▪ evaluate different tools to perform life cycle management of data architecture artefacts based on the stakeholders' needs ▪ select appropriate tools to build a registry of data architecture artefacts

	<p>6.6 Apply and develop required tools to build a registry of data architecture artefacts for its lifecycle management</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ apply selected tools to build a registry of data architecture artefacts for performing lifecycle management of the artefacts to satisfy stakeholders' needs, e.g. version control software ▪ customise existing tools or develop new tools to build a registry of data architecture artefacts to perform lifecycle management of the artefacts to satisfy stakeholders' needs, e.g. build a website for the registry
7. Assessment Criteria	<p>The integrated outcome requirements of this UoCs are the abilities to:</p> <ul style="list-style-type: none"> (i) apply and develop required tools and techniques to capture and model data assets into data architecture artefacts; and (ii) apply and develop required tools and techniques to build a registry of data architecture artefacts for performing lifecycle management of the artefacts.
Remark	<p>1. Examples of required tools for developing data architecture artefacts are</p> <ul style="list-style-type: none"> a) data modelling tools such as UML modelling tools; b) spreadsheet software; and c) database administrative utilities such as those used to capture database schemas.

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

1. Title	Define and establish a data architecture
2. Code	ITSWAR610A
3. Range	Evaluate, define, and apply appropriate practices and methodologies to establish a data architecture to support the development of information systems [Architecture – Data Architecture]
4. Level	6
5. Credit	3
6. Competency	<p style="text-align: right;"><u>Performance Requirement</u></p> <p>6.1 Understand the various best practices and relevant methodologies for the data architecture development</p> <p>6.2 Evaluate, select and formulate the appropriate practices and methodologies to establish the data architecture</p> <p>6.3 Apply the formulated practices and methodologies to establish the data architecture</p> <p>Be able to identify different best practices and relevant methodologies to establish the data architecture</p> <p>See Remark 1 for examples of practices and methodologies.</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ evaluate and select relevant practices and methodologies based on the stakeholders' needs and information requirements ▪ formulate appropriate practices and methodologies to establish the data architecture for the development of information systems <p>Be able to apply the formulated practices and methodologies to develop the data architecture artefacts</p>
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to (i) evaluate, select and formulate the appropriate practices and methodologies to establish the data architecture; and (ii) apply the formulated practices and methodologies to establish the data architecture.
Remark	<p>1. Examples of industry and international practices and methodologies to establish data architecture are as follows</p> <ol style="list-style-type: none"> a) ISO/IEC 11179 Metadata Registry (MDR) standard; b) UN/CEFACT Core Components Technical Specifications; c) Unified Modelling Language; d) Hong Kong SAR Government XML Schema Design and Management Guide; and e) Document Engineering methodology (http://cde.berkeley.edu/). <p>2. Pre-requisites: ITSWAR608A, ITSWAR609A</p>

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

1. Title	Construct a data architecture for an information system
2. Code	ITSWAR611A
3. Range	Integrate data assets to business process models to form a registry of data architecture artefacts to support the development of information systems [Architecture – Data Architecture]
4. Level	6
5. Credit	5
6. Competency	<p style="text-align: right;"><u>Performance Requirement</u></p> <p>6.1 Understand different artefacts in data architecture. Be able to understand the different artefacts in a data architecture (see Remark 1)</p> <p>6.2 Identify the driving factors for building the data architecture Be able to identify the factors for development and use of the data architecture; those factors could be related to</p> <ul style="list-style-type: none"> ▪ business drivers ▪ IT strategy ▪ regulatory requirements <p>6.3 Model data flows and structures Be able to</p> <ul style="list-style-type: none"> ▪ develop business process models that describe the data flows between different systems and parties ▪ develop data models that describe the data structures of the existing data assets and new application requirements ▪ perform trade-offs to harmonize any conflicting models into standardized models to maximize their reusability <p>6.4 Document the required data architecture artefacts Be able to translate the process and data models into data architecture artefacts</p> <p>6.5 Develop, publish, and maintain a registry of data architecture artefacts. Be able to</p> <ul style="list-style-type: none"> ▪ develop and publish a registry of data architecture artefacts ▪ provide rules and guidelines to manage the life cycle of data architecture artefacts and to ensure the contents are up-to-date
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to (i) develop the required data architecture artefacts from data assets; and (ii) develop, publish, and maintain a registry of data architecture artefacts as the data architecture of the information system to be developed.
Remark	<p>1. Examples of data architecture artefacts are</p> <ol style="list-style-type: none"> a) business process model, i.e. documentation of how and where data is collected, stored, processed and flowed in an organisation; b) data dictionary, i.e. listings and specifications of the data entities used in electronic and paper data assets; c) conceptual and logical data models, i.e. data models to represent the structures and relationships of data entities, e.g. UML diagrams; d) system implementation data model, e.g. database, XML schemas; e) data exchange matrix, e.g. message and file formats for data exchange between different systems, business units, and with external parties; and f) data entity / business function / access control matrix. <p>2. Pre-requisites: ITSWAR608A, ITSWAR609A, ITSWAR610A</p>

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

1. Title	Check usability of a target data architecture	
2. Code	ITSWAR612A	
3. Range	Review correctness and completeness of a target data architecture via mapping and gap analysis between data assets and target data architecture to ensure the constructed data architecture meets its requirements [Architecture – Data Architecture]	
4. Level	6	
5. Credit	5	
6. Competency		<u>Performance Requirement</u>
	6.1 Understand various architecture viewpoints supported by different data architecture artefacts	<p>Be able to</p> <ul style="list-style-type: none"> ▪ understand how various architecture viewpoints can be used to address the needs of different stakeholders, e.g. managers, software developers, and the information requirements ▪ understand the advantages and disadvantages of different architecture viewpoints in representing data assets <p>(See Remark 1)</p>
	6.2 Baseline the existing data assets	<p>Be able to</p> <ul style="list-style-type: none"> ▪ stock take the existing data assets in the organisation ▪ develop descriptions for existing data assets ▪ provide guidelines to incorporate the data assets into the data architecture
	6.3 Select relevant data architecture viewpoints to represent data assets	<p>Be able to</p> <ul style="list-style-type: none"> ▪ select and define suitable data architecture viewpoints to represent data assets to address stakeholders' needs and information requirements ▪ perform trade-off analysis (e.g. completeness vs. simplicity) to resolve conflicts in selection of architecture viewpoints
	6.4 Develop mappings between existing data assets and the target data architecture	<p>Be able to</p> <ul style="list-style-type: none"> ▪ document the mappings between the data entities used in the existing data assets and the data entities defined in the data architecture ▪ define suitable document formats for different disciplines of stakeholders so that they can understand and review the mappings of their managed data assets to the target data architecture

	<p>6.5 Perform gap analysis between existing data assets and the target data architecture</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ perform the gap analysis between the existing data assets and the target data architecture ▪ review the architecture viewpoints used in the data architecture to confirm whether they can accurately represent data assets in order to address stakeholders' needs and information requirements ▪ review discrepancies between the data structures in existing data assets and those defined in the target data architecture
<p>7. Assessment Criteria</p>	<p>The integrated outcome requirements of this UoCs are the abilities to</p> <ol style="list-style-type: none"> (i) develop mappings between existing data assets and the target data architecture; and (ii) perform gap analysis between existing data assets and the target data architecture to assure that the target data architecture can meet the business requirements.
<p>Remark</p>	<ol style="list-style-type: none"> 1. Different architecture viewpoints are supported by different types of artefacts. For example, <ol style="list-style-type: none"> a) business process models (e.g. flowcharts, UML activity diagrams) provide the viewpoints to understand how data is flowed between business processes; b) conceptual and logical models present the structures and relationships of data entities; and c) data dictionaries list and specific data entities in a table format, e.g. spreadsheet. 2. Pre-requisites: ITSWAR609A, ITSWAR610A, ITSWAR611A

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

1. Title	Enforce compliance of the enterprise data standards	
2. Code	ITSWAR613A	
3. Range	Define, maintain and enforce data standards in information systems implemented by project teams [Architecture – Data Architecture]	
4. Level	6	
5. Credit	3	
6. Competency		<p style="text-align: center;"><u>Performance Requirement</u></p> <p>6.1 Understand different data application areas for standardisation</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ understand the driving factors (e.g. business drivers, IT strategy) for setting data standards ▪ understand different data application areas (see Remark 1) <p>6.2 Identify suitable data application that require standardisation</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify the data application that requires standardisation to address the driving factors ▪ document the rationales and guiding principles to formulate the data standards <p>6.3 Identify, evaluate and select suitable industry and international data standards to meet the data application requirements</p> <p>Be able to identify, evaluate and select suitable industry and international data standards to meet the data application requirements</p> <p>See Remark 2 for examples of industry and international data standards)</p> <p>6.4 Derive an enterprise data standards from the suitable industry and international data standards or from the data architecture</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ adopt suitable industry and international data standards to form an enterprise data standards ▪ customise the adopted industry and international data standards to meet the data application requirements ▪ translate the data dictionary and schemas to form the enterprise data standards <p>6.5 Publish and maintain the enterprise data standards</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ publish the enterprise data standards in the data registry ▪ maintain different versions of enterprise data standards

	<p>6.6 Enforce project teams to follow the enterprise data standards to implement the information systems</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ establish policies, rules and guidelines for project teams to follow enterprise data standards ▪ establish a management structure to facilitate different business units to agree upon and promulgate enterprise data standards ▪ establish a management framework for managers and domain experts to review, update, and endorse enterprise data standards
7. Assessment Criteria	<p>The integrated outcome requirements of this UoCs are the abilities to</p> <ol style="list-style-type: none"> (i) derive the enterprise data standards from the data architecture; (ii) maintain the enterprise data standards; and (iii) enforce project teams to follow the enterprise data standards to implement systems.
Remark	<ol style="list-style-type: none"> 1. Examples of data applications where standardisation can be applied are <ol style="list-style-type: none"> a) how data is stored in database (e.g. customer profiles in database), i.e. database schemas can be standardized; and b) how data is exchanged between different systems and parties (e.g. placing electronic purchase orders), i.e. data file formats can be standardized, e.g. spreadsheet layouts. 2. Example of international and local data standards are <ol style="list-style-type: none"> a) EDIFACT; b) OASIS Universal Business Language; and c) Hong Kong SAR Government Registry of Data Standards. (http://www.xml.gov.hk) 3. Pre-requisite: ITSWAR608A 4. Co-requisites: ITSWAR609A, ITSWAR610A, ITSWAR611A, ITSWAR612A

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

1. Title	Define, review and document a technology architecture baseline	
2. Code	ITSWAR614A	
3. Range	Develop a technology architecture baseline to satisfy business requirements of the particular IT solution in an organisation [Architecture – Technology Architecture]	
4. Level	6	
5. Credit	5	
6. Competency		<p style="text-align: center;"><u>Performance Requirement</u></p> <p>6.1 Understand standards, policy and procedure for the development of baseline technology architecture</p> <p>Be able to describe and identify the key baseline technology architecture components and the standards, policy, process and procedure required for its development</p> <p>6.2 Define the baseline technology architecture</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ extract relevant technology requirements from the higher level business requirement, architecture vision, application, data and integration needs ▪ collect relevant information on current systems ▪ consider all constraints on current systems ▪ list distinct functionalities of these systems ▪ produce affinity groupings of functionality using a service grouping model applicable to the particular industry ▪ identify key non-functional requirements of the baseline technology architecture (See Remark 2) ▪ identify candidate technology architecture building blocks ▪ identify their current interfaces ▪ produce an initial technology architecture model <p>6.3 Review the baseline technology architecture</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ review and validate (or generate if necessary) the set of technology architecture principles. ▪ sanity check the functionalities to assure all of current system and business requirements are considered ▪ verify the initial technology architecture model <p>6.4 Document the baseline technology architecture</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ document all constraints of the baseline technology architecture model ▪ document criteria to check merits of the baseline technology architecture model ▪ document criteria for selection of service portfolio architecture ▪ use an appropriate tool (architecture description language, diagrams, schematics) to facilitate the documentation

	6.5 Exhibit professional skills	<p>Be able to exercise professional judgment to</p> <ul style="list-style-type: none"> ▪ identify appropriate constraints and determine relevant principles ▪ produce a baseline technology architecture model best suited for a particular industry or the specific problem domain
7. Assessment Criteria	<p>The integrated outcome requirements of this UoCs are the abilities to:</p> <p>(i) produce a baseline technology architecture model that is best suited to the particular problem domain and requirements from the higher level architecture (e.g. business, vision, data, application, integration, current system architecture); and</p> <p>(ii) ensure that the baseline technology architecture model summarises key findings and conclusions, and illustrates baseline configurations which can be further extended and elaborated into the target technology architecture.</p>	
Remark	<ol style="list-style-type: none"> 1. Examples of non-functional requirements are scalability, reliability, availability and manageability 2. Pre-requisites: ITSWAR601A, ITSWAR605A, ITSWAR608A 3. Co-requisites: ITSWAR510A, ITSWAR519A, ITSWAR619A 	

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

1. Title	Build, evaluate and review a target technology architecture reference model	
2. Code	ITSWAR615A	
3. Range	Develop a target technology architecture reference model from various viewpoints to align with the business requirements as well as requirements from higher level architecture [Architecture – Technology Architecture]	
4. Level	6	
5. Credit	5	
6. Competency		<u>Performance Requirement</u>
	6.1 Understand different technology architecture models	Be able to <ul style="list-style-type: none"> ▪ understand the technology trends and the different leading technology architecture frameworks and models (See Remark 1) ▪ identify best technology architecture model(s) applicable to the business ▪ identify the best technology architecture reference model(s) to be developed
	6.2 Understand the functions of each building block in the technology architecture reference model	Be able to describe the functions and service requirements of individual building block for the selection of best implementation technology based on the architecture building blocks developed (See Remark 2)
	6.3 Build target technology architecture reference model	Be able to further refine the architecture building blocks of the initial technology architecture into the target technology architecture reference model. The target technology architecture should <ul style="list-style-type: none"> ▪ be easily understood in terms of how the services required in the target system will be grouped after considering all viewpoints ▪ provide abstract of the business requirements in the form of a collection of discrete services that can be clearly defined ▪ be documented by appropriate tool and methodology to reflect the inter-relationship of the building blocks ▪ enable solution building blocks to be identified for implementation
	6.4 Evaluate and review a technology architecture reference model	Be able to <ul style="list-style-type: none"> ▪ assure that all stakeholder concerns are addressed. If they are not, create new models to address concerns not covered or augment exist models. ▪ ensure that all information requirements in the business architecture, data architecture, application and integration architectures are met ▪ cross-check affinity groups against requirements ▪ ensure that all the views have been considered in the architectural model ▪ validate that the architectural model

	<p>supports the principles, objectives and constraints of the business</p> <ul style="list-style-type: none"> ▪ identify solution building blocks that would be used to implement the architecture building blocks ▪ check the architecture model for completeness against requirements ▪ select standards for each of the architecture building blocks, reusing as much as possible from the selected reference models or existing building blocks library <p>6.5 Exhibit professional behaviour Be able to</p> <ul style="list-style-type: none"> ▪ produce a technology architecture reference model up to a professional standard ▪ perform trade-off analysis to resolve conflicts among different views
7. Assessment Criteria	<p>The integrated outcome requirements of this UoCs are the abilities to produce a target technology architecture reference model to meet the business goals and objectives as well as the requirements from other higher level architectures such as Architecture Vision and Business, Data, Application, as well as Integration Architectures.</p>
Remark	<ol style="list-style-type: none"> 1. Examples of technology architecture frameworks and models are: client-server, web-based, SOA, J2EE, and dotNET. 2. Pre-requisite: ITSWAR507A 3. Co-requisites: ITSWAR605A, ITSWAR611A, ITSWAR519A

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

1. Title	Manage technology architecture life cycle	
2. Code	ITSWAR616A	
3. Range	Manage technology architecture life cycle (can also be described as perform change management of the technology architecture) by analysing current as well as future needs of the organisation and technology trends [Architecture – Technology Architecture]	
4. Level	6	
5. Credit	3	
6. Competency	<p>6.1 Be aware of new technology advancement</p> <p>6.2 Review the current technology architecture against new business requirements, changes in standards, technology, and methodology and revise as appropriate</p> <p>6.3 Build and maintain a library of technology architecture building blocks</p> <p>6.4 Perform trade-off analysis of newer technology / model against current technology in the architecture</p>	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ understand new technology development and identify impacts to the current technology architecture ▪ understand the current technology architecture limitation and ongoing changes in business requirements so as to identify the potential use of new technology which could either enhance the current architecture and / or address new business requirements <p>See Remark 1 for examples of new technology impacts.</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ support appropriate re-use of building blocks that have been developed ▪ replace individual building blocks with those implemented by using new technology without impacting the entire technology architecture <p>Be able to</p> <ul style="list-style-type: none"> ▪ use appropriate models to perform the trade-off analysis, on possibly incomplete and inconsistent information, for the decision of technology changes or replacement in the technology architecture ▪ utilize technology architecture viewpoints to perform the trade-off analysis or illustrate differences in the various technology architecture options ▪ work out an optimal model that resolve all conflicts among various technology architecture options <p>(See Remark 2 for examples of technology architecture viewpoints)</p>

	6.5 Define technology architecture life cycle in a professional manner	Be able to define and manage technology architecture life cycle according to evolving business requirements as well as the organisation's policies, procedures, standards and any applicable industry standards as appropriate
7. Assessment Criteria	<p>The integrated outcome requirements of this UoCs are the abilities to:</p> <ul style="list-style-type: none"> (i) perform life cycle management of the technology architecture for continuous improvement; and (ii) maintain the currency of the technology adopted. <p>It should be noted that any changes to the technology architecture should consider the current and future needs (which may involve incomplete and inconsistent information) as well as appropriate organisation and industry standards.</p>	
Remark	<ul style="list-style-type: none"> 1. Examples of new technology impacts include, but are not limited to, <ul style="list-style-type: none"> a) financial impact on the availability of lower cost technology option; b) business impact on the availability of new technology which addresses a key business requirement; and c) technical impact on the availability of new technology which makes the current technology obsolete 2. Examples of technology architecture viewpoints include hardware, communication, processing, standards, cost, and integration. 	

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

1. Title	Recommend application integration architecture models
2. Code	ITSWAR617A
3. Range	Review, perform trade-offs and recommend application integration architecture models and patterns for an organisation or for solving existing problems related to software architecture in an organisation [Architecture – Application Integration Architecture]
4. Level	6
5. Credit	2
6. Competency	<p style="text-align: right;"><u>Performance Requirement</u></p> <p>6.1 Understand and document the current stage of application integration architecture models</p> <p style="margin-left: 20px;">Be able to</p> <ul style="list-style-type: none"> ▪ understand current and future trends of application integration architecture models and software ▪ understand and review the current application integration architecture model (including the model, its patterns, its variants, and its various supporting technologies) ▪ document the current application integration architecture model including the linkage to other architecture models such as those in the business, application and technology architectures <p>6.2 Define the end stage of application integration architecture and to perform the gap analysis between the current and end stage</p> <p style="margin-left: 20px;">Be able to</p> <ul style="list-style-type: none"> ▪ discuss with various stakeholders on the end stage requirements ▪ document and align the defined requirements with other architecture models such as the business, application and technology architecture models ▪ identify, analyse and document the gaps between the current stage and the end stage ▪ evaluate and document the impacts on other architecture models such as those in the business, application and technology architectures <p>6.3 Select and recommend application integration architecture model(s)</p> <p style="margin-left: 20px;">Be able to</p> <ul style="list-style-type: none"> ▪ perform costs/benefits analysis on options of potential application integration architectures ▪ effectively and objectively select and recommend most cost-effective (in terms of value added) application integration architecture model(s) in accordance with the defined architecture principles and standards
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) understand the current stage of application integration architecture model(s); (ii) define the future stage of application integration architecture model(s); and (iii) recommend most cost-effective application integration architecture model(s) for the software to be developed for an organisation or for solving the existing problems related to software architecture in an organisation.
Remark	1. Examples of application integration architecture models are “tightly-cohesive” loosely-coupled, EAI bus based integration, peer-to-peer integration, on-demand integration, and service brokers based Integration. 2. Pre-requisite: ITSWAR601A

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

1. Title	Develop application integration architecture resources	
2. Code	ITSWAR618A	
3. Range	Evaluate, develop and apply appropriate resources to support application integration architecture, based on business drivers, requirement of specific problem and existing IT infrastructure of the organisation [Architecture – Application Integration Architecture]	
4. Level	6	
5. Credit	2	
6. Competency	<p>6.1 Understand new technology and development trends of proprietary and open technology products</p> <p>6.2 Define project plan and resources requirements and select relevant application integration architecture resources</p> <p>6.3 Implement application integration architecture resources</p>	<p><u>Performance Requirement</u> Be able to</p> <ul style="list-style-type: none"> ▪ understand new technologies and products provided by specific vendor for supporting the end stage of application integration ▪ understand open source and open technology products ▪ propose metrics to evaluate the appropriateness of these products to be used as application integration architecture resources <p>See Remark 1 for examples of application integration architecture resources.</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ define resources requirements and project plan to support the implementation of proposed application integration architecture model ▪ select relevant application integration architecture resources (in-source and/or outsource) based on the skills and competencies for intended purposes <p>Be able to</p> <ul style="list-style-type: none"> ▪ develop and implement application integration architecture resources (i.e. buy, build, and apply any combinations of them) to support the application integration architecture as well as to become part of IT architecture of an organisation ▪ develop quality assurance procedures and checkpoints to ensure compliance to defined principles, policies and standards
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) select relevant application integration architecture resources based on the proposed application integration architecture; and (ii) develop application integration architecture resources to support the application integration architecture as well as to become part of the IT architecture of an organisation.	
Remark	<p>1. Examples of application integration architecture resources are software products and platforms.</p> <p>2. Pre-requisite: ITSWAR617A</p>	

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

1. Title	Recommend embedded software architecture models	
2. Code	ITSWAR619A	
3. Range	Evaluate, choose and adopt appropriate embedded software architecture models, tools and standards for the design and development of the different classes of embedded software systems in an organisation. [Architecture – Embedded Software Architecture]	
4. Level	6	
5. Credit	6	
6. Competency		<p style="text-align: right;"><u>Performance Requirement</u></p> <p>6.1 Comprehend different embedded software architecture models and the technologies behind them</p> <p>Be able to review and recommend a particular embedded software architecture model (including its design, patterns, variants, and various supporting technologies)</p> <p>See Remark 1 for examples of technologies of embedded software architecture models.</p> <p>6.2 Select and recommend the most appropriate model(s)</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ review an embedded software architecture model ▪ perform comparison and trade-offs analysis among embedded software architecture models (See Remark 2) ▪ propose the most appropriate embedded software architecture model(s) for the classes of embedded software to be developed in an organisation or to solve the existing problems <p>6.3 Select and / or develop necessary embedded software architecture resources</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ select relevant embedded software architecture resources (e.g. standards and tools) based on the given requirements and their best fitness for the intended purposes ▪ develop and implement embedded software architecture resources to support the embedded software architecture <p>6.4 Evaluate, choose and adopt appropriate embedded software architecture model(s) in a professional manner</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ review, select and recommend appropriate embedded software architecture model(s), standards and tools ▪ ensure that the adopted embedded software architecture(s) support good software design and development practices, and are in compliance with the organisation's guidelines as well as any local and international laws and regulatory requirements, where applicable
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) select and recommend the most appropriate embedded software architecture	

	<p>model(s) for the classes of embedded software to be developed in an organisation; and</p> <p>(ii) select and develop the necessary embedded software architecture resources (e.g. standards and tools) for the classes of embedded software to be developed in an organisation.</p>
Remark	<ol style="list-style-type: none"> 1. Examples of various technologies of embedded software framework and platforms are J2ME, Symbian, MSCE, and Embedded Linux. 2. This may involve performing trade-off analysis on an implementation of a given system function through software, hardware and / or the most optimal combination of both.

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

1. Title	Determine technology mix for the design and development of embedded software systems	
2. Code	ITSWAR620A	
3. Range	Based on the adopted embedded software architecture model(s), standards, tools and other resources, choose the most appropriate combination of technology mix to design and develop a given embedded software system [Architecture – Embedded Software Architecture]	
4. Level	6	
5. Credit	3	
6. Competency		<p style="text-align: center;"><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ formulate different combinations of the adopted embedded software architecture model for a given embedded software system to be developed for the organisation ▪ review and recommend a particular combination of the adopted embedded software architecture models (including its design, patterns, variants, and various supporting technologies) for a given embedded software system <p style="text-align: center;">See Remark 1 for examples of technologies of embedded software architecture models.</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ review various technology mixes (combinations of technology) ▪ perform comparison and trade-offs analysis among various technology mixes (See Remark 2) ▪ propose the most appropriate technology mix to design and develop a given embedded software system based on the adopted embedded software architecture model <p>Be able to</p> <ul style="list-style-type: none"> ▪ review, select and recommend the most appropriate technology combination to design and develop a given embedded software system based on the adopted embedded software architecture model ▪ ensure that the most appropriate combination supports good software design and development practices, and are in compliance with organisation's guidelines as well as any local and international laws and regulatory requirements, where applicable
	6.1 Comprehend different embedded software architecture models and the technologies behind them	
	6.2 Select and recommend the most appropriate technology mix for the adopted embedded software architecture model	
	6.3 Choose the most appropriate technology combination to design and develop a given embedded software system based on the adopted embedded software architecture model in a professional manner	

7. Assessment Criteria	The integrated outcome requirement of this UoCs are the abilities to select and recommend the most appropriate technology mix (combination) for the design and development of a given embedded software system based on the adopted embedded software architecture model.
Remark	<ol style="list-style-type: none"> 1. Examples of various technologies of embedded software framework and platforms are J2ME, Symbian, MSCE, and Embedded Linux. 2. This may involve performing trade-off analysis on an implementation of a given system function through software, hardware and/or the most optimal combination of both. 3. Pre-requisite: ITSWAR619A 4. Co-requisite: ITSWAR621A

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

1. Title	Decompose embedded software system model into manageable layers	
2. Code	ITSWAR621A	
3. Range	Abstract and partition the embedded software system into manageable layers as well as apply the appropriate modelling techniques to support the design and development of embedded software systems [Architecture – Embedded Software Architecture]	
4. Level	6	
5. Credit	6	
6. Competency		<p style="text-align: center;">Performance Requirement</p> <p>6.1 Understand the abstraction and partitioning techniques for embedded software systems Be able to explain the abstraction and partitioning techniques for embedded software systems</p> <p>6.2 Understand the various modelling techniques available for the design and development of embedded software systems Be able to explain the various modelling techniques available for the design and development of embedded software systems See Remark 1 for some examples of modelling techniques.</p> <p>6.3 Apply the appropriate modelling techniques and tools in the design and development of embedded software system Be able to</p> <ul style="list-style-type: none"> ▪ abstract the needed software functions into structured layers for isolation of hardware, environmental and other dependence ▪ perform the necessary partitioning of the embedded software into manageable building block with clear interface boundaries ▪ use appropriate models in the analysis and design of these software building blocks <p>6.4 Apply the appropriate modelling techniques and tools in the design and development of embedded software system in a professional manner Be able to demonstrate a high degree of professionalism and competence in the application of modelling tools</p>
7. Assessment Criteria	The integrated outcome requirement of this UoCs are the abilities to use appropriate modelling tools in the design and development of embedded software systems, which is suitably partitioned into manageable layers.	
Remark	<p>1. Some examples of modelling techniques are</p> <ol style="list-style-type: none"> a) finite state machines; b) data flow model; c) multi-threading; and d) concurrent multi-processing models. <p>2. Pre-requisite: ITSWAR619A</p> <p>3. Co-requisite: ITSWAR620A</p>	

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

1. Title	Maintain a common library of reusable embedded software components
2. Code	ITSWAR622A
3. Range	Maintain a common library of reusable embedded software components to support embedded software development [Architecture – Embedded Software Architecture]
4. Level	6
5. Credit	3
6. Competency	<p><u>Performance Requirement</u></p> <p>6.1 Understand the needs and the methodologies for developing and maintaining a common library of re-usable building blocks for embedded software systems</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ determine whether a building block of a certain embedded software system has the potential to be reused in the organisation ▪ set up enforcement procedures and standard to capture re-useable building blocks of the embedded software systems ▪ identify building blocks from existing common library to meet the needs of a given embedded software system <p>6.2 Maintain a common library of reusable embedded software components</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ Determine whether a building block of a certain embedded software system can be reused based on possibly incomplete and inconsistent information ▪ maintain and update a common library of reusable embedded software architecture building blocks as part of software resources of an organisation to promote re-useability ▪ ensure that each building block in the library conforms to some adopted embedded software architectures and related standards <p>6.3 Maintain a common library of reusable embedded software components in a professional manner</p> <p>Be able to maintain and update a common library of reusable embedded software components in accordance with the organisation's guidelines as well as any local and international laws, regulatory requirements and industry best practices, where applicable</p>
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to maintain and update a common library of reusable embedded software architecture building blocks as part of the ICT infrastructure of an organisation for reuse.
Remark	

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

1. Title	Exercise lifecycle management on the adopted embedded software architecture	
2. Code	ITSWAR623A	
3. Range	Define and maintain the lifecycle management policy for the adopted embedded software architecture to support the current and future needs of the organisation [Architecture – Embedded Software Architecture]	
4. Level	6	
5. Credit	5	
6. Competency		<p style="text-align: center;"><u>Performance Requirement</u></p> <p>6.1 Understand the requirements of a lifecycle management policy for the adopted embedded software architecture Be able to explain the requirements of a lifecycle management policy for the adopted embedded software architecture</p> <p>6.2 Define a lifecycle management policy for the adopted embedded software architecture Be able to define an appropriate lifecycle management policy for the adopted embedded software architecture in support of the current and future needs of the organisation based on the available information at hand which may or may not be complete and consistent</p> <p>6.3 Implement a set of appropriate lifecycle management policy for the adopted embedded software architecture Be able to perform lifecycle management of the adopted embedded software architecture in accordance with the lifecycle management policy defined</p> <p>6.4 Maintain a set of appropriate lifecycle management policy for the adopted embedded software architecture Be able to ensure these adopted architectural standards are in line with the technology advancement and availability of such technologies in the industry</p> <p>6.5 Manage the chosen lifecycle management policy for the adopted embedded software architecture in a professional manner Be able to demonstrate a high degree of professionalism and competence in the chosen management of lifecycle management policy for the adopted embedded software architecture in an organisation</p>
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to manage the adopted embedded software architecture in accordance with the defined lifecycle management policy.	
Remark		

Appendix D.4 UoCs in Information Security

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

1. Title	Ensure information security procedures and guidelines support information security policies
2. Code	ITSWIS402A
3. Range	Ensure the development of procedures and guidelines support the defined information security policies of an organisation as per ITSWIS601A [Information Security - Information Security Governance]
4. Level	4
5. Credit	2
6. Competency	<p><u>Performance Requirement</u></p> <p>6.1 Understand information security policies Be able to</p> <ul style="list-style-type: none"> ▪ identify the required levels of protection for information resources ▪ identify the responsibilities of relevant persons in protecting the information resources based on the organisation's information security policies <p>6.2 Identify the responsibilities of protecting the information resources among all members of the organisation Be able to share the responsibilities among all members of the organisation in protecting and preserving the information resources and complying with applicable policies and laws through the awareness of the growing importance of securing electronic resources</p> <p>6.3 Monitor the development of the procedures and guidelines that support information security policies Be able to ensure the development of procedures and guidelines to support the information security policies</p> <p>6.4 Review and revise procedures and guidelines Be able to</p> <ul style="list-style-type: none"> ▪ review the suitability of the procedures and guidelines that support information security policies ▪ revise the procedures and guidelines that support information security for further improvement within a revisable timeframe <p>6.5 Ensure the development of procedures and guidelines in a professional manner Be able to make sure that the development of procedures and guidelines that support information security policies are in accordance with organisation's policies and 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 are the abilities to ensure the developed procedures and guidelines can support information security policies in accordance with the organisation's information security strategy.
Remark	

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

1. Title	Report significant changes in risks	
2. Code	ITSWIS401A	
3. Range	Report significant changes in information security risks to appropriate levels of management of an organisation on both a periodic and event-driven basis [Information Security – Risk Management]	
4. Level	4	
5. Credit	1	
6. Competency	<p>6.1 Understand risk analysis methods and techniques</p> <p>6.2 Manage and report status of identified risks</p>	<p>Performance Requirement</p> <p>Be able to apply risk analysis methods and techniques to assess changes in risks</p> <p>Be able to manage and report significant changes in risks to appropriate levels of management on a periodic and event-driven basis according to the organisation's policies and guidelines and applicable laws</p>
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to manage and report significant changes in risks to appropriate levels of management on a periodic and event-driven basis according to the organisation's policies and guidelines and applicable laws.	
Remark	This UoCs assumes competencies as described in ITSWIS605A	

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

1. Title	Maintain plans to implement information security governance framework						
2. Code	ITSWIS403A						
3. Range	Realize that the ISG (Information Security Governance) framework covers information security baselines, procedures and guidelines for medicating security risks and IT infrastructure activities [Information Security - Information Security Programme Management]						
4. Level	4						
5. Credit	3						
6. Competency	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%; vertical-align: top;">6.1 Know the various components of information security governance framework</td> <td style="vertical-align: top;"><u>Performance Requirement</u> Be able to interpret and describe the information security governance framework.</td> </tr> <tr> <td style="vertical-align: top;">6.2 Maintain plans to implement the information security governance framework</td> <td style="vertical-align: top;">Be able to <ul style="list-style-type: none"> ▪ maintain information security baseline(s) ▪ maintain procedures and guidelines to ensure business processes address information security risk ▪ maintain procedures and guidelines for IT infrastructure activities to ensure compliance with information security policies </td> </tr> <tr> <td style="vertical-align: top;">6.3 Maintain metrics to manage the information security governance framework</td> <td style="vertical-align: top;">Be able to maintain measurable standards of information security governance in reference to other similar organisation and industry norms.</td> </tr> </table>	6.1 Know the various components of information security governance framework	<u>Performance Requirement</u> Be able to interpret and describe the information security governance framework.	6.2 Maintain plans to implement the information security governance framework	Be able to <ul style="list-style-type: none"> ▪ maintain information security baseline(s) ▪ maintain procedures and guidelines to ensure business processes address information security risk ▪ maintain procedures and guidelines for IT infrastructure activities to ensure compliance with information security policies 	6.3 Maintain metrics to manage the information security governance framework	Be able to maintain measurable standards of information security governance in reference to other similar organisation and industry norms.
6.1 Know the various components of information security governance framework	<u>Performance Requirement</u> Be able to interpret and describe the information security governance framework.						
6.2 Maintain plans to implement the information security governance framework	Be able to <ul style="list-style-type: none"> ▪ maintain information security baseline(s) ▪ maintain procedures and guidelines to ensure business processes address information security risk ▪ maintain procedures and guidelines for IT infrastructure activities to ensure compliance with information security policies 						
6.3 Maintain metrics to manage the information security governance framework	Be able to maintain measurable standards of information security governance in reference to other similar organisation and industry norms.						
7. Assessment Criteria	The integrated requirements of this UoCs are the abilities to maintain plans to implement the ISG framework for consistent results and accountability.						
Remark							

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

1. Title	Support and implement information security practices and procedures				
2. Code	ITSWIS404A				
3. Range	Support and implement the information security practices and procedures for using information systems to comply with the organisation's information security policies [Information Security - Information Security Management]				
4. Level	4				
5. Credit	2				
6. Competency	<table style="width: 100%; border: none;"> <tr> <td style="width: 30%; vertical-align: top;">6.1 Understand the organisation's information security policies</td> <td style="vertical-align: top;"><u>Performance Requirement</u> Be able to understand the organisation's information security policies</td> </tr> <tr> <td style="vertical-align: top;">6.2 Implement the practices, procedures and guidelines</td> <td style="vertical-align: top;">Be able to <ul style="list-style-type: none"> ▪ publish and communicate the practices, procedures and guidelines to the staff responsible ▪ assist user department to resolve issues ▪ report to senior management the implementation status of their approved policies ▪ set up a framework to review the implementation of these policies in accordance with the organisation's policies and procedures as well as any local and international laws and standards </td> </tr> </table>	6.1 Understand the organisation's information security policies	<u>Performance Requirement</u> Be able to understand the organisation's information security policies	6.2 Implement the practices, procedures and guidelines	Be able to <ul style="list-style-type: none"> ▪ publish and communicate the practices, procedures and guidelines to the staff responsible ▪ assist user department to resolve issues ▪ report to senior management the implementation status of their approved policies ▪ set up a framework to review the implementation of these policies in accordance with the organisation's policies and procedures as well as any local and international laws and standards
6.1 Understand the organisation's information security policies	<u>Performance Requirement</u> Be able to understand the organisation's information security policies				
6.2 Implement the practices, procedures and guidelines	Be able to <ul style="list-style-type: none"> ▪ publish and communicate the practices, procedures and guidelines to the staff responsible ▪ assist user department to resolve issues ▪ report to senior management the implementation status of their approved policies ▪ set up a framework to review the implementation of these policies in accordance with the organisation's policies and procedures as well as any local and international laws and standards				
7. Assessment Criteria	The integrated requirements of this UoCs are the abilities to: (i) implement the practices, procedures and guidelines to support the information security policies; and (ii) assist user departments to implement the information security policies.				
Remark					

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

1. Title	Implement information security awareness programme	
2. Code	ITSWIS405A	
3. Range	Implement information security awareness programme to maintain an information security culture in an organisation [Information Security - Information Security Management]	
4. Level	4	
5. Credit	2	
6. Competency	<p>6.1 Understand the importance of raising staff awareness about the organisation's information security (IS)</p> <p>6.2 Implement information security awareness programme to maintain an information security culture</p> <p>6.3 Ensure the delivery of the activities that can influence the culture and behaviour of the staff, including information security education and awareness</p>	<p><u>Performance Requirement</u></p> <p>Be able to make employees understand and appreciate not only the value of the organisation's information assets but also the consequences if these assets are compromised</p> <p>Be able to organize and launch information security awareness programme including defining the objectives, target group and activities in each programme; developing a communication plan; and measuring the success of an implemented programme</p> <p>Be able to contribute to the implementation of an information security culture in the organisation by encouraging employees to act responsibly and thus handle information with more care</p>
7. Assessment Criteria	The integrated requirements of this UoCs are the abilities to implement an information awareness programme to sustain information security culture in an organisation.	
Remark		

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

1. Title	Conduct drills according to response and recovery plans	
2. Code	ITSWIS406A	
3. Range	Conduct periodic testings of the response and recovery plans, where appropriate, so as to minimize the impacts of any real security incidents on the organisation [Information Security – Response Management]	
4. Level	4	
5. Credit	2	
6. Competency		<u>Performance Requirement</u>
	6.1 Understand disaster recovery testing for infrastructure and critical business applications	Be able to explain the importance of performing regular testings of the response and recovery plans
	6.2 Conduct periodic testing of the response and recovery plans	Be able to conduct periodic testings of the response and recovery plans, where appropriate, so as to minimize the impacts on the organisation when real security incidents occur
	6.3 Conduct periodic testing of the response and recovery plans in a professional manner	Be able to conduct periodic testings of the response and recovery plans in accordance with the organisation's policies and procedures, as well as any (local and international) laws and regulatory requirements, where applicable
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) conduct periodic testings of the response and recovery plans, where appropriate, so as to minimize the impacts of any real security incidents should they occur in the organisation; and (ii) conduct regular testings of the response and recovery plans according to the organisation's policies, laws and regulatory requirements, where applicable.	
Remark		

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

1. Title	Establish reporting and communication channels	
2. Code	ITSWIS502A	
3. Range	Establish efficient reporting and communication channels for Information Security Governance (ISG) activities in an organisation [Information Security – Information Security Governance]	
4. Level	5	
5. Credit	2	
6. Competency	<p>6.1 Understand various best practices of ISG activities</p> <p>6.2 Comprehend centralized and decentralized approaches to coordinating information security</p> <p>6.3 Understand various information security management (or governance) roles, responsibilities and organisational structure</p> <p>6.4 Establish reporting and communication channels for ISG activities in a professional manner</p>	<p><u>Performance Requirement</u> Be able to identify suitable staff responsible for information security, their expertise and the best industry practices</p> <p>Be able to establish ISG practices for the management of reporting and communication channels in the organisation</p> <p>Be able to assign suitable roles and responsibilities for management reporting and communication that support ISG activities</p> <p>Be able to establish efficient reporting and communication channels for ISG activities in the organisation for the senior management, in accordance with the organisation's policies and 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 are the abilities to establish efficient management reporting and communication channels for ISG activities in the organisation.	
Remark		

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

1. Title	Maintain information security policies										
2. Code	ITSWIS523A										
3. Range	Maintain information security policies that support business goals and objectives of an organisation [Information Security – Information Security Governance]										
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 Know various components of information security policies</td> <td>Be able to interpret, describe and document all information security policies</td> </tr> <tr> <td>6.2 Maintain information security policies</td> <td>Be able to maintain information security policies in alignment with the organisation's objectives, scope, coverage and awareness when embracing security policies</td> </tr> <tr> <td>6.3 Review and revise information security policies</td> <td>Be able to adjust the information security policies to continue their roles in supporting the business goals and objectives of an organisation within a reasonable timeframe</td> </tr> <tr> <td>6.4 Maintain information security policies in a professional manner</td> <td>Be able to maintain information security policies that support business goals and objectives of an organisation in compliance with the organisation's policies and procedures as well as any local and international laws and standards</td> </tr> </table>		<u>Performance Requirement</u>	6.1 Know various components of information security policies	Be able to interpret, describe and document all information security policies	6.2 Maintain information security policies	Be able to maintain information security policies in alignment with the organisation's objectives, scope, coverage and awareness when embracing security policies	6.3 Review and revise information security policies	Be able to adjust the information security policies to continue their roles in supporting the business goals and objectives of an organisation within a reasonable timeframe	6.4 Maintain information security policies in a professional manner	Be able to maintain information security policies that support business goals and objectives of an organisation in compliance with the organisation's policies and procedures as well as any local and international laws and standards
	<u>Performance Requirement</u>										
6.1 Know various components of information security policies	Be able to interpret, describe and document all information security policies										
6.2 Maintain information security policies	Be able to maintain information security policies in alignment with the organisation's objectives, scope, coverage and awareness when embracing security policies										
6.3 Review and revise information security policies	Be able to adjust the information security policies to continue their roles in supporting the business goals and objectives of an organisation within a reasonable timeframe										
6.4 Maintain information security policies in a professional manner	Be able to maintain information security policies that support business goals and objectives of an organisation in compliance with the organisation's policies and procedures as well as any local and international laws and standards										
7. Assessment Criteria	The integrated requirements of this UoCs are the abilities to (i) maintain information security policies that support business goals and objectives of an organisation within a reasonable timeframe; and (ii) ensure that the information security policies address each aspect of the strategy, control and regulation.										
Remark	Risk analysis has to be taken before establishing information security policies.										

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

1. Title	Ensure risk management related activities are integrated into business life cycle processes				
2. Code	ITSWIS503A				
3. Range	Ensure that risk identification, analysis and mitigation activities are integrated into the whole organisation from the business operation perspective [Information Security – Risk Management]				
4. Level	5				
5. Credit	1				
6. Competency	<table border="0" style="width: 100%;"> <tr> <td style="width: 30%; vertical-align: top;"> <p>6.1 Know the life-cycle-based risk management principles and practices</p> </td> <td style="vertical-align: top;"> <p><u>Performance Requirement</u> Be able to</p> <ul style="list-style-type: none"> ▪ understand that risk management related activities are on-going processes and assess their potential threats to the organisation ▪ ensure that risk management related activities are integrated into the business life cycle processes </td> </tr> <tr> <td style="vertical-align: top;"> <p>6.2 Ensure that risk management related activities are integrated into business life cycle processes</p> </td> <td style="vertical-align: top;"> <p>Be able to ensure that all risk identification, analysis and mitigation activities are integrated into the business life cycle processes and operations of an organisation according to its policies and guidelines, and any applicable (local and international) laws as well as regulatory requirements</p> </td> </tr> </table>	<p>6.1 Know the life-cycle-based risk management principles and practices</p>	<p><u>Performance Requirement</u> Be able to</p> <ul style="list-style-type: none"> ▪ understand that risk management related activities are on-going processes and assess their potential threats to the organisation ▪ ensure that risk management related activities are integrated into the business life cycle processes 	<p>6.2 Ensure that risk management related activities are integrated into business life cycle processes</p>	<p>Be able to ensure that all risk identification, analysis and mitigation activities are integrated into the business life cycle processes and operations of an organisation according to its policies and guidelines, and any applicable (local and international) laws as well as regulatory requirements</p>
<p>6.1 Know the life-cycle-based risk management principles and practices</p>	<p><u>Performance Requirement</u> Be able to</p> <ul style="list-style-type: none"> ▪ understand that risk management related activities are on-going processes and assess their potential threats to the organisation ▪ ensure that risk management related activities are integrated into the business life cycle processes 				
<p>6.2 Ensure that risk management related activities are integrated into business life cycle processes</p>	<p>Be able to ensure that all risk identification, analysis and mitigation activities are integrated into the business life cycle processes and operations of an organisation according to its policies and guidelines, and any applicable (local and international) laws as well as regulatory requirements</p>				
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) ensure that risk management related activities (risk identification, analysis and mitigation activities) are integrated into the business life cycle processes and operations of an organisation; and (ii) ensure that those risk management related activities of an organisation are complied with its policies and guidelines, and any applicable (local and international) laws as well as regulatory requirements.				
Remark					

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

1. Title	Define strategies and prioritize options to mitigate risk
2. Code	ITSWIS504A
3. Range	Define and prioritize risk mitigation strategies to reduce risks to acceptable levels to an organisation [Information Security - Risk Management]
4. Level	5
5. Credit	2
6. Competency	<p><u>Performance Requirement</u></p> <p>6.1 Comprehend risk mitigation strategies Be able to define risk mitigation strategies related to security requirements of information resources that support business applications</p> <p>6.2 Understand cost benefit analysis Be able to perform cost benefit analysis techniques in assessing options for mitigating risks threats and exposures to acceptable levels</p> <p>6.3 Define risk mitigation strategies Be able to define and recommend strategies to mitigate risk to levels acceptable to the organisation based on its business impacts</p> <p>6.4 Prioritize risk mitigation strategies Be able to</p> <ul style="list-style-type: none"> ▪ perform cost benefit analysis techniques in assessing options for mitigating risks threats and exposures to levels acceptable to the organisation ▪ prioritize cost effective risk reduction measures and mitigation alternatives to mitigate risk to levels acceptable to the organisation <p>6.5 Define and prioritize risk mitigation strategies in a professional manner Be able to define and prioritize risk mitigation strategies in compliance with the organisation's policies and procedures, as well as any (local and international) laws and regulatory requirements, if applicable</p>
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to define and prioritize risk mitigation strategies so that the risks are mitigated to levels acceptable to the organisation.
Remark	This UoCs assumes competencies as described in ITSWIS605A

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

1. Title	Develop methods to satisfy information security policy requirements	
2. Code	ITSWIS505A	
3. Range	Develop methods that satisfy information security policy requirements and recognise impact on end users [Information Security - Information Security Programme Management]	
4. Level	5	
5. Credit	4	
6. Competency		<u>Performance Requirement</u>
	6.1 Understand various components of an information security governance framework	Be able to assess the impact of integrating information security governance framework such as security principles, practices, management and awareness into all aspects and all levels of the enterprise
	6.2 Understand the impact of information security technologies	Be able to review and assess information security technologies so as to enable management to select appropriate control that may affect end-users (i.e. staff, customers and services providers)
	6.3 Understand security procedures and guidelines	Be able to assess the impact of security procedures and guidelines for business processes and infrastructure activities that may affect end-users
	6.4 Develop methods to satisfy information security policy requirements in a professional manner	Be able to develop methods to satisfy information security policy requirements that recognise impact on end users and in compliance with the organisation's policies and guidelines as well as any (local and international) laws and regulatory requirements, where applicable
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to develop effective methods, acceptable to senior management, to satisfy information security policy requirements that recognise impact on end users.	
Remark		

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

1. Title	Promote accountability in managing information security risks										
2. Code	ITSWIS524A										
3. Range	Promote accountability by business process owners and other stakeholders in managing information security risks [Information Security – Information Security Programme Management]										
4. Level	5										
5. Credit	3										
6. Competency	<table border="0" style="width: 100%;"> <tr> <td style="width: 30%;"></td> <td style="text-align: right;"><u>Performance Requirement</u></td> </tr> <tr> <td>6.1 Understand the importance of accountability in the process of implementing Information Security Governance (ISG)</td> <td>Be able to recognise the associated impacts from people factor in implementing ISG framework</td> </tr> <tr> <td>6.2 Identify the chief security officer and secure authority and resource</td> <td>Be able to identify the ultimate responsible person in the organisation and chief security officer bearing the ultimate responsibility in managing risks and secure enough authority and resource</td> </tr> <tr> <td>6.3 Define clearly the roles and responsibility of business process owner and responsible employees in terms of security risks</td> <td>Be able to clearly define duties, roles and responsibilities of business process owners and those staff concerned about the process of managing security risks</td> </tr> <tr> <td>6.4 Instil reward and penalty system to enforce accountability</td> <td>Be able to clearly state the consequence and liability upon failure to assume duties of information security functions</td> </tr> </table>		<u>Performance Requirement</u>	6.1 Understand the importance of accountability in the process of implementing Information Security Governance (ISG)	Be able to recognise the associated impacts from people factor in implementing ISG framework	6.2 Identify the chief security officer and secure authority and resource	Be able to identify the ultimate responsible person in the organisation and chief security officer bearing the ultimate responsibility in managing risks and secure enough authority and resource	6.3 Define clearly the roles and responsibility of business process owner and responsible employees in terms of security risks	Be able to clearly define duties, roles and responsibilities of business process owners and those staff concerned about the process of managing security risks	6.4 Instil reward and penalty system to enforce accountability	Be able to clearly state the consequence and liability upon failure to assume duties of information security functions
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6.4 Instil reward and penalty system to enforce accountability	Be able to clearly state the consequence and liability upon failure to assume duties of information security functions										
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to clearly identify and appropriately penalize, if needed, the staff who do not assume their security roles and responsibility.										
Remark											

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

1. Title	Minimize information security risks	
2. Code	ITSWIS525A	
3. Range	Ensure that internal and external resources for information security are identified, appropriated and managed [Information Security - Information Security Programme Management]	
4. Level	5	
5. Credit	3	
6. Competency		<u>Performance Requirement</u>
	6.1 Understand the needs for internal and external resource for information security	Be able to identify and recognize the internal and external resources that can be utilized for information security
	6.2 Identify the strengths and weakness of the internal and external resource for information security	Be able to analyse and evaluate the characteristics, nature, limitations, strengths and weaknesses of the internal and external resources
	6.3 Appropriate and manage the internal and external resource	Be able to appropriate, orchestrate, and manage the internal and external resources to manage information security programmes.
	6.4 Optimize the internal and external resources to minimize security risks and utilize best available security technology and practices	Be able to optimize the internal and external resources to minimize security risks and maximize the information security protection in terms of using the best available technologies and adopting the best practices
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to identify and optimize both internal and external resources to produce optimal information security management results.	
Remark		

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

1. Title	Develop information security practices and procedures								
2. Code	ITSWIS506A								
3. Range	Develop information security practices and procedures for using information systems to comply with the organisation's information security policies [Information Security - Information Security 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: right;"><u>Performance Requirement</u></td> </tr> <tr> <td>6.1 Understand the organisation's information security policies</td> <td>Be able to understand the organisation's information security policies</td> </tr> <tr> <td>6.2 Develop relevant practices, procedures and guidelines to support the policies</td> <td>Be able to work with relevant departments to develop detailed practices, procedures and guidelines that support the organisation's information security policies</td> </tr> <tr> <td>6.3 Ensure the practices, procedures and guidelines are properly approved</td> <td>Be able to explain the practices, procedures and guidelines to user management and get their approval</td> </tr> </table>		<u>Performance Requirement</u>	6.1 Understand the organisation's information security policies	Be able to understand the organisation's information security policies	6.2 Develop relevant practices, procedures and guidelines to support the policies	Be able to work with relevant departments to develop detailed practices, procedures and guidelines that support the organisation's information security policies	6.3 Ensure the practices, procedures and guidelines are properly approved	Be able to explain the practices, procedures and guidelines to user management and get their approval
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6.3 Ensure the practices, procedures and guidelines are properly approved	Be able to explain the practices, procedures and guidelines to user management and get their approval								
7. Assessment Criteria	The integrated requirements of this UoCs are the abilities to develop the practices, procedures and guidelines to support the information security policies.								
Remark									

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

1. Title	Evaluate and assess the effectiveness of corporate information security practices
2. Code	ITSWIS507A
3. Range	Establish appropriate techniques to measure, monitor and report on the effectiveness of information security practices implemented in information protection, application systems and telecommunications networks [Information Security – Information Security Management]
4. Level	5
5. Credit	3
6. Competency	<p style="text-align: right;"><u>Performance Requirement</u></p> <p>6.1 Understand different techniques to monitor and measure the effectiveness of information security practices Be able to understand different techniques for monitoring and measuring information security practices</p> <p>6.2 Understand different technique for vulnerability assessment Be able to</p> <ul style="list-style-type: none"> ▪ understand the vulnerabilities in non-compliance with information security practices ▪ identify techniques for detecting vulnerabilities ▪ set procedures and guidelines in handling vulnerabilities in non-compliance issues <p>6.3 Monitor, measure and report on the effectiveness of information security controls Be able to</p> <ul style="list-style-type: none"> ▪ define the monitoring process to perform regular and/or event-driven monitoring ▪ define the techniques to measure the effectiveness of the information security practices ▪ define the reporting mechanisms for reporting the effectiveness of the information security controls ▪ identify the responsible personnel in the monitoring, measuring and reporting processes <p>6.4 Ensure the non-compliance issue and other variance are resolved in a timely manner Be able to</p> <ul style="list-style-type: none"> ▪ define the procedures for handling non-compliance issue ▪ define the time frame in handling non-compliance issue ▪ identify the responsible personnel who can ensure the non-compliance issues are resolved
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) establish processes to monitor, measure and report on the effectiveness of information security controls; and (ii) establish processes to assess the vulnerability in non-compliance with information security policies.
Remark	

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

1. Title	Ensure availability, integrity and confidentiality of information systems	
2. Code	ITSWIS508A	
3. Range	Implement information security measures for protecting the availability, integrity and confidentiality of information systems / data in the change management process [Information Security – Information Security Management]	
4. Level	5	
5. Credit	2	
6. Competency	<p>6.1 Know how to protect the integrity and confidentiality of information systems / data in the organisation</p> <p>6.2 Understand the process of change management</p> <p>6.3 Implement security measures for protecting the integrity and confidentiality of information systems / data in the change management process</p> <p>6.4 Ensure the organisation's information security is not compromised throughout the change management process</p>	<p><u>Performance Requirement</u></p> <p>Be able to understand how to keep information accurate and from being disclosed to unauthorized parties</p> <p>Be able to ensure the proposed changes are merited and will not adversely affect other elements of the organisation's planning</p> <p>Be able to organise processes, install software, and set up hardware to ensure the confidentiality and integrity of data, availability of information technology resources owned by the organisation and its authorized users. Security measures may include reviewing files for potential or actual policy violations and investigating security-related issues</p> <p>Be able to assure an organisation's information security infrastructure, systems and data are not compromised throughout the change management process in the implementation of security measures</p>
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) ensure the integrity and confidentiality of data together with the availability of information systems are not compromised throughout the change management process; and (ii) ascertain an organisation's security policies are being complied with.	
Remark		

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

1. Title	Develop information security awareness programme	
2. Code	ITSWIS509A	
3. Range	Develop information security awareness programme to maintain an information security culture in an organisation [Information Security – Information Security Management]	
4. Level	5	
5. Credit	2	
6. Competency	<u>Performance Requirement</u>	
	6.1 Understand the importance of raising staff awareness about the organisation's information security (IS)	Be able to make employees understand and appreciate not only the value of the organisation's information assets but also the consequences if these assets are compromised
	6.5 Develop information security awareness programmes to maintain an information security culture	Be able to plan information security awareness programmes including defining the objectives, target group and activities in each programme; developing the communication plan; and measuring the success of an implemented programme
	6.3 Ensure the development of the activities can influence the culture and behaviour of the staff, including information security education and awareness	Be able to contribute to the development of an information security culture in the organisation by encouraging employees to act responsibly and thus handle information with more care
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to develop and implement an information awareness programme to sustain information security culture in an organisation.	
Remark		

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

1. Title	Manage the execution of response and recovery plans
2. Code	ITSWIS511A
3. Range	Manage the execution of the response and recovery plans when a tragic event arises [Information Security – Response Management]
4. Level	5
5. Credit	3
6. Competency	<p><u>Performance Requirement</u></p> <p>6.1 Understand response and recovery plans Be able to</p> <ul style="list-style-type: none"> ▪ understand the structure of response and recovery plans to locate relevant information efficiently ▪ identify key action items and baselines to achieve according to the plan <p>6.2 Manage the execution of the response and recovery plans Be able to</p> <ul style="list-style-type: none"> ▪ determine when a tragic event has occurred ▪ follow the guidelines in the plans to respond to the tragic event ▪ manage and coordinate the Response Team to execute the plans accordingly <p>6.3 Feedback to and integrate the response and recovery plans into the organisation's security programme Be able to</p> <ul style="list-style-type: none"> ▪ archive the current tragic event's data and experience into the organisation's knowledgebase. ▪ ensure that the confidential data are well protected during emergency period ▪ ensure the response and recovery plans' integration and alignment to organisation-wide security programme
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to execute the response and recovery plans by: (i) determining the occurrence of a tragic event; (ii) following the plans to rectify disruptions in business functions in a reasonably short time; and (iii) maintaining the alignment of plans into the organisation's security programme.
Remark	

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

1. Title	Establish procedures for documenting security incident								
2. Code	ITSWIS512A								
3. Range	Establish procedures for documenting a tragic event as a basis for subsequent actions in response management [Information Security - Response 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 Understand the basis of documenting an event as a basis for subsequent action</td> <td> Be able to <ul style="list-style-type: none"> ▪ determine the level of threats which require documentation ▪ understand the procedures to document a tragic event </td> </tr> <tr> <td>6.2 Develop procedures for documenting an event</td> <td> Be able to <ul style="list-style-type: none"> ▪ establish guidelines for the person who is responsible for documenting a tragic event ▪ identify the person-in-charge to coordinate all documentation in this aspect ▪ develop steps to document the tragic event </td> </tr> <tr> <td>6.3 Ensure standardization and control of the documentation procedures</td> <td> Be able to <ul style="list-style-type: none"> ▪ develop a standard set of document templates for department / company ▪ design the workflow of the documentation and ensure endorsement will be obtained where necessary </td> </tr> </table>		<u>Performance Requirement</u>	6.1 Understand the basis of documenting an event as a basis for subsequent action	Be able to <ul style="list-style-type: none"> ▪ determine the level of threats which require documentation ▪ understand the procedures to document a tragic event 	6.2 Develop procedures for documenting an event	Be able to <ul style="list-style-type: none"> ▪ establish guidelines for the person who is responsible for documenting a tragic event ▪ identify the person-in-charge to coordinate all documentation in this aspect ▪ develop steps to document the tragic event 	6.3 Ensure standardization and control of the documentation procedures	Be able to <ul style="list-style-type: none"> ▪ develop a standard set of document templates for department / company ▪ design the workflow of the documentation and ensure endorsement will be obtained where necessary
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7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to establish procedures for documenting a tragic event by: (i) determining the level of threats requiring documentations; (ii) developing steps and templates to document the tragic event; and (iii) designing the workflow of documentation so that the documents are controlled properly.								
Remark									

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

1. Title	Enact information system security audit plan	
2. Code	ITSWIS513A	
3. Range	Execute the information system security audit plan with due care on audit evidence for the organisation [Information Security - Information System Audit]	
4. Level	5	
5. Credit	3	
6. Competency		<u>Performance Requirement</u>
	6.1 Conduct the audit assignments according to the information system audit plan	Be able to carry out the information system audit plan
	6.2 Gather sufficient, reliable and relevant evidence to achieve the audit objectives	Be able to gather appropriate audit evidence
	6.3 Interpret and analyse the collected evidence to conclude the audit findings	Be able to analyse audit evidence and draw findings and conclusions
	6.4 Record the process, the evidence, the findings and conclusions of the audit	Be able to maintain proper records of the audit
	6.5 Exercise the audit following appropriate professional standards and ethics	Be able to ensure the information systems audit effectively achieves the audit objectives
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to conduct information system security audit effectively and professionally.	
Remark		

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

1. Title	Prepare and deliver information system security audit report
2. Code	ITSWIS514A
3. Range	Report findings after information system security audit work to management via full documentation and management summary in industry standard format [Information Security – Information System Audit]
4. Level	5
5. Credit	4
6. Competency	<p><u>Performance Requirement</u></p> <p>6.1 Understand the information system audit work performed with its findings and conclusions Be able to identify the key issues in information system security audit work performed are in compliance with information security policy and standards</p> <p>6.2 Prepare an information system security audit report Be able to provide a report that</p> <ul style="list-style-type: none"> ▪ states the scope, objectives, nature and period of coverage, timing and extent of the audit work performed ▪ states the findings, conclusions and recommendations and any reservations, qualifications or limitations ▪ supports the reported results with sufficient and appropriate audit evidence <p>6.3 Deliver the information system security audit report Be able to issue and distribute the report according to the terms of the audit charter</p> <p>6.4 Provide the information system security audit report identifying major security exception and ensure appropriate management follow up actions taken Be able to</p> <ul style="list-style-type: none"> ▪ report and alert management if the organisation's baseline information security governance has been breached ▪ ensure appropriate follow up actions has been taken ▪ suggest improvement in future information system security audit work
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to prepare and deliver the information system security audit report in compliance with information security governance and up-to-date industry standards.
Remark	

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

1. Title	Evaluate and follow up on the recommendations in the information system security audit report										
2. Code	ITSWIS526A										
3. Range	Judge and take appropriate actions after evaluating the information system security audit report [Information Security – Information System Audit]										
4. Level	5										
5. Credit	4										
6. Competency	<table border="0" style="width: 100%;"> <tr> <td style="width: 30%; vertical-align: top;">6.1 Understand information system security audit report and security baseline</td> <td style="vertical-align: top;"> <p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ interpret the findings, recommendations of the information system security audit reports and their implied effect and impact over the organisation's business activities ▪ identify the priority of the organisation business goals in relation to the recommendations and suggestions provided in the audit report </td> </tr> <tr> <td style="vertical-align: top;">6.2 Request and evaluate the detailed proof and its supporting evidence of some important findings and recommendations</td> <td style="vertical-align: top;"> <p>Be able to</p> <ul style="list-style-type: none"> ▪ request and clarify further details and proofs from the findings and recommendations of the audit work ▪ judge and evaluate supporting evidence critically </td> </tr> <tr> <td style="vertical-align: top;">6.3 Identify the appropriate level of management and related parties to follow up the fine-tuned recommendations</td> <td style="vertical-align: top;"> <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify the urgency and priority of the recommendations of the audit report ▪ assign related parties responsible for the appropriate action in a timely manner </td> </tr> <tr> <td style="vertical-align: top;">6.4 Optimize resources to ensure follow up actions are cost effective</td> <td style="vertical-align: top;"> <p>Be able to prioritize the resources for the timely implementation of the information security recommendations bought up in the audit report</p> </td> </tr> <tr> <td style="vertical-align: top;">6.5 Evaluate and follow up on the information security audit report in a professional manner</td> <td style="vertical-align: top;"> <p>Be able to evaluate and follow up on the information security audit report in accordance with the organisation's guidelines as well as any (local and international) laws and regulatory requirements, if applicable</p> </td> </tr> </table>	6.1 Understand information system security audit report and security baseline	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ interpret the findings, recommendations of the information system security audit reports and their implied effect and impact over the organisation's business activities ▪ identify the priority of the organisation business goals in relation to the recommendations and suggestions provided in the audit report 	6.2 Request and evaluate the detailed proof and its supporting evidence of some important findings and recommendations	<p>Be able to</p> <ul style="list-style-type: none"> ▪ request and clarify further details and proofs from the findings and recommendations of the audit work ▪ judge and evaluate supporting evidence critically 	6.3 Identify the appropriate level of management and related parties to follow up the fine-tuned recommendations	<p>Be able to</p> <ul style="list-style-type: none"> ▪ identify the urgency and priority of the recommendations of the audit report ▪ assign related parties responsible for the appropriate action in a timely manner 	6.4 Optimize resources to ensure follow up actions are cost effective	<p>Be able to prioritize the resources for the timely implementation of the information security recommendations bought up in the audit report</p>	6.5 Evaluate and follow up on the information security audit report in a professional manner	<p>Be able to evaluate and follow up on the information security audit report in accordance with the organisation's guidelines as well as any (local and international) laws and regulatory requirements, if applicable</p>
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7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to evaluate relevant information in the information system security audit report to conclude whether appropriate actions have been taken by management in a timely manner.										
Remark											

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

1. Title	Provide advice on computer forensics								
2. Code	ITSWIS515A								
3. Range	Provide advice on computer forensics to legal personnel as well as management personnel [Information Security - Forensics]								
4. Level	5								
5. Credit	3								
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 Understand local and relevant international laws related to ICT, in particular data privacy and computer crime</td> <td> Be able to provide advice on legal matters related to computer forensic such as <ul style="list-style-type: none"> ▪ whether an act constitutes a computer crime ▪ the proactive ways to investigate a computer crime and collect relevant evidence </td> </tr> <tr> <td>6.2 Provide advice on legal matters related to computer forensic evidence collection and investigation</td> <td>Be able to provide advice on handling computer incidents properly and in compliance with related laws and regulations</td> </tr> <tr> <td>6.3 Make appropriate reference to professional standards and ethics</td> <td>Be able to provide professional advice on legal matters related to computer forensics</td> </tr> </table>		<u>Performance Requirement</u>	6.1 Understand local and relevant international laws related to ICT, in particular data privacy and computer crime	Be able to provide advice on legal matters related to computer forensic such as <ul style="list-style-type: none"> ▪ whether an act constitutes a computer crime ▪ the proactive ways to investigate a computer crime and collect relevant evidence 	6.2 Provide advice on legal matters related to computer forensic evidence collection and investigation	Be able to provide advice on handling computer incidents properly and in compliance with related laws and regulations	6.3 Make appropriate reference to professional standards and ethics	Be able to provide professional advice on legal matters related to computer forensics
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6.3 Make appropriate reference to professional standards and ethics	Be able to provide professional advice on legal matters related to computer forensics								
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to provide professional advice on legal matters related to computer forensics, including incident investigation and evidence collection.								
Remark									

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

1. Title	Manage computer forensics evidence												
2. Code	ITSWIS516A												
3. Range	Manage computer forensics evidence appropriate to legal proceedings for an organisation [Information Security - Forensics]												
4. Level	5												
5. Credit	3												
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 Understand how to collect computer forensics evidence</td> <td>Be able to know where and how to collect evidence from the scene of crime</td> </tr> <tr> <td>6.2 Define computer forensics evidence collection plans</td> <td>Be able to define an appropriate evidence collection plan for a computer forensics incident</td> </tr> <tr> <td>6.3 Maintain the chain of custody of the evidence</td> <td>Be able to <ul style="list-style-type: none"> ▪ properly maintain the chain of custody ▪ demonstrate to relevant persons that the evidence is properly maintained </td> </tr> <tr> <td>6.4 Preserve the evidence</td> <td>Be able to properly preserve the integrity of evidence regardless of both intentional or unintentional acts</td> </tr> <tr> <td>6.5 Make appropriate reference to the related professional standards</td> <td>Be able to manage evidence in a professional manner according to related laws and regulations</td> </tr> </table>		<u>Performance Requirement</u>	6.1 Understand how to collect computer forensics evidence	Be able to know where and how to collect evidence from the scene of crime	6.2 Define computer forensics evidence collection plans	Be able to define an appropriate evidence collection plan for a computer forensics incident	6.3 Maintain the chain of custody of the evidence	Be able to <ul style="list-style-type: none"> ▪ properly maintain the chain of custody ▪ demonstrate to relevant persons that the evidence is properly maintained 	6.4 Preserve the evidence	Be able to properly preserve the integrity of evidence regardless of both intentional or unintentional acts	6.5 Make appropriate reference to the related professional standards	Be able to manage evidence in a professional manner according to related laws and regulations
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7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to manage computer forensics evidence properly and professionally.												
Remark													

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

1. Title	Investigate an information security case
2. Code	ITSWIS517A
3. Range	Investigate an ICT-security case for an organisation with presentable evidence [Information Security - Forensics]
4. Level	5
5. Credit	5
6. Competency	<p style="text-align: right;"><u>Performance Requirement</u></p> <p>6.1 Understand forensics concepts and investigation techniques</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ understand ICT-security issues ▪ understand the procedures in conducting an investigation of security cases ▪ understand the various techniques in evidence gathering ▪ apply forensics principles to assess the environment ▪ understand the framework of an investigation plan <p>6.2 Identify a case for investigation</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ define a set of guidelines for identifying a case ▪ ensure that steps taken during investigation are legal within the law ▪ evaluate whether a case is suitable for investigation <p>6.3 Develop an investigation plan</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ define the procedures for handling an investigation on a particular case ▪ define the techniques used in information collection ▪ determine the policies, procedures, processes and types of tools ▪ designate staff with knowledge to handle the investigation ▪ define the framework in documenting all forensic activities <p>6.4 Examine the collected data</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ designate staff to conduct forensics analysis ▪ understand and interpret the collected data and prepare evidence for civil litigation ▪ collate useful information and admissible evidence from collected data ▪ be able to recognize essential elements of possible offending <p>6.5 Investigate a security case in a professional manner</p> <p>Be able to carry out an investigation of security cases in accordance with the organisation'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 are the abilities to: (i) formulate a set of guidelines to identify a security case ; and (ii) develop a plan to investigate an ICT-security case.
Remark	

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

1. Title	Prepare and present forensics investigation report
2. Code	ITSWIS518A
3. Range	Prepare and present forensics investigation report in court or to senior management [Information Security - Forensics]
4. Level	5
5. Credit	3
6. Competency	<p style="text-align: right;"><u>Performance Requirement</u></p> <p>6.1 Understand the important traits of a forensics report Be able to</p> <ul style="list-style-type: none"> ▪ understand the contents required in a forensics investigation report ▪ understand evidence presentation <p>6.2 Define guidelines in documenting the entire forensic investigation process Be able to document all essentials steps in an investigation process in a logical manner with details</p> <p>6.3 Develop guidelines in drafting a forensic investigation report Be able to</p> <ul style="list-style-type: none"> ▪ define the topics and cross-referencing required in a forensic investigation report ▪ explain the technical details to readers who might not have sufficient technical background <p>6.4 Define guidelines in presenting a case Be able to</p> <ul style="list-style-type: none"> ▪ define the steps in presentation ▪ define the required supporting evidence ▪ define the appropriate methods to present evidence to the audience with different technical backgrounds <p>6.5 Present the investigation report Be able to clearly and unambiguous communicate the investigation report in court or to management</p> <p>6.6 Prepare and present an investigation report in a professional manner Be able to prepare and present an investigation report in accordance with the organisation'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 are the abilities to prepare and present forensics investigation report in court or to management.
Remark	

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

1. Title	Establish a business continuity planning strategy	
2. Code	ITSWIS519A	
3. Range	Develop and obtain approval of a Business Continuity Planning (BCP) strategy within the organisation [Information Security – Business Continuity Planning]	
4. Level	5	
5. Credit	2	
6. Competency	<p>6.1 Appreciate the importance of BCP</p> <p>6.2 Obtain executive support in BCP</p> <p>6.3 Build business continuity model</p> <p>6.4 Define performance indicators</p>	<p><u>Performance Requirement</u></p> <p>Be able to understand the value of BCP in business operation; including reducing financial and operational impacts and ensuring the survivability of the corporation under different scenarios</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ articulate the importance of BCP to an organisation’s business upon unexpected interruption ▪ obtain senior management commitment and full support on the execution of BCP in the organisation <p>Be able to</p> <ul style="list-style-type: none"> ▪ participate in the enterprise risk management process development cycle for building a BCP ▪ establish the strategy for the BCP based on business requirements, risk management model and regulation requirements ▪ define the roles and responsibilities of each individual / business unit for BCP execution <p>Be able to</p> <ul style="list-style-type: none"> ▪ develop models from different Business Impact Analysis methodologies ▪ understand and define the Mission Critical Business processes, Recovery Time Objectives (RTO), Recovery Point Objectives (RPO), and Acceptable Exposure to Loss according to business requirements
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to develop and obtain approval of a BCP strategy by: (i) obtaining senior management support; and (ii) building business continuity model.	
Remark		

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

1. Title	Prepare a full set of business continuity planning documentation
2. Code	ITSWIS520A
3. Range	Prepare a full set of BCP (Business Continuity Planning) documentation tailored for software development and services [Information Security - Business Continuity Planning]
4. Level	5
5. Credit	2
6. Competency	<p style="text-align: right;"><u>Performance Requirement</u></p> <p>6.1 Understand BCP documentation requirements</p> <p style="padding-left: 20px;">Be able to</p> <ul style="list-style-type: none"> ▪ identify the critical information that must be included in BCP documentation ▪ master all key components of BCP documentation <p>6.2 Develop BCP documents</p> <p style="padding-left: 20px;">Be able to</p> <ul style="list-style-type: none"> ▪ work with all parties within the organisation to comply with the mandatory BCP requirements on the necessary processes as baseline services during an incident ▪ categorise related information under various categories such as Facility, People, Hardware, Software and Supplies ▪ present the recovery procedures in a coherent manner <p>6.3 Archive and maintain the documents</p> <p style="padding-left: 20px;">Be able to</p> <ul style="list-style-type: none"> ▪ archive and maintain the plan in an easily accessible location ▪ maintain suitable version control on the documentation
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to prepare a full set of BCP documentation with proven recovery procedures and version control.
Remark	

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

1. Title	Conduct drill test on business continuity planning	
2. Code	ITSWIS521A	
3. Range	Develop BCP (Business Continuity Planning) drill strategy and conduct drill test on regular basis [Information Security – Business Continuity Planning]	
4. Level	5	
5. Credit	4	
6. Competency	<p>6.1 Understand the objectives of the BCP drill</p> <p>6.2 Develop drill strategy</p> <p>6.3 Conduct drill test</p> <p>6.4 Review performance of drill tests</p>	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ understand the different natures of drills ▪ understand the importance of drill tests which play a vital role in the BCP <p>Be able to</p> <ul style="list-style-type: none"> ▪ generate suitable scenarios, which may include situations and factors that might not have happened before, for each test in various disaster possibilities for the participants to practise ▪ use of the testing results to discover the participants' strengths and opportunities for growth and better performances in the future improvements of the team's capabilities <p>Be able to</p> <ul style="list-style-type: none"> ▪ conduct checklist test ▪ conduct structured walk-through test ▪ conduct simulation test ▪ conduct parallel test ▪ conduct full-interruption test ▪ perform audit review in all tests for appropriate enhancements <p>Be able to conduct critical review on the processes and outcomes of drill tests for possible improvements in subsequent drill tests</p>
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to develop BCP drill strategy and conduct all types of drill test on regular basis.	
Remark		

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

1. Title	Provide awareness training programme to staff dealing with business continuity planning
2. Code	ITSWIS522A
3. Range	Provide appropriate awareness training programme to relevant support staff dealing with Business Continuity Planning (BCP) [Information Security – Business Continuity Planning]
4. Level	5
5. Credit	2
6. Competency	<p><u>Performance Requirement</u></p> <p>6.1 Prepare for a BCP awareness training programme</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify those staff concerned in the BCP training programme ▪ understand the key components of awareness training programme ▪ identify the availability of resources and budget for launching the awareness training programme ▪ collect data and assess the awareness of staff on BCP as a baseline for reference <p>6.2 Develop an awareness training programme</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ plan the structure of awareness training programme aiming at raising the current awareness level ▪ develop the training programme materials ▪ schedule the training programme and organize the respective events. <p>6.3 Deliver the awareness training programme</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ obtain the executive support to promote awareness training programme ▪ conduct training for the participants of the BCP programme ▪ organize awareness events and displays to supplement the formal training <p>6.4 Evaluate the effectiveness of the training programme</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ evaluate any improvements in awareness after the training events ▪ suggest follow up actions to management
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to develop and deliver a BCP training programme and ensure improved awareness after the campaign.
Remark	

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

1. Title	Establish information security policies												
2. Code	ITSWIS601A												
3. Range	Establish information security policies that support business goals and objectives of an organisation [Information Security - Information Security Governance]												
4. Level	6												
5. Credit	4												
6. Competency	<table border="0"> <tr> <td></td> <td style="text-align: right;"><u>Performance Requirement</u></td> </tr> <tr> <td>6.1 Understand various information security standards</td> <td>Be able to understand various information security standards and policies which support the organisation's activities</td> </tr> <tr> <td>6.2 Know various components of information security policies</td> <td>Be able to interpret, describe and document all information security policies</td> </tr> <tr> <td>6.3 Evaluate, adapt and define information security policies in administrative, physical and technical ways</td> <td>Be able to establish organisational information security policies in accordance with the organisation's information security strategy and direction for supporting the business goals and objectives</td> </tr> <tr> <td>6.4 Establish information security policies</td> <td>Be able to establish and maintain information security policies in alignment with the organisation's objectives, scope, coverage and awareness when embracing security policies</td> </tr> <tr> <td>6.5 Establish information security policies in a professional manner</td> <td>Be able to establish and maintain information security policies that support business goals and objectives of an organisation in compliance with the organisation's policies and procedures as well as any local and international laws and standards</td> </tr> </table>		<u>Performance Requirement</u>	6.1 Understand various information security standards	Be able to understand various information security standards and policies which support the organisation's activities	6.2 Know various components of information security policies	Be able to interpret, describe and document all information security policies	6.3 Evaluate, adapt and define information security policies in administrative, physical and technical ways	Be able to establish organisational information security policies in accordance with the organisation's information security strategy and direction for supporting the business goals and objectives	6.4 Establish information security policies	Be able to establish and maintain information security policies in alignment with the organisation's objectives, scope, coverage and awareness when embracing security policies	6.5 Establish information security policies in a professional manner	Be able to establish and maintain information security policies that support business goals and objectives of an organisation in compliance with the organisation's policies and procedures as well as any local and international laws and standards
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7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to (i) establish security policies that support business goals and objectives of an organisation within a reasonable timeframe; and (ii) ensure that the information security policies address each aspect of strategy, control and regulation.												
Remark	Risk analysis has to be taken before establishing information security policies.												

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

1. Title	Develop a business case and perform an enterprise value analysis	
2. Code	ITSWIS603A	
3. Range	Develop a business case and perform an enterprise value analysis, both are used to support information security programme investments for an organisation [Information Security - Information Security Governance]	
4. Level	6	
5. Credit	3	
6. Competency	<p>6.1 Know the methodologies for business case development</p> <p>6.2 Know the different ways to perform enterprise value analysis</p> <p>6.3 Develop a business case that supports information security programme investments</p> <p>6.4 Perform an enterprise value analysis that supports information security programme investments</p> <p>6.5 Develop a business case and perform an enterprise value analysis in a professional manner</p>	<p><u>Performance Requirement</u></p> <p>Be able to understand and select an appropriate methodology to develop the business case that supports information security programme investments</p> <p>Be able to understand and select an appropriate way to perform enterprise value analysis (e.g. compute enterprise value proposition) to support information security programme investments</p> <p>Be able to develop a structured proposal for business improvement that supports information security programme investments (See Remark 1)</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ use an appropriate process to formulate and plan the costs for supporting information security programme ▪ ensure that security costs are planned and budgeted into the organisation's annual budget submission for all IT investments and systems <p>Be able to develop a business case and perform an enterprise value analysis, both are used to support information security programme investments in accordance with the organisation's information security strategy, policies and procedures</p>
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to develop a business case and perform an enterprise value analysis, both of which are used to support information security programme investments of an organisation, for approval.	
Remark	A business case includes an analysis of business process performance and associated needs or problems, proposed alternative solutions, assumptions, constraints, and a risk-adjusted cost-benefit analysis.	

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

1. Title	Develop information security strategy and obtain management buy-in	
2. Code	ITSWIS621A	
3. Range	Develop information security strategy for an organisation in support of its business strategy and direction, and to obtain senior management commitment and support of the strategy throughout the organisation [Information Security – Information Security Governance]	
4. Level	6	
5. Credit	2	
6. Competency		Performance Requirement
	6.1 Understand the concept of information security	Be able to be aware that information security concerns about the access of the information systems in an organisation and the protection of data kept in these systems
	6.2 Understand the business strategy and direction of an organisation	Be able to develop information security strategy that addresses an organisation's business strategy and direction
	6.3 Understand the relationship between information security and business operations	Be able to relate confidentiality and integrity of business data with the availability of information systems and communication infrastructure to support business operations
	6.4 Understand various information security management (or governance) roles, responsibilities and organisational structure	Be able to <ul style="list-style-type: none"> ▪ define the roles and responsibilities of each individual entity throughout the organisation in all information security governance activities ▪ ensure that these definitions are in place
	6.5 Have knowledge in legal and regulatory issues related to information security	Be able to identify the current and potential legal and regulatory issues affecting information security and assess their impact on the organisation
	6.6 Apply appropriate techniques used to secure senior management commitment and support	Be able to develop business cases for the developed information security strategy so as to obtain senior management commitment and support for information security throughout the organisation
	6.7 Develop information security strategy in a professional manner	Be able to <ul style="list-style-type: none"> ▪ develop information security strategy in support of the organisation's business strategy and direction and in accordance with the organisation's guidelines as well as any (local and international) laws and regulatory requirements, if applicable ▪ document those identified current and potential legal and regulatory issues affecting information security and their impact on the organisation ▪ develop business cases via effective communications with senior management to obtain their commitment and support for information security throughout the organisation

7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) develop information security strategy in support of the organisation's business strategy and direction; and (ii) obtain senior management commitment and support of the information security throughout the organisation.
Remark	

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

1. Title	Develop a risk management process
2. Code	ITSWIS604A
3. Range	Develop a systematic, analytical and continuous risk management process to manage information security risks so that the organisation can achieve its business objectives [Information Security – Risk Management]
4. Level	6
5. Credit	3
6. Competency	<p><u>Performance Requirement</u></p> <p>6.1 Understand information resources Be able to</p> <ul style="list-style-type: none"> ▪ articulate the critical information resources for an organization's business operation ▪ explain how information resources are used to support an organisation's business processes <p>6.2 Understand the principles of developing baselines Be able to</p> <ul style="list-style-type: none"> ▪ understand the principles of developing baselines ▪ understand the role of these baselines in risk-based assessments of control requirements so as to develop a systematic, analytical and continuous risk management process <p>6.3 Comprehend information security management standards and good practices Be able to establish and adopt generally accepted standards of best practices for information security management against current state and applicable to business requirements</p> <p>6.4 Develop a risk management process / framework in a professional manner Be able to</p> <ul style="list-style-type: none"> ▪ develop a systematic, analytical and continuous risk management process for management to effectively deal with uncertainty, associated risk and opportunity so as to enhance the organisation's capacity to build value ▪ ensure that the developed process is in compliance with organisation's policies and guidelines, as well as any (local and international) laws and regulatory requirements, if applicable. ▪ ensure an on-going continuous improvement mechanism to identify new risks and then mitigate the risks accordingly
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) develop a systematic, analytical, and continuous risk management process for information security risk management so that the organisation can achieve its business objectives; and (ii) ensure that the risk management process can be implemented.
Remark	

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

1. Title	Identify and evaluate risks	
2. Code	ITSWIS605A	
3. Range	Apply risk identification and analysis methods to identify and evaluate risks that pose the gravest threat to an organisation's business processes [Information Security – Risk Management]	
4. Level	6	
5. Credit	2	
6. Competency	<p>6.1 Understand information resources of an organisation</p> <p>6.2 Comprehend potential risk factors related to information resources</p> <p>6.3 Understand quantitative and qualitative methods for risk assessment.</p> <p>6.4 Apply risk identification and analysis methods in a professional manner</p>	<p><u>Performance Requirement</u> Be able to</p> <ul style="list-style-type: none"> ▪ articulate the critical information resources for an organisation's business operation ▪ understand how information resources of an organisation can be used to support its normal business processes (including its employees, business assets, business operations and business functions) ▪ explain that certain information resources in an organisation are critical to its business processes <p>Be able to identify and analyse risks (such as threats, vulnerabilities and exposures associated with confidentiality, integrity and availability of information resources) that are related to the information resources of an organisation, which may have adverse effects on its business processes</p> <p>Be able to apply quantitative and qualitative methods to determine sensitivity and criticality of information resources, and the impact of adverse events</p> <p>Be able to apply risk identification and analysis methods to</p> <ul style="list-style-type: none"> ▪ identify physical and logical risks that pose the gravest threat to an organisation's employees, business assets, operations and business functions ▪ evaluate the potential financial and service impacts that may arise from those identified risks ▪ comply with the organisation's policies and guidelines as well as any (local and international) laws and regulatory requirements, if applicable
7. Assessment Criteria	<p>The integrated outcome requirements of this UoCs are the abilities to:</p> <p>(i) identify and manage risks that pose the gravest threat to the organisation; and</p> <p>(ii) evaluate the potential financial and service impacts that may arise from those identified risks.</p> <p>in accordance with the organisation's policies and guidelines as well as any (local and international) laws and regulatory requirements, if applicable</p>	
Remark		

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

1. Title	Create plans to implement information security governance framework	
2. Code	ITSWIS606A	
3. Range	Realize that the Information Security Governance (ISG) framework covers information security baselines, procedures and guidelines for medicating security risks and IT infrastructure activities [Information Security – Information Security Programme Management]	
4. Level	6	
5. Credit	4	
6. Competency	<p>6.1 Understand the importance of information security governance in support of business strategy and direction</p> <p>6.2 Create plans to implement the information security governance framework</p> <p>6.3 Promote accountability by business process owners and other stakeholders in managing information security risks</p> <p>6.4 Establish metrics to manage the information security governance framework</p>	<p><u>Performance Requirement</u> Be able to evaluate and prioritize information security plans to address the long-term business strategy and direction</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ develop information security baseline(s) ▪ develop procedures and guidelines to ensure business processes address information security risk ▪ develop procedures and guidelines for IT infrastructure activities to ensure compliance with information security policies <p>Be able to</p> <ul style="list-style-type: none"> ▪ secure management’s approval and resource for the information security plan ▪ define and clarify the key security roles and responsibilities of business process owners and stakeholders ▪ identify and penalize the culprit when security incident happens or security violation is discovered in the process of information security audit <p>Be able to</p> <ul style="list-style-type: none"> ▪ understand best practices and industry standards of information security ▪ implement measurable standards of information security governance in reference to other similar organisation and industry norms
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to create and maintain plans to implement the ISG framework for consistent results and accountability.	
Remark		

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

1. Title	Integrate information security programme requirements into an enterprise's life cycle activities	
2. Code	ITSWIS607A	
3. Range	Integrate information security programme requirements into an enterprise's life cycle activities to construct proactive measures in information security programmes [Information Security - Information Security Programme Management]	
4. Level	6	
5. Credit	4	
6. Competency	<p>6.1 Understand various life cycle activities of an enterprise</p> <p>6.2 Integrate information security programme requirements into the enterprise's life cycle activities in a professional manner</p>	<p><u>Performance Requirement</u> Be able to assess information security risks in an enterprise's life cycle activities</p> <p>Be able to plan, design, develop and implement information security programme requirements, and integrate them into an enterprise's life cycle activities as well as business processes based on the enterprise's security policies and procedures, relevant laws and regulatory requirements</p>
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to integrate information security requirements into the enterprise's life cycle activities and business processes.	
Remark		

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

1. Title	Establish metrics to manage information security governance framework	
2. Code	ITSWIS609A	
3. Range	Establish metrics to manage the information security governance (ISG) framework with reference to current industry practice [Information Security - Information Security Programme Management]	
4. Level	6	
5. Credit	4	
6. Competency		<u>Performance Requirement</u>
	6.1 Understand best practices and industry standards of information security	Be able to suggest and introduce the right information security practice and industry standards to the organisation
	6.2 Setup an objective system to measure the level and standards of information security governance framework	Be able to adopt and establish appropriate guidelines and systems to measure the level and standards of the information security governance framework
	6.3 Obtain certain widely-known security standards certification	Be able to drill, participate and measure the information security practices of the organisation with reference to certain widely-known information security standards certification
	6.4 Use ISG automation tools to analyse the level of achievement of ISG framework	Be able to make use of appropriate ISG automation tools to analyse, improve and perfect the achievement of ISG framework with measurable outcomes
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to establish metrics in managing the information security governance framework in a scientific way according to the industry standards and best practices.	
Remark		

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

1. Title	Develop, propose and promulgate an enterprise's information security policies	
2. Code	ITSWIS611A	
3. Range	Develop, propose and promulgate an enterprise's information security policies for the support of its business missions [Information Security – Information Security Management]	
4. Level	6	
5. Credit	4	
6. Competency	<p>6.1 Understand the principles of information security policies</p> <p>6.2 Understand the stakeholders and their concerns</p> <p>6.3 Develop and propose information security policies</p> <p>6.4 Promulgate the information security policies</p>	<p><u>Performance Requirement</u> Be able to</p> <ul style="list-style-type: none"> ▪ understand and evaluate the principles of information security policies that can be used to support the enterprise's business and operations ▪ understand the local and international laws and regulatory requirements relating to information security <p>Be able to identify the stakeholders and understand their concerns on information security</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ study the information security policies implemented elsewhere and lessons learnt ▪ understand the important elements that need to be addressed in the information security policy after taking into consideration the business requirements of the enterprise; local and international laws and regulatory requirements ▪ define the scope, policy and enforcement process of the information security policies that are suitable for the enterprise ▪ explain the policies to senior management and obtain their approval <p>Be able to</p> <ul style="list-style-type: none"> ▪ develop an implementation plan of the policies ▪ disseminate the policies to the relevant action parties ▪ communicate and explain the advantages / disadvantages of the policies and their compliance issues ▪ assist users to implement the policies
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to develop, propose and promulgate an enterprise's information security policies adopted by the enterprise for the support of its business mission.	
Remark		

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

1. Title	Establish corporate information security standards												
2. Code	ITSWIS612A												
3. Range	Promulgate and co-ordinate with services providers or external parties to establish information security practices and ensure their compliance with the enterprise's information security policies [Information Security – Information Security Management]												
4. Level	6												
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 Understand the enterprise's information security policies</td> <td>Be able to understand the enterprise's information security policies</td> </tr> <tr> <td>6.2 Understand the information security requirements for services provided by external parties</td> <td>Be able to <ul style="list-style-type: none"> • identify the service providers and external parties and understand their services • assess the information security requirements for their services </td> </tr> <tr> <td>6.3 Advocate and explain the enterprise information security policies</td> <td>Be able to <ul style="list-style-type: none"> ▪ explain the enterprise information security policies to external parties ▪ define the IS requirements to external parties ▪ explain the relevant information security policies and practices </td> </tr> <tr> <td>6.4 Establish the information security practices with external parties</td> <td>Be able to establish the information security practices, procedures and guidelines that support the enterprise's information security policies</td> </tr> <tr> <td>6.5 Set up processes to monitor the compliance with information security policies for the services provided by external parties</td> <td>Be able to define the monitoring and reporting processes for non-compliance with the established information security practices, procedures and guidelines</td> </tr> </table>		<u>Performance Requirement</u>	6.1 Understand the enterprise's information security policies	Be able to understand the enterprise's information security policies	6.2 Understand the information security requirements for services provided by external parties	Be able to <ul style="list-style-type: none"> • identify the service providers and external parties and understand their services • assess the information security requirements for their services 	6.3 Advocate and explain the enterprise information security policies	Be able to <ul style="list-style-type: none"> ▪ explain the enterprise information security policies to external parties ▪ define the IS requirements to external parties ▪ explain the relevant information security policies and practices 	6.4 Establish the information security practices with external parties	Be able to establish the information security practices, procedures and guidelines that support the enterprise's information security policies	6.5 Set up processes to monitor the compliance with information security policies for the services provided by external parties	Be able to define the monitoring and reporting processes for non-compliance with the established information security practices, procedures and guidelines
	<u>Performance Requirement</u>												
6.1 Understand the enterprise's information security policies	Be able to understand the enterprise's information security policies												
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6.5 Set up processes to monitor the compliance with information security policies for the services provided by external parties	Be able to define the monitoring and reporting processes for non-compliance with the established information security practices, procedures and guidelines												
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) explain the enterprise information security policies to services provider or external parties; (ii) establish the information security practices, procedures and guidelines that support the enterprise's information security policies; and (iii) establish the monitoring and reporting processes for non-compliance with the enterprise's information security policies.												
Remark													

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

1. Title	Devise processes for detecting, identifying and analysing security incident	
2. Code	ITSWIS613A	
3. Range	Develop and implement processes for detecting, identifying and analysing security related events for an organisation to support its normal business operations away from security threats [Information Security – Response Management]	
4. Level	6	
5. Credit	2	
6. Competency	<p>6.1 Understand help desk processes</p> <p>6.2 Know information security incident detection and reporting policies and processes</p> <p>6.3 Develop processes to deal with security incidents</p> <p>6.4 Develop processes to deal with security incidents in a professional manner</p>	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify security incidents reported by users (Being able to identify something assumes the ability to distinguish something from others.) ▪ explain the reason why some help desk issues are security incidents and others are not <p>Be able to develop processes for detecting and identifying information security incidents</p> <p>Be able to develop and implement processes for detecting, identifying and analysing security related events of an organisation</p> <p>Be able to develop and implement processes for detecting, identifying and analysing security related events in compliance with organisation’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 are the abilities to: (i) develop and implement organisational processes for detecting, identifying and analysing security related events; and (ii) ensure that the developed and implemented processes comply with the organisation’s policies and guidelines and any applicable local and international laws and regulatory requirements.	
Remark		

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

1. Title	Develop response and recovery plans	
2. Code	ITSWIS614A	
3. Range	Develop organisational response and recovery plans including organizing, training and equipping the teams to restore the organisation's normal business operations [Information Security – Response Management]	
4. Level	6	
5. Credit	3	
6. Competency		<u>Performance Requirement</u>
	6.1 Know the components of an incident response capability	Be able to understand response and recovery plans for an organisation to minimize any interruptions, caused by security incidents, of its normal business operations
	6.2 Understand the disaster recovery planning and business recovery processes	
	6.3 Know the information security emergency management practices (See Remark)	Be able to understand response and recovery plans that include processes to organize, train and equip the teams
	6.4 Develop response and recovery plans	Be able to <ul style="list-style-type: none"> ▪ develop response and recovery plans for an organisation to minimize any interruptions, caused by security incidents, of its normal business operations ▪ develop response and recovery plans that include processes to organize, train and equip the teams
	6.5 Develop response and recovery plans in a professional way	Be able to ensure that the developed response and recovery plans are in compliance with the organisation's policies and guidelines as well as any (local and international) laws and regulatory requirements, if applicable
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: <ul style="list-style-type: none"> (i) develop response and recovery plans for an organisation to minimize interruptions, caused by security incidents, of its normal business operations; (ii) develop response and recovery plans including organizing, training and equipping the teams; and (iii) ensure that the developed response and recovery plans comply with the organisation's policies and guidelines as well as any applicable local and international laws and regulatory requirements. 	
Remark	Examples of information security management practices are production of change control activities and development of computer emergency response team.	

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

1. Title	Manage post-event reviews
2. Code	ITSWIS615A
3. Range	Manage post-event reviews to identify causes and corrective actions after the tragic event has occurred [Information Security – Response Management]
4. Level	6
5. Credit	3
6. Competency	<p style="text-align: right;"><u>Performance Requirement</u></p> <p>6.1 Understand the process of post-event review</p> <p style="margin-left: 40px;">Be able to</p> <ul style="list-style-type: none"> ▪ understand the purpose of post-event review ▪ understand the steps required to complete post-event review <p>6.2 Conduct post-event analysis</p> <p style="margin-left: 40px;">Be able to</p> <ul style="list-style-type: none"> ▪ conduct post-event analysis to create incident report ▪ consolidate regular incident reports for trend analysis ▪ gather statistics to identify any abnormality ▪ interpret the statistical trends of incidents <p>6.3 Devise corrective actions</p> <p style="margin-left: 40px;">Be able to</p> <ul style="list-style-type: none"> ▪ conduct root cause analysis ▪ facilitate review meetings to discuss and devise corrective actions
7. Assessment Criteria	The integrated outcome requirements of this UoCs is the ability to manage post-event reviews by: (i) creating incident report; (ii) consolidating and interpreting regular incident reports; (iii) identifying root causes of the events; and (iv) producing a list of corrective actions for rectification.
Remark	

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

1. Title	Facilitate cross functional teams for crisis management
2. Code	ITSWIS616A
3. Range	Facilitate cross functional teams for crisis management to perform to the best of their capacity to handle any information security crisis events that may occur [Information Security – Crisis Management]
4. Level	6
5. Credit	1
6. Competency	<p style="text-align: center;"><u>Performance Requirement</u></p> <p>6.1 Have the knowledge of cross functional team management Be able to explain the need for a cross functional team, and the techniques and methods in managing the team</p> <p>6.2 Perform cross functional team facilitation Be able to</p> <ul style="list-style-type: none"> ▪ identify and invite suitable members from different functions for the team formation ▪ liaise with different functional teams ▪ organize and structure the team ▪ coordinate the team's communication ▪ motivate members' active contribution to the team ▪ facilitate meetings ▪ steer and focus the team into achieving the team's goals and objectives <p>6.3 Perform cross functional team facilitation in a professional manner Be able to</p> <ul style="list-style-type: none"> ▪ demonstrate a high degree of professionalism and competence in the facilitation of cross functional teams ▪ achieve the team's goals and objectives in an efficient and effective manner
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to facilitate cross functional teams to perform to the best of their capabilities in handling any information security crisis event that may occur.
Remark	

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

1. Title	Prepare a crisis management plan and perform life cycle management of the plan
2. Code	ITSWIS617A
3. Range	Prepare a comprehensive crisis management plan and perform lifecycle management of the plan, so as to enable an organisation to plan for, respond to, and recover from an event [Information Security – Crisis Management]
4. Level	6
5. Credit	3
6. Competency	<p style="text-align: right;"><u>Performance Requirement</u></p> <p>6.1 Have the knowledge of developing a comprehensive crisis management plan</p> <p style="margin-left: 20px;">Be able to</p> <ul style="list-style-type: none"> ▪ explain the requirements of a comprehensive crisis management plan ▪ adopt suitable standards and guidelines for creating a crisis management plan <p>6.2 Understand the requirements of lifecycle management of crisis management plans</p> <p style="margin-left: 20px;">Be able to explain the lifecycle management activities of crisis management plans</p> <p>6.3 Prepare the comprehensive crisis management plan</p> <p style="margin-left: 20px;">Be able to</p> <ul style="list-style-type: none"> ▪ identify and solicit inputs from the relevant personnel in the organisation ▪ document the necessary sections in a comprehensive crisis management plan ▪ obtain approvals from the top management for the crisis management plan <p>6.4 Perform lifecycle management of the comprehensive crisis management plan</p> <p style="margin-left: 20px;">Be able to</p> <ul style="list-style-type: none"> ▪ maintain the contents of the crisis management plan in accordance with any changes in the organisation or environment ▪ coordinate the relevant functions to perform drill tests in accordance with the crisis management plan <p>6.5 Prepare the crisis management plan in a professional manner</p> <p style="margin-left: 20px;">Be able to demonstrate a high degree of competence and professionalism in the preparation of the crisis management plan</p> <p>6.6 Perform lifecycle management of the comprehensive crisis management plan in a professional manner</p> <p style="margin-left: 20px;">Be able to</p> <ul style="list-style-type: none"> ▪ keep the crisis management plan up-to-date in a timely manner ▪ organize and facilitate the drill tests in an efficient and effective manner
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to develop and maintain a crisis management plan so that the organisation is always well-prepared for any crisis events that may occur.
Remark	

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

1. Title	Develop an information system security audit plan	
2. Code	ITSWIS618A	
3. Range	Develop an information system security audit (ISA) plan to aid corporate governance in particular on the use of information systems and data in an organisation [Information Security – Information System Audit]	
4. Level	6	
5. Credit	4	
6. Competency		<u>Performance Requirement</u>
	6.1 Understand the functions of ISA and the format of an ISA plan	Be able to plan an ISA exercise
	6.2 Understand applicable laws	Be able to list all applicable legal requirements related to an ISA exercise
	6.3 Understand and evaluate various professional auditing standards	Be able to formulate best practices for an ISA exercise
	6.4 Define the purpose, responsibility, authority, and accountability of the ISA function in Audit Charter	Be able to establish policy for guiding the development and execution of the ISA plan
	6.5 Develop an ISA plan that matches the needs of the organisation and the characteristics of the information system	Be able to develop an information systems audit plan that <ul style="list-style-type: none"> ▪ addresses the audit objectives as defined by the stakeholders ▪ describes the audit detailing the nature and objectives, timing and extent, objectives and resources required
	6.6 Develop an ISA plan in compliance with applicable laws and professional auditing standards	Be able to ensure that the information systems audit plan is effective and in compliance with applicable laws and professional auditing standards
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to develop an information system audit plan based on appropriate adoption of professional standards in order to effectively fulfil the audit objectives as defined by the organisation and in compliance with applicable laws.	
Remark	Being able to document the information system security audit plan is assumed to be a common generic skill.	

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

1. Title	Plan and maintain business continuity solutions								
2. Code	ITSWIS620A								
3. Range	Plan and maintain appropriate solutions to meet the stipulated Business Continuity Planning (BCP) strategy [Information Security – Business Continuity Planning]								
4. Level	6								
5. Credit	4								
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 Understand the stipulated BCP strategy</td> <td> Be able to <ul style="list-style-type: none"> ▪ summarise the outcomes of business impact analysis (BIA) ▪ link up the relationship between the BIA outcomes and the stipulated strategy </td> </tr> <tr> <td>6.2 Plan business continuity solutions</td> <td> Be able to <ul style="list-style-type: none"> ▪ define critical business functions and their supporting units ▪ identify the inter-dependencies between the supporting units ▪ identify all possible threats that may affect these supporting units to work together </td> </tr> <tr> <td>6.3 Develop and maintain solutions</td> <td> Be able to <ul style="list-style-type: none"> ▪ prioritize the threats according to their likelihood and impact ▪ develop tailored solutions according to the priority of threats ▪ regularly review and update the solutions to respond to the changing business environment </td> </tr> </table>		<u>Performance Requirement</u>	6.1 Understand the stipulated BCP strategy	Be able to <ul style="list-style-type: none"> ▪ summarise the outcomes of business impact analysis (BIA) ▪ link up the relationship between the BIA outcomes and the stipulated strategy 	6.2 Plan business continuity solutions	Be able to <ul style="list-style-type: none"> ▪ define critical business functions and their supporting units ▪ identify the inter-dependencies between the supporting units ▪ identify all possible threats that may affect these supporting units to work together 	6.3 Develop and maintain solutions	Be able to <ul style="list-style-type: none"> ▪ prioritize the threats according to their likelihood and impact ▪ develop tailored solutions according to the priority of threats ▪ regularly review and update the solutions to respond to the changing business environment
	<u>Performance Requirement</u>								
6.1 Understand the stipulated BCP strategy	Be able to <ul style="list-style-type: none"> ▪ summarise the outcomes of business impact analysis (BIA) ▪ link up the relationship between the BIA outcomes and the stipulated strategy 								
6.2 Plan business continuity solutions	Be able to <ul style="list-style-type: none"> ▪ define critical business functions and their supporting units ▪ identify the inter-dependencies between the supporting units ▪ identify all possible threats that may affect these supporting units to work together 								
6.3 Develop and maintain solutions	Be able to <ul style="list-style-type: none"> ▪ prioritize the threats according to their likelihood and impact ▪ develop tailored solutions according to the priority of threats ▪ regularly review and update the solutions to respond to the changing business environment 								
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to plan business continuity solutions according to the priority of threats that could affect the operations among critical business functions.								
Remark									

Appendix D.5 UoCs in Design, Development and Maintenance

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

1. Title	Perform testing activities to facilitate different levels of testing (See Remark for different levels of testing)								
2. Code	ITSWDM401A								
3. Range	Perform testing activities according to the corresponding test plans which may involve the development of software simulators to facilitate different 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	4								
5. Credit	2								
6. Competency	<table border="0"> <tr> <td></td> <td style="text-align: right;"><u>Performance Requirement</u></td> </tr> <tr> <td>6.1 Have the knowledge to design and develop test plans and software simulator to facilitate different levels of testing</td> <td> Be able to <ul style="list-style-type: none"> ▪ identify the requirements of test plans ▪ identify the requirements of software simulator, if applicable </td> </tr> <tr> <td>6.2 Perform various levels of testing, which may involve the use of a software simulator</td> <td> Be able to <ul style="list-style-type: none"> ▪ design and develop software simulator, if applicable, to facilitate different levels of testing ▪ perform the required testing activities of various levels of testing according to the corresponding test plans </td> </tr> <tr> <td>6.3 Perform all testing activities in a professional manner</td> <td> Be able to <ul style="list-style-type: none"> ▪ perform the testing activities of various levels of testing in an efficient and effective manner ▪ ensure that all such testing activities are complied with the corresponding test plans and are in accordance with the organisation's guidelines as well as any (local and international) laws and regulatory requirements, if applicable </td> </tr> </table>		<u>Performance Requirement</u>	6.1 Have the knowledge to design and develop test plans and software simulator to facilitate different levels of testing	Be able to <ul style="list-style-type: none"> ▪ identify the requirements of test plans ▪ identify the requirements of software simulator, if applicable 	6.2 Perform various levels of testing, which may involve the use of a software simulator	Be able to <ul style="list-style-type: none"> ▪ design and develop software simulator, if applicable, to facilitate different levels of testing ▪ perform the required testing activities of various levels of testing according to the corresponding test plans 	6.3 Perform all testing activities in a professional manner	Be able to <ul style="list-style-type: none"> ▪ perform the testing activities of various levels of testing in an efficient and effective manner ▪ ensure that all such testing activities are complied with the corresponding test plans and are in accordance with the organisation's guidelines as well as any (local and international) laws and regulatory requirements, if applicable
	<u>Performance Requirement</u>								
6.1 Have the knowledge to design and develop test plans and software simulator to facilitate different levels of testing	Be able to <ul style="list-style-type: none"> ▪ identify the requirements of test plans ▪ identify the requirements of software simulator, if applicable 								
6.2 Perform various levels of testing, which may involve the use of a software simulator	Be able to <ul style="list-style-type: none"> ▪ design and develop software simulator, if applicable, to facilitate different levels of testing ▪ perform the required testing activities of various levels of testing according to the corresponding test plans 								
6.3 Perform all testing activities in a professional manner	Be able to <ul style="list-style-type: none"> ▪ perform the testing activities of various levels of testing in an efficient and effective manner ▪ ensure that all such testing activities are complied with the corresponding test plans and are in accordance with the organisation's guidelines as well as any (local and international) laws and regulatory requirements, if applicable 								
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) develop appropriate software simulators, if necessary, for testing purposes; (ii) perform various levels of testing; and (iii) document all testing activities in test reports.								
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	Report discrepancies between software and its related document		
2. Code	ITSWDM402A		
3. Range	Report discrepancies between software and its related documents after conducting testing activities in the context of development of software products / services within an organisation or for a client [Design Development Maintenance – Software Quality Assurance]		
4. Level	4		
5. Credit	1		
6. Competency	<table border="0" style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> <p>6.1 Have the knowledge to report the results of different levels of testing</p> <p>6.2 Report the discrepancies between the software and its related documents</p> <p>6.3 Report the discrepancies between software and its related documents in a professional manner</p> </td> <td style="width: 50%; vertical-align: top;"> <p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify the requirements for reporting the results of various levels of testing ▪ understand the appropriate format required for the report <p>Be able to complete the corresponding testing reports after performing the testing by pointing out any discrepancy, if any, between the software and its related design documents (See Remark for details)</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ report the discrepancies between software and its related documents in an efficient and effective manner; ▪ advise which part of programme source should be modified <p>in accordance with organisation's guidelines as well as any (local and international) laws and regulatory requirements, if applicable</p> </td> </tr> </table>	<p>6.1 Have the knowledge to report the results of different levels of testing</p> <p>6.2 Report the discrepancies between the software and its related documents</p> <p>6.3 Report the discrepancies between software and its related documents in a professional manner</p>	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify the requirements for reporting the results of various levels of testing ▪ understand the appropriate format required for the report <p>Be able to complete the corresponding testing reports after performing the testing by pointing out any discrepancy, if any, between the software and its related design documents (See Remark for details)</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ report the discrepancies between software and its related documents in an efficient and effective manner; ▪ advise which part of programme source should be modified <p>in accordance with organisation's guidelines as well as any (local and international) laws and regulatory requirements, if applicable</p>
<p>6.1 Have the knowledge to report the results of different levels of testing</p> <p>6.2 Report the discrepancies between the software and its related documents</p> <p>6.3 Report the discrepancies between software and its related documents in a professional manner</p>	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify the requirements for reporting the results of various levels of testing ▪ understand the appropriate format required for the report <p>Be able to complete the corresponding testing reports after performing the testing by pointing out any discrepancy, if any, between the software and its related design documents (See Remark for details)</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ report the discrepancies between software and its related documents in an efficient and effective manner; ▪ advise which part of programme source should be modified <p>in accordance with organisation'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 are the abilities to: (i) report results of various levels of testing in proper format; and (ii) point out the discrepancies between the software and its related documents.		
Remark	The discrepancies between the software and its related documents are usually found after testing has been performed. Normally, this reflects that the actual and expected results of the software do not match with each other under certain input values.		

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

1. Title	Debug a programme	
2. Code	ITSWDM403A	
3. Range	Locate and fix defects in a programme with appropriate debugging tools in the context of development of software products / services within an organisation or for a client [Design Development Maintenance – Software Quality Assurance]	
4. Level	4	
5. Credit	1	
6. Competency	<p>6.1 Have the knowledge to select appropriate debugger</p> <p>6.2 Locate and fix the logical error</p> <p>6.3 Perform debugging of programmes in a professional manner</p>	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ understand the selection criteria for an appropriate debugger for debugging programmes ▪ understand the various debuggers available <p>Be able to</p> <ul style="list-style-type: none"> ▪ select and make use of an appropriate debugger to help in debugging programmes ▪ systematically locate any logical errors ▪ effectively fix the logical error, if any ▪ record the locations of the errors, if any, and the corresponding fixing methods <p>Be able to</p> <ul style="list-style-type: none"> ▪ debug programmes in an efficient and effective manner ▪ follow organisation's standards and guidelines where applicable ▪ prepare the debugging report for stakeholders
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) select appropriate debuggers to help debug programmes; (ii) use debugger to locate and fix the bug; and (iii) prepare report on debugging.	
Remark		

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

1. Title	Perform software audit
2. Code	ITSWDM404A
3. Range	Record and report the audit findings in a software audit for continuous improvement in the context of development of software products / services within an organisation or for a client [Design Development Maintenance – Software Quality Assurance]
4. Level	4
5. Credit	1
6. Competency	<p style="text-align: right;"><u>Performance Requirement</u></p> <p>6.1 Understand the process of performing software audit and how to select appropriate tools for software audit</p> <p style="margin-left: 20px;">Be able to</p> <ul style="list-style-type: none"> ▪ understand the requirements of software audit process ▪ understand the various tools available for software audit ▪ identify the selection criteria for software audit tools <p>6.2 Perform software audit, with the use of selected tools where applicable</p> <p style="margin-left: 20px;">Be able to</p> <ul style="list-style-type: none"> ▪ use the software audit tools, if applicable, to audit the software which is licensed ▪ use the software audit tools, if applicable, to audit the setting ▪ use the software audit tools, if applicable, to audit security ▪ use the software audit tools, if applicable, to audit performance <p>6.3 Prepare software audit report</p> <p style="margin-left: 20px;">Be able to</p> <ul style="list-style-type: none"> ▪ list the software audit results ▪ list action plans for corrective action items ▪ recommend continuous improvement items <p>6.4 Perform software audit and record the audit findings for continuous improvement in a professional manner</p> <p style="margin-left: 20px;">Be able to perform software audit and recommend for future improvements:</p> <ul style="list-style-type: none"> ▪ in an efficient and effective manner ▪ in accordance with industry best practices, organisation’s guidelines as well as any (local and international) laws and regulatory requirements, if applicable ▪ with the agreement of stakeholders
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) perform software audit; (ii) prepare software audit report; and (iii) recommend future improvements.
Remark	

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

1. Title	Verify and validate that the deployed / migrated software and the existing software are functioning properly	
2. Code	ITSWDM405A	
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 [Design, Development and Maintenance – Software Deployment and Migration]	
4. Level	4	
5. Credit	1	
6. Competency	<p>6.1 Understand the relationship between the deployed or migrated software with other systems</p> <p>6.2 Perform verification and validation of the deployed or migrated software</p> <p>6.3 Ensure independent operation in the verification and validation process</p> <p>6.4 Verify and validate that the deployed / migrated software and the existing software are functioning properly in a professional manner</p>	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ state the features of the newly deployed software ▪ state which functionalities from the retired software were replaced by those from the migrated software ▪ identify the position of the deployed or migrated software in the integrated environment within an organisation <p>Be able to</p> <ul style="list-style-type: none"> ▪ draw up a verification and validation plan about 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 installed correctly and completely according to the 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>Be able to</p> <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 the verification and validation plan ▪ review documentary evidence received and fully document audit work <p>Be able to verify and validate that the deployed / migrated software and the existing software are functioning properly in accordance with organisation's guidelines as well as any (local and international) laws and regulatory requirements, if applicable</p>
7. Assessment	The integrated outcome requirements of this UoCs are the abilities to:	

Criteria	(i) confirm that the deployed or migrated software delivers its expected outcomes; and (ii) confirm that the deployed or migrated software and the existing software are functioning properly.
Remark	

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

1. Title	Identify components that need to be managed in software decommissioning	
2. Code	ITSWDM406A	
3. Range	Identify components (including hardware, software, account and credential information) that need to be retained, removed or archived in the context of preparing the software decommissionion [Design, Development and Maintenance – Software Decommissioning]	
4. Level	4	
5. Credit	1	
6. Competency	<p>6.1 Understand the software decommissioning policy</p> <p>6.2 Identify components to be removed</p> <p>6.3 Identify information to be removed</p> <p>6.4 Classify and archive information with potential usage</p> <p>6.5 Observe data protection requirements</p>	<p><u>Performance Requirement</u></p> <p>Be able to comprehend the defined software decommissioning policy in particular the scope, conditions, criteria and requirements</p> <p>Be able to point out software, hardware and storage media that need to be removed from operation</p> <p>Be able to locate account and credential information of software users that need to be removed from the operating environment</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify information that need to be archived for further reference such as for audit and compliance purposes ▪ archive information with potential usage together with its retrieval environments, processes and procedures <p>Be able to observe data protection requirements from within the operating organisation and regulatory bodies on confidentiality and privacy</p>
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to classify items into disposable or not disposable in a software decommissioning process.	
Remark	This UoCs assumes that a software decommissioning policy is available.	

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

1. Title	Verify and validate that the remaining software are functioning properly										
2. Code	ITSWDM407A										
3. Range	Verify and validate that the remaining software are functioning properly to ensure that the decommissioning does not affect the existing systems in the context of software decommissioning [Design, Development and Maintenance – Software Decommissioning]										
4. Level	4										
5. Credit	1										
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 Understand the functionalities of the decommissioned software</td> <td> Be able to <ul style="list-style-type: none"> ▪ identify the functions delivered by the decommissioned software ▪ trace the relationship between the decommissioned software and other systems or components from records </td> </tr> <tr> <td>6.2 Verify and validate the remaining software</td> <td> Be able to <ul style="list-style-type: none"> ▪ verify that the existing software are functioning properly in the absence of the decommissioned software ▪ validate the integrity of the remaining systems and components to ensure that they remain fit for their usual purpose </td> </tr> <tr> <td>6.3 Document test results for future reference</td> <td> Be able to <ul style="list-style-type: none"> ▪ record the results from verification and validation tests ▪ sign off the results as the benchmark for future reference </td> </tr> <tr> <td>6.4 Verify and validate that the remaining software are functioning properly</td> <td>Be able to verify and validate that the remaining software are functioning properly in accordance with the organisation's guidelines as well as any (local and international) laws and regulatory requirements, if applicable</td> </tr> </table>		<u>Performance Requirement</u>	6.1 Understand the functionalities of the decommissioned software	Be able to <ul style="list-style-type: none"> ▪ identify the functions delivered by the decommissioned software ▪ trace the relationship between the decommissioned software and other systems or components from records 	6.2 Verify and validate the remaining software	Be able to <ul style="list-style-type: none"> ▪ verify that the existing software are functioning properly in the absence of the decommissioned software ▪ validate the integrity of the remaining systems and components to ensure that they remain fit for their usual purpose 	6.3 Document test results for future reference	Be able to <ul style="list-style-type: none"> ▪ record the results from verification and validation tests ▪ sign off the results as the benchmark for future reference 	6.4 Verify and validate that the remaining software are functioning properly	Be able to verify and validate that the remaining software are functioning properly in accordance with the organisation's guidelines as well as any (local and international) laws and regulatory requirements, if applicable
	<u>Performance Requirement</u>										
6.1 Understand the functionalities of the decommissioned software	Be able to <ul style="list-style-type: none"> ▪ identify the functions delivered by the decommissioned software ▪ trace the relationship between the decommissioned software and other systems or components from records 										
6.2 Verify and validate the remaining software	Be able to <ul style="list-style-type: none"> ▪ verify that the existing software are functioning properly in the absence of the decommissioned software ▪ validate the integrity of the remaining systems and components to ensure that they remain fit for their usual purpose 										
6.3 Document test results for future reference	Be able to <ul style="list-style-type: none"> ▪ record the results from verification and validation tests ▪ sign off the results as the benchmark for future reference 										
6.4 Verify and validate that the remaining software are functioning properly	Be able to verify and validate that the remaining software are functioning properly in accordance with the organisation's guidelines as well as any (local and international) laws and regulatory requirements, if applicable										
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) conclude that the decommissioned software has been properly handled; and (ii) confirm that the remaining software and components are functioning properly to meet their original purposes.										
Remark	This UoCs assumes that the decommissioning decision has been made.										

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

1. Title	Formulate, analyse, and develop requirements for the development of software products / services	
2. Code	ITSWDM501A	
3. Range	Formulate, analyse, and develop both functional and non-functional requirements for the development of software products / services in the context of development of software products / services within an organisation or for a client [Design, Development and Maintenance – Requirements]	
4. Level	5	
5. Credit	8	
6. Competency	<p>6.1 Understand the user requirement process</p> <p>6.2 Formulate and analyse user requirements of the application</p> <p>6.3 Develop user requirements with users of the software application</p> <p>6.4 Prioritize functional requirements in a professional manner</p>	<p><u>Performance Requirement</u> Be able to facilitate users to provide user requirements of the application</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ formulate user requirements ▪ analyse user requirements ▪ synthesize and define user requirements ▪ prioritise user requirements <p>Be able to</p> <ul style="list-style-type: none"> ▪ work with users to formulate, analyse, synthesize and develop functional requirements of the software application based on the agreed user requirements ▪ work with users to formulate, analyse, synthesize and develop non-functional requirements, including: <ul style="list-style-type: none"> ➢ performance ➢ usability / re-usability ➢ reliability, availability and maintainability (RAM) ➢ Graphical User Interface (GUI) ➢ operating environment (both hardware and software) ➢ safety and security <p>Be able to prioritize the functional requirements for development based on agreed criteria (see Remark for examples) within an organisation</p>
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) develop functional and non-functional user requirements; and (ii) prioritize functional requirements in a professional manner.	
Remark	Examples of criteria for prioritizing the functional requirements are the alignment of business objectives and common features to various system components.	

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

1. Title	Verify and validate requirements for the development of the software products	
2. Code	ITSWDM502A	
3. Range	Verify and validate both functional and non-functional requirements for the development of the software product in the context of development of software products / services within an organisation or for a client [Design, Development and Maintenance – Requirements]	
4. Level	5	
5. Credit	6	
6. Competency	<p>6.1 Comprehend Software Requirements Specification (SRS)</p> <p>6.2 Prepare the SRS</p> <p>6.3 Validate user requirements in a professional manner</p>	<p><u>Performance Requirement</u> Be able to comprehend the structure and content of a Software Requirements Specification (SRS)</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ document functional requirements into the corresponding sections of SRS ▪ document non-functional requirements into the corresponding sections of SRS <p>Be able to validate user requirements as documented in the SRS in an efficient and effective manner, and in accordance with an established development lifecycle model</p>
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) document functional and non-functional user requirements into SRS; and (ii) validate requirements against SRS.	
Remark		

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

1. Title	Verify and validate the relevant design documentations of the software/system
2. Code	ITSWDM503A
3. Range	Verify and validate the relevant design documentations (architecture, high-level and detailed-level designs) of the software/system in the context of development of software products / services within an organisation or for a client [Design Development Maintenance – Software/System Design]
4. Level	5
5. Credit	1
6. Competency	<p><u>Performance Requirement</u></p> <p>6.1 Understand the requirements for verification and validation of design documentations</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ appreciate the importance of the design verification and validation in the quality of the software/system design ▪ understand the software/system requirements specification, its architecture design and its high level and detailed level designs <p>6.2 Verify and validate different levels of software/system design</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify the inconsistencies and conflicting design among different levels of the design ▪ provide guidelines to resolve the identified inconsistencies of design ▪ ensure that the lower level design of the software is sufficient to meet the requirements of its corresponding upper level designs ▪ ensure that different levels of the software design meet all functional and non-functional requirements <p>6.3 Perform the verification and validation of design documentations in a professional manner</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ perform the verification and validation of design documentations in an efficient and effective manner ▪ follow the organisation's standards and guidelines where applicable ▪ obtain agreement among stakeholders
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to ensure that the different levels of the software design are consistent and meet all system functional and non-functional requirements.
Remark	

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

1. Title	Develop programme modules of the software based on its design documents	
2. Code	ITSWDM504A	
3. Range	Develop programme modules of the software based on its design documents using specified programming languages following the organisation'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 programme modules</p> <p>6.3 Develop programme 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 programme modules based on DLD, HLD and AD ▪ decompose different programme modules into software/system components according to their design documentations <p>Be able to</p> <ul style="list-style-type: none"> ▪ develop programme modules according to company and/or international coding standards, and in an efficient and effective manner ▪ develop codes that execute efficiently ▪ develop programmes 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 programme modules according to the organisation'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	Manage and maintain the programme source	
2. Code	ITSWDM505A	
3. Range	Manage and maintain the programme source via proper version control mechanism 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	2	
6. Competency	<p>6.1 Understand version control mechanism</p> <p>6.2 Manage programme source</p> <p>6.3 Maintain programme source</p> <p>6.4 Act in line with software configuration management</p>	<p><u>Performance Requirement</u> Be able to understand version control mechanism used by the organisation</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ manage the consistency of programme source format ▪ manage the storage / backup of programme sources <p>Be able to</p> <ul style="list-style-type: none"> ▪ maintain programme source via proper version control mechanisms ▪ standardize the numbering systems for version control within the organisation <p>Be able to</p> <ul style="list-style-type: none"> ▪ appreciate the change control policy in configuration management ▪ manage and maintain programme source with alignment to configuration management activities
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) manage programme source; and (ii) maintain programme source via proper version control mechanism.	
Remark	Activities in this competence may intertwine with the UoCs of Software Configuration Management.	

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

1. Title	Perform inspection for the programme code and software documents (See Remark 1 for the meaning of "inspection")	
2. Code	ITSWDM506A	
3. Range	Perform inspection, walkthrough and review for the programme code and software documents according to the Quality Assurance (QA) policies 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 checklists for inspecting programme source and software documents</p> <p>6.2 Perform inspection of programme source and software documents</p> <p>6.3 Revise and update the checklist after an inspection</p> <p>6.4 Perform inspection of programme source and software documents in a professional manner</p>	<p><u>Performance Requirement</u> Be able to identify the requirements of checklists (see Remark 3 & 4) for inspecting programme source and software documents</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ create checklists for inspecting programme source and software documents ▪ inspect the programme source and software documents according to the items in the inspection checklist ▪ determine the correctness and quality of programme source and software documents after inspection ▪ complete the relevant items in the checklist <p>Be able to revise and update the items in an inspection checklist for future improvements</p> <p>Be able to perform an inspection of programme source and software documents according to</p> <ul style="list-style-type: none"> ▪ the QA policies of the software project ▪ the organisation's guidelines ▪ any (local and international) laws and regulatory requirements, if applicable
7. Assessment Criteria	<p>The integrated outcome requirements of this UoCs are the abilities to:</p> <p>(i) rigorously perform inspection of programme source and software documents according to the QA policies and procedures on the developed inspection checklist; and</p> <p>(ii) evaluate the correctness and quality of the programme source and software documents after inspection.</p>	

Remark	<ol style="list-style-type: none">1. In this UoCs, “inspection” generally means “inspection”, “walk-through” and “review” of certain software artefacts such as programme source and software documents.2. In this UoCs, “software document” generally means any document related to the software such as software requirements specification and various software design documents.3. The inspection checklist should have at least the following categories:<ol style="list-style-type: none">a) Architecture Review;b) User Interface;c) Data Reference;d) Data Declaration;e) Computation;f) Comparison;g) Control Flow;h) Input/Output; andi) Interface.4. The inspection checklist can be checked by another professional/third party.
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**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>Performance Requirement Be able to identify the requirements of various level of test plans according to the SRS, various software design documents and programme source</p> <p>Based on software documentations such as the SRS, various software design documents and programme 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 organisation'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 are the abilities 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	Identify extra functional requirements of an existing software										
2. Code	ITSWDM508A										
3. Range	Identify extra functional requirements of the existing software to address the required changes in the context of software maintenance within an organisation or for a client [Design Development Maintenance – Software Maintenance]										
4. Level	5										
5. Credit	1										
6. Competency	<table border="0" style="width: 100%;"> <tr> <td style="width: 60%;"></td> <td style="text-align: right;"><u>Performance Requirement</u></td> </tr> <tr> <td>6.1 Understand various tools and techniques in identifying functional requirements of an existing software</td> <td style="vertical-align: top;"> Be able to <ul style="list-style-type: none"> ▪ understand the required changes ▪ use appropriate tools and techniques to identify the extra functional requirements </td> </tr> <tr> <td>6.2 Identify extra functional requirements of an existing software</td> <td style="vertical-align: top;">Be able to identify extra functional requirements of an existing software to address the required changes in software functionality, software platform, or hardware platform</td> </tr> <tr> <td>6.3 Revise the software documents accordingly</td> <td style="vertical-align: top;">Be able to revise any software documents related to the extra functional requirements</td> </tr> <tr> <td>6.4 Identify extra functional requirements of an existing software in a professional manner</td> <td style="vertical-align: top;">Be able to identify extra functional requirements of software in accordance with industry best practices, organisation's guidelines as well as any (local and international) laws and regulatory requirements, if applicable</td> </tr> </table>		<u>Performance Requirement</u>	6.1 Understand various tools and techniques in identifying functional requirements of an existing software	Be able to <ul style="list-style-type: none"> ▪ understand the required changes ▪ use appropriate tools and techniques to identify the extra functional requirements 	6.2 Identify extra functional requirements of an existing software	Be able to identify extra functional requirements of an existing software to address the required changes in software functionality, software platform, or hardware platform	6.3 Revise the software documents accordingly	Be able to revise any software documents related to the extra functional requirements	6.4 Identify extra functional requirements of an existing software in a professional manner	Be able to identify extra functional requirements of software in accordance with industry best practices, organisation's guidelines as well as any (local and international) laws and regulatory requirements, if applicable
	<u>Performance Requirement</u>										
6.1 Understand various tools and techniques in identifying functional requirements of an existing software	Be able to <ul style="list-style-type: none"> ▪ understand the required changes ▪ use appropriate tools and techniques to identify the extra functional requirements 										
6.2 Identify extra functional requirements of an existing software	Be able to identify extra functional requirements of an existing software to address the required changes in software functionality, software platform, or hardware platform										
6.3 Revise the software documents accordingly	Be able to revise any software documents related to the extra functional requirements										
6.4 Identify extra functional requirements of an existing software in a professional manner	Be able to identify extra functional requirements of software in accordance with industry best practices, organisation's guidelines as well as any (local and international) laws and regulatory requirements, if applicable										
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: <ol style="list-style-type: none"> (i) identify any extra functional requirements of an existing software to address the required changes; and (ii) revise any software documents related to the identified extra functional requirements. 										
Remark	Example of changes in the software that may affect the functional requirements of the software include, but are not limited to, the following: <ol style="list-style-type: none"> a) functional enhancement; b) additional features required; c) changes of software platform; and d) changes of hardware platform. 										

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

1. Title	Identify extra non-functional requirements of an existing software
2. Code	ITSWDM509A
3. Range	Identify extra non-functional requirements of an existing software to address the required changes in the context of software maintenance within an organisation or for a client
4. Level	5
5. Credit	1
6. Competency	<p style="text-align: right;"><u>Performance Requirement</u></p> <p>6.1 Understand various tools and techniques in identifying non-functional requirements of an existing software Be able to</p> <ul style="list-style-type: none"> ▪ understand the required changes ▪ use appropriate tools and techniques to identify the extra non-functional requirements <p>6.2 Identify extra non-functional requirements of an existing software Be able to identify extra non-functional requirements of an existing software to address the required changes in software functionality, software performance, software platform, or hardware platform</p> <p>6.3 Revise the software documents accordingly Be able to revise any software documents related to the extra non-functional requirements</p> <p>6.4 Identify extra non-functional requirements of an existing software in a professional manner Be able to identify extra non-functional requirements of a software in accordance with industry best practices, organisation'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 are the abilities to: <ul style="list-style-type: none"> (i) identify any extra non-functional requirements of an existing software to address the required changes; and (ii) revise any software documents related to the identified extra non-functional requirements.
Remark	Example of changes in software that may affect the non-functional requirements of the software include, but are not limited to, the following: <ul style="list-style-type: none"> a) usability enhancement; b) Reliability, Availability and Serviceability (RAS) enhancement; c) changes of software platforms; and d) changes of hardware platforms.

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

1. Title	Identify the Standard Operating Environment (SOE) and related issues for a software to be deployed/migrated	
2. Code	ITSWDM510A	
3. Range	Identify the stakeholders, constraints, risks, and the Standard Operating Environment (SOE) for a software to be deployed/migrated in the context of Design, Development and Maintenance of software after the release of the software from developers [Design, Development and Maintenance - Software Deployment and Migration]	
4. Level	5	
5. Credit	2	
6. Competency	<p>6.1 Understand the defined goals to be achieved upon software deployment or migration</p> <p>6.2 Identify the business requirements for software deployment and migration</p> <p>6.3 Identify the stakeholders in software deployment and migration</p> <p>6.4 Identify the limitations, constraints and risks for the software to be deployed or migrated</p> <p>6.5 Specify a standard operating environment</p> <p>6.6 Identify the constraints, risks, and the Standard Operating Environment (SOE) for a software to be deployed/migrated in a professional manner</p>	<p><u>Performance Requirement</u></p> <p>Be able to understand the outcome specifications of the software for determination of success or failure of deployment or migration</p> <p>Be able to state the business values to the organisation upon the successful deployment or migration of software</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify the stakeholders related to the software to be deployed/migrated (See Remark) ▪ relate the role and responsibilities of each stakeholder to facilitate reporting and coordination in deployment or migration <p>Be able to</p> <ul style="list-style-type: none"> ▪ observe the deployment timeline ▪ check the availability of infrastructure for software deployment or migration ▪ inform related parties on possible risk factors upon changes away from planned course <p>Be able to specify a standard hardware specification for the large scale deployment or migration of software in a consistent manner for potential reduction in management and support costs</p> <p>Be able to identify the constraints, risks, and the SOE for software to be deployed/migrated in accordance with the organisation'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 are the abilities to: (i) identify the stakeholders for further communication; and (ii) specify a standard operating environment to aid cost reduction.	
Remark	Examples of stakeholders are software sponsors, developers, operators and end users.	

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

1. Title	Monitor the decommissioning plan and processes	
2. Code	ITSWDM511A	
3. Range	Monitor the decommissioning plan and processes (i.e. ensuring that the decommissioned software will no longer exist in the system) while executing the software decommissioning plan [Design, Development and Maintenance – Software Decommissioning]	
4. Level	5	
5. Credit	2	
6. Competency	<p>6.1 Comprehend the details in software decommissioning policy and plan</p> <p>6.2 Ensure decommissioning criteria are met</p> <p>6.3 Remove account and credential information</p> <p>6.4 Remove software and hardware components</p>	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ understand the detailed requirements in the software decommissioning operation ▪ locate the item to be decommissioned <p>Be able to confirm the functions performed by the outgoing system or component have been</p> <ul style="list-style-type: none"> ▪ fully replaced by a new system or component ▪ fully replaced by a combination of new system or component(s) and a reconfiguration of other existing components ▪ declared to be unnecessary <p>Be able to</p> <ul style="list-style-type: none"> ▪ archive information with potential usage together with their retrieval environments, processes, and procedures ▪ remove user account and credential information <p>Be able to</p> <ul style="list-style-type: none"> ▪ record and properly handle the software license associated with the software to be removed ▪ perform unrecoverable deletion of data associated with the outgoing software ▪ uninstall the software from operating environment ▪ remove storage media from hardware ▪ disconnect hardware from operating environment
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to execute the defined decommission plan in a way that the decommissioned software will no longer exist.	
Remark	This UoCs assumes that the decommissioning decision has been made.	

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

1. Title	Propose an architecture design (AD) of the software/system	
2. Code	ITSWDM601A	
3. Range	Formulate, analyse, evaluate and propose an architecture design (AD) of the software/system based on its SRS in the context of development of software products / services within an organisation or for a client [Design Development Maintenance – Software/Systems Design]	
4. Level	6	
5. Credit	1	
6. Competency		<p style="text-align: center;"><u>Performance Requirement</u></p> <p>6.1 Understand the requirements of an architecture design of software/system</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ understand the basic principles, methodologies and techniques in the whole software process life cycle ▪ appreciate the objectives of software/system architecture design and its relation with other phases of the software process cycle ▪ understand the software/system requirements specification ▪ understand how reference architectures are used to communicate architectural concepts <p>6.2 Formulate an architecture design of the software/system</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ perform a software/system architecture design exercise based on the software/system requirements specification ▪ describe any assumptions, dependencies, limitations and constraints regarding the software and its use in relation to related software or hardware, operating systems, end-user characteristics and others ▪ identify the major components of the software architecture and their relationships according to the functional and non-functional requirements in the software/system requirements specification ▪ establish a basic structural framework using appropriate architectural models depending on the type of applications ▪ document the architecture design using appropriate architectural models describing how the system is structured into sub-systems ▪ describe the development approach adopted ▪ highlight the part of the architecture design involving business process reengineering <p>6.3 Analyse and evaluate the formulated architecture design of the software/system</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ assess system architecture so as to meet the requirements in the software/system requirements specification ▪ determine whether all the functional and non-functional requirements have been considered ▪ ensure the architecture design is fit for its intended purpose of the software/system ▪ identify the incompatible aspects of the architectural design due to the inconsistent or conflicting requirements

	<ul style="list-style-type: none"> ▪ evaluate whether the architecture design is sufficient to support the business processes efficiently and effectively ▪ determine whether there is a need to re-engineer business processes <p>6.4 Exhibit professional skills in the formulation of architecture design</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ adapt standard design methodologies and principles for the software/system architecture design to cater for the specific organisation's environment ▪ produce the architecture design in an efficient and effective manner ▪ follow the organisation's standards and guidelines where applicable ▪ obtain agreement among stakeholders
7. Assessment Criteria	<p>The integrated outcome requirements of this UoCs are the abilities to formulate a software/system architecture design which can:</p> <ul style="list-style-type: none"> (i) ensure that functional and non-functional requirements are met; (ii) describe the structure of the software/system architecture design; and (iii) highlight the part of architectural design involving business process re-engineering.
Remark	

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

1. Title	Propose a high level design (HLD) of the software	
2. Code	ITSWDM602A	
3. Range	Formulate, analyse, evaluate and propose a high level design (HLD) of the software based on its SRS and AD in the context of development of software products / services within an organisation or for a client [Design Development Maintenance – Software/Systems Design]	
4. Level	6	
5. Credit	1	
6. Competency	<p>6.1 Understand the requirements of an high level design of software/system</p> <p>6.2 Formulate a high level design of the software/system</p> <p>6.3 Analyse and evaluate the formulated high level design of the software/system</p>	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ understand the basic principles, methodologies and techniques in the whole software process life cycle ▪ appreciate the objectives of software/system high level design and its relation with architecture design and other phases of the software process cycle ▪ understand the software/system requirements specification and architecture design <p>Be able to</p> <ul style="list-style-type: none"> ▪ describe the approach or methods used for this software design ▪ describe any assumptions, limitations and constraints regarding the composition of each system component and their dependencies ▪ describe how each sub-system is structured into programme components ▪ define the function of each programme component and dependencies between them ▪ describe the high level (logical) design of each programme component, its logical interfaces and interaction with other components ▪ if necessary, decompose a programme component into sub-components to manage complexity ▪ document a software/system high-level design using appropriate models and describing the composition of the software/system and its components ▪ describe the functionalities of each system component and their dependencies and interaction ▪ highlight the part of the high level design involved in business process re-engineering <p>Be able to</p> <ul style="list-style-type: none"> ▪ determine whether the functional and non-functional requirements have been fully considered in the design ▪ employ appropriate modelling tools to analyse the design ▪ evaluate whether the high level design suffices to fit the function of programme components by means of using cases and viewpoints ▪ use the adopted design method's principles

	<p>and criteria to evaluate whether the design is a good design</p> <ul style="list-style-type: none"> ▪ determine whether there is a need to re-engineer business processes in the design ▪ identify any incompatible aspects of the design due to the inconsistent or conflicting requirements <p>6.4 Exhibit professional skills in the formulation of high level design</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ adapt standard design methodologies and principles for the high level design of the software/system to cater for the specific organisation's environment ▪ produce the high level design in an efficient and effective manner ▪ follow the organisation's standards and guidelines where applicable ▪ obtain agreement among stakeholders
7. Assessment Criteria	<p>The integrated outcome requirements of this UoCs are the abilities to formulate a high level software/system design which can:</p> <ul style="list-style-type: none"> (i) ensure that functional and non-functional requirements are met; (ii) describe the composition of the software system, the functionality of each programme component as well as its dependency and interaction with other components; and (iii) highlight the part of the high level design involved in business process re-engineering.
Remark	

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

1. Title	Propose a detailed level design (DLD) of the software	
2. Code	ITSWDM603A	
3. Range	Formulate, analyse, evaluate and propose a detailed level design (DLD) of the software based on its SRS, AD, and HLD in the context of development of software products / services within an organisation or for a client [Design Development Maintenance – Software/Systems Design]	
4. Level	6	
5. Credit	1	
6. Competency	<p>6.1 Understand the requirements of a detailed level design of software/system</p> <p>6.2 Formulate a detailed level design of the software/system</p>	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ understand the basic principles, methodologies and techniques in the whole software process life cycle ▪ appreciate the objectives of software/system detailed level design and its relation with architecture design, high level design and other phases of the software process cycle ▪ understand the software/system requirements specification, architecture design and high level design <p>Be able to</p> <ul style="list-style-type: none"> ▪ describe any assumptions, dependencies, limitations and constraints regarding the physical aspects of the software/system design ▪ describe the detailed level (physical) design of each programme component, its processing logic, information flow and its execution pre-conditions and post-conditions ▪ define programme components' physical interfaces and their interaction and dependencies ▪ document a software/system detailed-level design using appropriate models describing the composition of the software/system ▪ describe the programme logic of each system component and its information flow and its relation with other components ▪ highlight the part of the design involved in business process re-engineering

	<p>6.3 Analyse and evaluate the formulated detailed level design of the software/system</p> <p>6.4 Exhibit professional skills in the formulation of detailed level design</p>	<p>Be able to</p> <ul style="list-style-type: none"> ▪ determine whether all the functional requirements have been considered by the design ▪ analyse whether the design has sufficiently considered all the identified execution conditions to accomplish the function of the programme components ▪ use the adopted design method's principles and criteria to evaluate whether the design is a good design ▪ determine whether there is a need to re-engineer business processes in the design ▪ identify any incompatible aspects of the design due to the inconsistent or conflicting requirements <p>Be able to</p> <ul style="list-style-type: none"> ▪ adapt standard design methodologies and principles for the detailed level design of the software/system to cater for the specific organisation's environment ▪ produce the detailed level design in an efficient and effective manner ▪ follow the organisation's standards and guidelines where applicable ▪ obtain agreement among stakeholders
7. Assessment Criteria	<p>The integrated outcome requirements of this UoCs are the abilities to formulate a detailed level software/system design which can:</p> <ul style="list-style-type: none"> (i) ensure that functional and non-functional requirements are met; (ii) describe the functionality of each programme components, its programme logic and information flow as well as its dependency and relation with other components; and (iii) highlight the part of design involved in business process re-engineering. 	
Remark		

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

1. Title	Develop and implement the change control policy
2. Code	ITSWDM604A
3. Range	Develop and implement a series of change control policies, procedures and standards in the context of system configuration management during the development of software products / services within an organisation or for a client [Design Development Maintenance – Software Configuration Management]
4. Level	6
5. Credit	1
6. Competency	<p style="text-align: right;"><u>Performance Requirement</u></p> <p>6.1 Understand the principles and concepts of change control policy</p> <ul style="list-style-type: none"> ▪ Be able to appreciate the importance of managing changes to a software system to ensure software quality ▪ understand the requirements of change control policy in the context of system configuration management <p>6.2 Develop change control policy of system configuration management</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ determine configuration management objectives to establish the basis for formulating change control policies; ▪ develop change control policies in relation to four major aspects of configuration management, namely configuration identification, configuration changes control, configuration status accounting, and configuration auditing and review <p>6.3 Implement change control policy of system configuration management</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ set up a change control board to oversee the implementation of change control policies ▪ develop procedures and standards to manage an evolving software system ▪ describe the relationship of change management with the software process life cycle <p>6.4 Exhibit professional skills in the development and implementation of change control policy</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ develop and implement the change control policy in an efficient and effective manner ▪ adapt standard change control methodologies and principles to cater for the specific system configuration management environment ▪ obtain agreement among stakeholders
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to define a set of change control policies, procedures and standards for system configuration management.
Remark	

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

1. Title	Develop and implement software configuration management plan	
2. Code	ITSWDM605A	
3. Range	Develop and implement software configuration management plan according to organisational processes, procedures and standards in the context of system configuration management during the development of software products / services within an organisation or for a client [Design Development Maintenance – Software Configuration Management]	
4. Level	6	
5. Credit	1	
6. Competency	<p>6.1 Understand the principles and concepts of system configuration management</p> <p>6.2 Develop software configuration management plan</p> <p>6.3 Implement software configuration management plan</p>	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ appreciate the importance of configuration management to a software system to ensure software quality ▪ understand the requirements of software configuration management plan <p>Be able to</p> <ul style="list-style-type: none"> ▪ define the purposes and scope of the software configuration management plan ▪ set up an software configuration management organisation and its authorities and responsibilities ▪ determine configuration management processes ▪ acquire suitable configuration management software to support these processes, if necessary ▪ develop procedures and standards for the major aspects of configuration management such as configuration identification, configuration changes control, configuration status accounting and configuration auditing and review ▪ define criteria for change control baselines, reviews and audit <p>Be able to</p> <ul style="list-style-type: none"> ▪ perform configuration identification involving components' specification, configuration baselines, identification tracking schemes etc ▪ perform configuration changes control by defining procedures for changing baselines, procedures for approving change requests and updating relevant documents etc ▪ perform configuration status accounting and record different types of information needed to be reported for control and producing various reports ▪ perform configuration auditing

	<p>6.4 Exhibit professional skills in the development and implementation of software configuration management plan</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ develop and implement the software configuration management plan in an efficient and effective manner ▪ adapt standard change control methodologies and principles to cater for the peculiar system configuration management environment ▪ obtain agreement among stakeholders
<p>7. Assessment Criteria</p>	<p>The integrated outcome requirements of this UoCs are the abilities to produce a software configuration management plan documenting the following:</p> <ul style="list-style-type: none"> (i) its purposes and scope; (ii) a configuration management organisation and its authorities and responsibilities; (iii) the configuration management processes; (iv) the procedures and standards for the four major aspects of configuration management; and (v) the criteria for change control baselines, reviews and audit.
<p>Remark</p>	

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

1. Title	Identify the requirements for software releases and control	
2. Code	ITSWDM606A	
3. Range	Identify the stakeholders, limitations, constraints, risks and technical as well as business requirements for software releases and control in the context of software releases within an organisation or for a client [Design, Development & Maintenance - Software Releases & Control]	
4. Level	6	
5. Credit	2	
6. Competency	<p>6.1 Understand the various requirements involved in software releases and control</p> <p>6.2 Obtain approval for the requirements identified in a software release</p> <p>6.3 Demonstrate a high degree of expertise and professionalism in identification and development of requirements for software releases and control</p>	<p><u>Performance Requirement</u> Be able to identify</p> <ul style="list-style-type: none"> ▪ software modules that must be released as a group ▪ hardware components, e.g. specific hardware required by certain software modules such as bar-code reader ▪ Standard Operating Environment (SOE) ▪ the stakeholders, e.g. developers, operators and end users ▪ the limitations, constraints and risks ▪ the technical and business requirements <p>for software releases and control within the organisation</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ specify and integrate the requirements identified into a coherent document ▪ obtain agreement among the stakeholders for the software release <p>Be able to</p> <ul style="list-style-type: none"> ▪ communicate and consult effectively with different levels of stakeholders ▪ address and balance the concerns of all stakeholders ▪ highlight the limitations, constraints and risks involved that are most relevant and important for the situation concerned ▪ document the limitations, constraints, risks, technical and business requirements in a manner that is clear and easy to understand by all stakeholders ▪ make appropriate use of methodologies and tools in developing the requirements for software releases and control <p>in accordance with organisation's guidelines as well as any (local and international) laws and regulatory requirements, if applicable</p>
7. Assessment	The integrated outcome requirements of this UoCs are the abilities to	

Criteria	(i) identify all stakeholders and all requirements, including software modules, hardware components, limitations, constraints, risk, technical and business requirements for software releases and control; and (ii) ensure that all requirements are agreed by the stakeholders.
Remark	

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

1. Title	Perform risk assessment on software releases and control	
2. Code	ITSWDM607A	
3. Range	Perform risk assessment on software releases and control with reference to standard methodologies and organisation's guidelines in the context of software releases within an organisation or for a client [Design, Development & Maintenance - Software Releases & Control]	
4. Level	6	
5. Credit	4	
6. Competency	<p>6.1 Understand the processes for risk assessment on software releases and control</p> <p>6.2 Perform the risk assessment activities on software releases and control with a high degree of expertise and professionalism</p>	<p>Performance Requirement Be able to identify the activities involved in risk assessment on software releases and control, with reference to standard methodologies and organisation's guidelines if applicable</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ plan the appropriate risk assessment activities with regard to the particular situation of software release and control ▪ manage and/or carry out the execution of risk assessment activities ▪ obtain agreement of stakeholders on the risk assessment results in accordance with organisation's guidelines as well as any (local and international) laws and regulatory requirements, if applicable
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) execute all the activities planned for risk assessment on software releases and control; (ii) review the risk assessment results; and (iii) ensure that the risk assessment results are agreed by the concerned stakeholders.	
Remark		

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

1. Title	Define software releases and control plan
2. Code	ITSWDM608A
3. Range	Define software releases and control plan (including contingency plan) in the context of software releases within an organisation or for a client [Design, Development & Maintenance - Software Releases & Control]
4. Level	6
5. Credit	4
6. Competency	<p style="text-align: right;"><u>Performance Requirement</u></p> <p>6.1 Understand the requirements for software releases and control plan</p> <p style="margin-left: 20px;">Be able to</p> <ul style="list-style-type: none"> ▪ identify the activities involved in a software releases and control plan, with reference to standard methodologies and organisation's guidelines if applicable ▪ include consideration for contingencies where appropriate <p>6.2 Define the software releases and control plan with a high degree of expertise and professionalism</p> <p style="margin-left: 20px;">Be able to</p> <ul style="list-style-type: none"> ▪ plan the appropriate software release and control activities with regard to the particular situation of the organisation; ▪ include contingency plan where appropriate ▪ document the software release and control activities in a manner that is clear and easy to understand by all stakeholders ▪ make appropriate use of methodologies and tools in developing the software releases and control plan ▪ obtain endorsement of the software release and control plan from stakeholders <p style="margin-left: 40px;">in accordance with the organisation'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 are the abilities to: (i) define a software releases and control plan that is tailored for the particular situation of the organisation; and (ii) ensure that the defined plan is agreed by the concerned stakeholders.
Remark	

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

1. Title	Execute and monitor the software releases and control plan	
2. Code	ITSWDM609A	
3. Range	Execute and monitor the software releases and control plan, verify and validate that the released software and existing software are functioning properly in the context of software releases within an organisation or for a client [Design, Development & Maintenance - Software Releases & Control]	
4. Level	6	
5. Credit	4	
6. Competency	<p style="text-align: right;"><u>Performance Requirement</u></p> <p>6.1 Have the knowledge to execute and monitor the software releases and control plan</p> <p style="padding-left: 20px;">Be able to</p> <ul style="list-style-type: none"> ▪ comprehend the activities specified in a software releases and control plan; ▪ seek clarification on any activities from stakeholders if necessary <p>6.2 Have the knowledge to verify and validate the outcomes of released software and existing software</p> <p style="padding-left: 20px;">Be able to</p> <ul style="list-style-type: none"> ▪ comprehend the activities required in verifying and validating the outcomes of released software and existing software ▪ interpret the outcomes of released software and existing software <p>6.3 Execute and monitor the software releases and control plan</p> <p style="padding-left: 20px;">Be able to</p> <ul style="list-style-type: none"> ▪ manage and/or carry out the execution and monitoring of software releases and control plan ▪ adjust plan suitably to cater for any particular issues and situations <p>6.4 Verify and validate the outcomes of released software and existing software</p> <p style="padding-left: 20px;">Be able to</p> <ul style="list-style-type: none"> ▪ verify that the outcomes of the released software and existing software are correct and accurate ▪ validate the outcomes against the original technical and business requirements <p>6.5 Perform the software releases and control plan and verification and validation activities with a high degree of expertise and professionalism</p> <p style="padding-left: 20px;">Be able to</p> <ul style="list-style-type: none"> ▪ manage and/or carry out the execution and monitoring of software releases and control plan according to the standards and guidelines of the organisation ▪ make adjustment to the plan, where necessary, according to the change management procedures of the organisation ▪ make appropriate use of methodologies and tools in verifying and validating the outcomes of the released software and existing software ▪ obtain agreement among stakeholders for <ul style="list-style-type: none"> ➢ the results of the software release 	

	<ul style="list-style-type: none"> and control plan ➤ the outcomes of the verification and validation of released software and existing software <p>in accordance with the organisation's guidelines as well as any (local and international) laws and regulatory requirements, if applicable</p>
7. Assessment Criteria	<p>The integrated outcome requirements of this UoCs are the abilities to:</p> <ul style="list-style-type: none"> (i) properly execute and monitor the software releases and control plan; (ii) properly verify and validate the outcomes of the released software and existing software; and (iii) obtain agreement of stakeholders on the end results.
Remark	

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

1. Title	Perform risk assessment on software deployment and migration	
2. Code	ITSWDM610A	
3. Range	Perform risk assessment on software deployment and migration in the context of Design, Development and Maintenance of software before the drawing up of the deployment or migration plan and contingency plan [Design, Development and Maintenance - Software Deployment and Migration]	
4. Level	6	
5. Credit	2	
6. Competency	<p>6.1 Understand the risk factors in software deployment or migration</p> <p>6.2 Perform risk assessment on software deployment and migration</p> <p>6.3 Report the risk assessment to stakeholders</p> <p>6.4 Perform risk assessment on software deployment and migration in a professional manner</p>	<p><u>Performance Requirement</u></p> <p>Be able to list out the general risk factors in software deployment or migration such as</p> <ul style="list-style-type: none"> ▪ tight schedule in deployment timeline ▪ insufficient scale of suitable hardware for software deployment or migration ▪ lack of network bandwidth for remote sites ▪ no automatic tool available for large scale deployment or migration of software <p>Be able to</p> <ul style="list-style-type: none"> ▪ evaluate the impact of each risk factor on the software deployment or migration exercise ▪ consolidate the impacts from possible risk factors in qualitative and quantitative terms <p>Be able to</p> <ul style="list-style-type: none"> ▪ rank the identified risk factors according to the severity to the business entity ▪ report the findings to stakeholders in good faith <p>Be able to perform risk assessment on software deployment and migration in accordance with the organisation'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 are the abilities to critically perform a risk assessment on a software deployment or migration exercise.	
Remark		

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

1. Title	Define a software deployment / migration plan	
2. Code	ITSWDM611A	
3. Range	Define a software deployment/migration plan taking into account the business operations (including contingency plan) in the context of deploying and migrating software [Design, Development and Maintenance – Software Deployment and Migration]	
4. Level	6	
5. Credit	4	
6. Competency	<p>6.1 Understand the requirements in software deployment or migration</p> <p>6.2 Develop and define a software deployment or migration plan and a contingency plan</p> <p>6.3 Update the developed plan</p> <p>6.4 Define software deployment / migration plan in a professional manner</p>	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ comprehend the organisational requirements, limitations and constraints on software deployment or migration ▪ know the regulatory requirement such as audit trails or other compliance requirements <p>Be able to</p> <ul style="list-style-type: none"> ▪ perform review of software requirements, hardware infrastructure, software architecture, components, interfaces and performance model ▪ list out the required deliverables upon deployment or migration ▪ identify the critical success milestone and criteria in deployment or migration ▪ formulate a software deployment or migration plan by integrating the known factors and also taking into account the available deployment timeline ▪ suggest an alternative contingency plan as a backup to cope with adverse cases <p>Be able to</p> <ul style="list-style-type: none"> ▪ stay on top to keep abreast of the pace of 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>Be able to</p> <ul style="list-style-type: none"> ▪ define a software deployment / migration plan ▪ define the contingency plan of the deployment / migration exercise in accordance with organisation's guidelines as well as any (local and international) laws and regulatory requirements, if applicable
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to devise a software deployment or migration plan and the related contingency plan for the deployment / migration exercise.	
Remark		

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

1. Title	Monitor the deployment / migration process	
2. Code	ITSWDM612A	
3. Range	Monitor, coordinate and track the deployment / migration process in the context of deploying and migrating software [Design, Development and Maintenance – Software Deployment and Migration]	
4. Level	6	
5. Credit	2	
6. Competency	<p>6.1 Understand the defined standard operating environment</p> <p>6.2 Coordinate the work of software deployment and/or migration</p> <p>6.3 Monitor and track the deployment and migration processes</p> <p>6.4 Maintain proper communications</p> <p>6.5 Monitor the deployment / migration process in a professional manner</p>	<p><u>Performance Requirement</u></p> <p>Be able to demonstrate knowledge on</p> <ul style="list-style-type: none"> ▪ software packaging and distribution tools ▪ practices and procedures of hardware and software support ▪ computer hardware, peripheral and diagnostic methods, techniques and procedures ▪ operating systems and utilities, system resources and services ▪ network communication protocols and remote procedure calls <p>Be able to</p> <ul style="list-style-type: none"> ▪ explain to affected stakeholders on procedures, processes to be conducted on software deployment and migration ▪ work with other functional units to achieve deployment or migration objectives <p>Be able to</p> <ul style="list-style-type: none"> ▪ review and comprehend technical papers for estimation of outcomes from deployment or migration ▪ ensure the work is conducted according to the deployment or migration plan record and assess results of deployment or migration ▪ report to stakeholders upon the conclusion of deployment or migration exercise and make suitable recommendations for follow up <p>Be able to communicate effectively, both verbal and written, with the affected stakeholders at all organisational levels</p> <p>Be able to monitor the deployment / migration process in accordance with the organisation'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 are the abilities to ensure that the deployment / migration processes are carried out according to defined plan.	
Remark		

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

1. Title	Define software decommissioning policy and plan
2. Code	ITSWDM613A
3. Range	Define software decommissioning policy and plan taking into account the impact on business operations in preparation for the decommissioning of software [Design, Development and Maintenance – Software Decommissioning]
4. Level	6
5. Credit	4
6. Competency	<p style="text-align: right;"><u>Performance Requirement</u></p> <p>6.1 Understand the rationale to perform software decommissioning</p> <p style="margin-left: 40px;">Be able to find out</p> <ul style="list-style-type: none"> ▪ the implications in decommissioning a particular software ▪ the relationship between the outgoing software and the integrated operating environment <p>6.2 Identify the responsible person or team in a decommission project</p> <p style="margin-left: 40px;">Be able to identify the person or team responsible for the preparation and management of the software decommissioning procedures</p> <p>6.3 Define the scope and conditions where a software decommissioning policy applies</p> <p style="margin-left: 40px;">Be able to</p> <ul style="list-style-type: none"> ▪ state which operational system to be replaced by the deployment or migration of new system ▪ state the functionalities of the replaced system ▪ express how and when a software can be phased out <p>6.4 Formulate and document a decommissioning policy and plan</p> <p style="margin-left: 40px;">Be able to</p> <ul style="list-style-type: none"> ▪ develop a decommissioning policy covering areas such as technical and administrative judgements in qualitative and quantitative terms ▪ develop a decommissioning plan detailed enough to ensure reliable operational services to users are available during the decommissioning period ▪ document the policy and plan for management approval <p>6.5 Ensure organisational policy or guideline and regulatory requirements, if any, are observed</p> <p style="margin-left: 40px;">Be able to comply with any organisational policy or guideline and regulatory requirements during the development of the decommissioning policy and plan</p> <p style="margin-left: 40px;">(See Remark for some examples in these aspects)</p>
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to deliver a set of software decommissioning policy and plan to guide operational staff in a software decommissioning project.

Remark	<p>Examples that organisational policy and regulatory requirements may affect the decommissioning policy and plan are as follows:</p> <ul style="list-style-type: none">▪ it is not cost effective to maintain the system in its present condition▪ the disposal of storage media should have the data in it be deleted in a way which is unrecoverable to uphold data privacy
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Appendix D.6 UoCs in Operations and Support

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

1. Title	Perform stock-take of IT assets
2. Code	ITSWOS201A
3. Range	Perform the regular stock-take of IT assets, report and resolve all discrepancies between physical assets and the asset database in the context of providing configuration management services for an organisation [Operations and Support – Configuration Management Services]
4. Level	2
5. Credit	1
6. Competency	<p><u>Performance Requirement</u></p> <p>6.1 Comprehend the stock-take issues</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ understand the stock-take procedure ▪ understand the structure of the asset database <p>6.2 Conduct stock-take of IT asset</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify, assess and verify the IT asset that is listed in the inventory report ▪ identify the IT assets that exist but not in the inventory report <p>6.3 Resolve all discrepancies between physical assets and the asset database</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify any discrepancies ▪ conduct the first level investigation and diagnostic activities to determine the correct information <p>6.4 Update the asset database</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ provide the accurate information to be updated ▪ verify that the update is completed accurately in accordance with organisation's guidelines
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) perform regular stock-take of IT assets; and (ii) report and resolve all discrepancies between physical assets and the asset database.
Remark	<ol style="list-style-type: none"> 1. The participant is assumed to have a comprehensive knowledge in IT asset covering hardware and software. 2. This UoCs comprises both the frontline and first level competency requirements to perform configuration management.

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

1. Title	Deliver Help Desk services	
2. Code	ITSWOS301A	
3. Range	Deliver and provide Help Desk services within an organisation or for a client based on a set of processes, guidelines and procedures [Operations and Support – Help Desk Service]	
4. Level	3	
5. Credit	3	
6. Competency		<p><u>Performance Requirement</u></p> <p>6.1 Have basic knowledge in IT</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ communicate with users in users' language (usually in laymen terms) ▪ communicate with technical personnel in technical language (usually in IT jargons) <p>about the incident and service call related to the IT infrastructure (e.g. software application or hardware system) provided by the organisation</p> <p>6.2 Understand the nature of the IT services or software provided by the organisation</p> <p>Be able to provide assistance to users on the usage of IT services or software provided by the organisation</p> <p>6.3 Understand the basic workflow of help desk services</p> <p>Be able to effectively follow through the entire help desk service handling process of the organisation</p> <p>6.4 Respond to service call</p> <p>Be able to appropriately handle user's service call and serve as the single point of contact (SPOC) for the IT services in the organisation in the following aspects</p> <ul style="list-style-type: none"> ▪ properly authenticate the calling parties ▪ correctly identify the call nature based on the provided scripts ▪ correctly identify and detect alert(s) generated by support tools ▪ correctly record the call as an incident or a service request of a particular category type ▪ own and track through the whole service handling process (e.g. track through to closure after the problem has been resolved) ▪ reply to service enquiry with information extracted from information/knowledge base, when available <p>6.5 Perform the first level assistance or investigation activities on the logged incidents</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ provide assistance to users on the usage of IT services or software ▪ conduct the first level investigation and diagnostic activities according to the problem determination guides with the help of established tools

	<ul style="list-style-type: none"> ▪ either solve and close the incident or identify the second level support party to follow up on the incident ▪ document the reported symptoms, actions taken and results on the incident log <p>6.6 Assign the follow-up party for the incidents or service requests</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify and assign the right parties to follow up the incident or service request ▪ track and monitor the whole follow up process (This may include tracking the time elapsed, communicating with the reporting user and assigning support parties at suitable time interval until the incident closure.) ▪ escalate the incident or service request if the resolving time has exceeded the respective service level agreements <p>6.7 Review the process of servicing the incident or service request</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ solicit and collect feedback from users related to the service handling process ▪ review the incidents with lessons learnt ▪ make suggestion to improve the problem determination guide or document the salient points for future reference in resolving similar incidents <p>6.8 Deliver Help Desk services in a professional manner</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ deliver help desk services in accordance with the organisation's guidelines as well as any (local and international) laws and regulatory requirements, if applicable ▪ calmly and sincerely communicate with users (in particular, those difficult customers) and supporting parties in their daily language during the entire service handling process ▪ correctly comprehend the incident or service request and record the descriptions in IT context for subsequent servicing performed by technical expertise ▪ deliver help desk services in an efficient and effective manner
7. Assessment Criteria	<p>The integrated outcome requirements of this UoCs are the abilities to:</p> <ul style="list-style-type: none"> (i) stay calm and courteous in all communications with both users (in particular, those difficult customers) and supporting parties in their daily language; (ii) correctly comprehend and record the incident or service request in IT context for subsequent servicing by technical expertise; and (iii) effectively and properly deliver Help Desk services based on a set of processes, guidelines and procedures to handle service requests made by users.

Remark	This UoCs comprises both the frontline and first level competency requirement for the Service Centre function and Incident Management of ITIL®.
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**Information and Communications Technology Industry Training Advisory Committee
Software Products and Software Services (SW) branch
Unit of Competencies**

1. Title	Maintain the help desk knowledge database	
2. Code	ITSWOS302A	
3. Range	Maintain, update, and administer the knowledge base of the service requests in the context of providing Help Desk services for an organisation [Operations and Support – Help Desk Service]	
4. Level	3	
5. Credit	4	
6. Competency		<p style="text-align: center;"><u>Performance Requirement</u></p> <p>6.1 Know the Help Desk guidelines, procedures and process Be able to identify the work contents undertaken by the Help Desk Service agent and map them to the guidelines, procedure and process</p> <p>6.2 Understand the incident and problem categorisation methodology Be able to categorise the incident and problem meaningfully so as to establish a corresponding baseline and trend projection</p> <p>6.3 Know the mathematical tool to project incident and problem trend Be able to project the trend into a period in the future based on historical data</p> <p>6.4 Have a working knowledge on the knowledge base tool used in Help Desk Service Be able to use the knowledge base tool to set up, customise, maintain, update and administer the knowledge base of the Help Desk Service</p> <p>6.5 Set up, customise, maintain, update, administer and improve the knowledge base for the Help Desk Service Be able to</p> <ul style="list-style-type: none"> ▪ solicit the requirements on the knowledge database from the teams in IT Operations ▪ collect and analyse the historical cases from the Help Desk and make reference to the industry norms from time to time ▪ categorise the resolutions of historical incidents and problems meaningfully, with reference to the established guidelines and procedures, and establish corresponding knowledge items ▪ assign search keyword to the knowledge item ▪ maintain, update, administer and improve the knowledge base for the Help Desk service <p>6.6 Improve the Help Desk Service resolution quality based on the evolving knowledge base Be able to</p> <ul style="list-style-type: none"> ▪ provide useful and updated knowledge to the Help Desk agents to solve the customer problems in a shorter duration and deliver with a better service quality ▪ reduce the incidents and problems that need to be referred to the second level support teams

	<p>6.7 Streamline the Help Desk processes, guidelines and procedures in step with the knowledge base evolution</p> <p>6.8 Maintain the knowledge base of those service requests in a professional manner</p>	<p>Be able to work with the other IT Operations teams and basing on the improvements made to the knowledge base, streamline the Help Desk processes, guidelines and procedures accordingly with the aim to uplift the productivity of the Help Desk Services function</p> <p>Be able to maintain, update and administer the knowledge base of the Help Desk service requests that need to be documented for future Help Desk services in accordance with the organisation'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 are the abilities to: (i) set up and maintain the Help Desk knowledge base; and (ii) improve the service level, quality and the productivity of the Help Desk Service function.	
Remark	The Help Desk Service knowledge base can range from a sophisticated knowledge base system to a manual file system. The sophistication ties with the service level requirement, size and criticalness of the function to the serving organisation.	

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

1. Title	Maintain the problem management knowledge database										
2. Code	ITSWOS303A										
3. Range	Maintain, update, and administer the knowledge base for better future problem management services in the context of providing Problem Management services in an organisation or for a client [Operations and Support – Problem Management Service]										
4. Level	3										
5. Credit	1										
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 Know the structure and operation principles of Configuration Management Database (CMDB)</td> <td> Be able to <ul style="list-style-type: none"> ▪ understand the structure of the CMDB ▪ identify the steps in the operation of the database ▪ state corporate policies related to creating, amending, updating, indexing, backing up, archiving, and deleting records in a database </td> </tr> <tr> <td>6.2 Keep trouble shooting records on CMDB in good order</td> <td> Be able to <ul style="list-style-type: none"> ▪ control access to CMDB according to corporate policy ▪ provide support for effective and efficient usage on the CMDB ▪ perform backup on system and CMDB to maintain continuity in service ▪ execute changes to records in CMDB after root cause analysis ▪ log database activities and generate appropriate reports ▪ monitor operations on database system and suggest improvement to ensure the CMDB meet changing operation environment </td> </tr> <tr> <td>6.3 Keep abreast with corporate policies</td> <td>Be able to ensure changes are authorized, properly documented, and circulated to users</td> </tr> <tr> <td>6.4 Manage the CMDB in a professional manner</td> <td> Be able to <ul style="list-style-type: none"> ▪ maintain, update and administer the CMDB in accordance with the organisation's guidelines as well as any (local and international) laws and regulatory requirements, if applicable ▪ perform the activities in an efficient and effective manner </td> </tr> </table>		<u>Performance Requirement</u>	6.1 Know the structure and operation principles of Configuration Management Database (CMDB)	Be able to <ul style="list-style-type: none"> ▪ understand the structure of the CMDB ▪ identify the steps in the operation of the database ▪ state corporate policies related to creating, amending, updating, indexing, backing up, archiving, and deleting records in a database 	6.2 Keep trouble shooting records on CMDB in good order	Be able to <ul style="list-style-type: none"> ▪ control access to CMDB according to corporate policy ▪ provide support for effective and efficient usage on the CMDB ▪ perform backup on system and CMDB to maintain continuity in service ▪ execute changes to records in CMDB after root cause analysis ▪ log database activities and generate appropriate reports ▪ monitor operations on database system and suggest improvement to ensure the CMDB meet changing operation environment 	6.3 Keep abreast with corporate policies	Be able to ensure changes are authorized, properly documented, and circulated to users	6.4 Manage the CMDB in a professional manner	Be able to <ul style="list-style-type: none"> ▪ maintain, update and administer the CMDB in accordance with the organisation's guidelines as well as any (local and international) laws and regulatory requirements, if applicable ▪ perform the activities in an efficient and effective manner
	<u>Performance Requirement</u>										
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7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) keep the information in CMDB up to date; and (ii) enhance the outcome of operations and support activities via more effective delivery of problem management services.										
Remark	According to ITIL®, Configuration Management Database (CMDB) is commonly accessed in every process. Incidents, changes, etc, are part of CMDB.										

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

1. Title	Monitor and control the system operation services	
2. Code	ITSWOS304A	
3. Range	Schedule, organize, monitor, control and report the system operations of non-routine nature or beyond the coverage of existing procedure in the context of providing system operations services for an organisation (See Remark 1 for examples of system operations) [Operations and Support – System Operations]	
4. Level	3	
5. Credit	3	
6. Competency	<p style="text-align: right;"><u>Performance Requirement</u></p> <p>6.1 Know the System Operations guidelines, procedures and process</p> <p style="margin-left: 20px;">Be able to</p> <ul style="list-style-type: none"> ▪ keep conversant with the operating environment and the associated set of operating work instruction, guidelines and procedures ▪ determine whether a system operations service request falls in the organisation's system operations guidelines and procedures ▪ understand the functional scope, business implication and service level requirements on the system operations <p>6.2 Understand the roles and responsibilities of all people involved in system operations</p> <p style="margin-left: 20px;">Be able to identify appropriate personnel to follow-up the system operations of non-routine nature</p> <p>6.3 Monitor and control the operating activities of the system</p> <p style="margin-left: 20px;">Be able to</p> <ul style="list-style-type: none"> ▪ ensure all operation instructions are followed and operation activities are recorded ▪ monitor and control the short term performance of the IT system/server operating services ▪ make escalation to appropriate technical support teams in case the system operating performance is beyond the normal condition boundary and approve exceptional operating work instruction in reaction ▪ assist in the problem management process to resolve the system operation problem ▪ maintain and grant exceptions for the system operations, the associated facilities and the data center access control <p>6.4 Schedule and organise the ad hoc, new request and changes in the operating activities</p> <p style="margin-left: 20px;">Be able to</p> <ul style="list-style-type: none"> ▪ plan, coordinate, schedule and organize the short term operational activities to meet project and operations service level requirement ▪ comprehend the planned operations activities and optimize the operations resources or facilities utilization 	

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

1. Title	Deliver the system operations services	
2. Code	ITSWOS305A	
3. Range	Operate the system operations according to a set of work instructions, guidelines, procedures and service requests for an organisation (See Remark 1 for examples of system operations) [Operations and Support – System Operations]	
4. Level	3	
5. Credit	2	
6. Competency	<p>6.1 Understand the basic components of system operations</p> <p>6.2 Have basic knowledge of IT in system operations</p> <p>6.3 Operate the system operations</p> <p>6.4 Perform first level problem diagnostic services on system operations</p>	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ operate the basic components of system operations ▪ communicate with users and technical persons using their own language about the incident and service call related to the system operations (e.g. software application or hardware system) provided by the organisation <p>Be able to</p> <ul style="list-style-type: none"> ▪ read, interpret and enter the associated work instructions ▪ communicate with the technical support teams on the specific operations requirements ▪ perform the prescribed operating services on system operations according to the work instruction and schedule ▪ monitor the planned change activities carried out on the system operations and raise an alert in the event of deviation in change time window or change scope ▪ monitor and record the operations activities with the results <p>Be able to</p> <ul style="list-style-type: none"> ▪ understand alert and malfunction symptoms of basic components related to system operations ▪ report the problem to Help Desk for incident tracking if necessary ▪ identify the source of problem and take corrective or recovery action according to the problem determination guide and procedure ▪ communicate with the second level support teams and get instruction on performing special diagnostic work ▪ record the diagnostic activities and the results

	<p>6.5 Review the operations activities, make suggestion and document for improvement</p> <p>6.6 Operate the system operations in a professional manner</p>	<p>Be able to</p> <ul style="list-style-type: none"> ▪ collect feedback from the Help Desk, technical and second level support teams ▪ review operations activities, system performance or problems ▪ make suggestions and document them to improve the operating manual, work instruction, problem determination guide and procedure <p>Be able to</p> <ul style="list-style-type: none"> ▪ deliver the system operations services within the agreed scope and timeline based on a set of work instructions, guidelines, procedures and service requests in accordance with the organisation's guidelines as well as any (local and international) laws and regulatory requirements, if applicable ▪ calmly and sincerely communicate with users and supporting parties in their daily language during the servicing process ▪ correctly comprehend the incident or service request and record the descriptions into IT context for subsequent servicing performed by technical expertise
7. Assessment Criteria	<p>The integrated outcome requirements of this UoCs are the abilities to fulfil system operations function of an organisation by:</p> <ul style="list-style-type: none"> (i) effectively communicating with the support teams in their daily language, comprehending problems and translating them into operations context for subsequent servicing ; (ii) operating the system operations based on a set of operating manual and procedure; (iii) performing first level problem diagnosis on system operations; and (iv) learning from the operations activities and making suggestions for improvement. 	
Remark	<ol style="list-style-type: none"> 1. System operations include, but are not limited to, <ul style="list-style-type: none"> a) IT system/server operations, b) network operations, c) voice and video conference services operations, and d) operations management 2. Examples of basic components of IT system/server include, but are not limited to, hardware, system software, database, application, operating consoles, system management tools, and computer centre facilities. 3. Examples of operating services of system operations related to IT system/server include, but are not limited to, start up, shut down, system monitoring, run job and batch, backup data, offsite backup data delivery, system health check and etc 4. This UoCs comprises the operating and first level system diagnosis competency requirement for the functions of system operations. 	

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

1. Title	Deliver field support services
2. Code	ITSWOS306A
3. Range	Define support process and provide on site support services for the hardware and software components (including any peripheral device and storage equipment) in the context of providing field support services for an organisation [Operations and Support – Field Support Services]
4. Level	3
5. Credit	3
6. Competency	<p style="text-align: right;"><u>Performance Requirement</u></p> <p>6.1 Know the ICT infrastructure and operating environment Be able to</p> <ul style="list-style-type: none"> ▪ be conversant with the functions of the building blocks in ICT infrastructure ▪ be familiar with the operational and technical characteristics of the devices related to the infrastructure, in particular the hardware and software components on desktop computers, storage and peripheral equipment <p>6.2 Define support process Be able to define and explain support process to calling party via</p> <ul style="list-style-type: none"> ▪ listening carefully to user's description of cause of call ▪ defining, recommending and explaining the steps to be done to the user <p>6.3 Provide on site support services Be able to</p> <ul style="list-style-type: none"> ▪ operate the hardware and software components on desktop computer, server, storage and/or peripheral equipment to ascertain the reason of call for field service ▪ identify cause of service call ▪ perform data backup for the user whenever possible ▪ restore standard operation environment if there were improper operation or change in configuration ▪ restore user's data if applicable ▪ enable remote usage monitoring and alert where applicable <p>6.4 Perform field service to the user's satisfaction Be able to</p> <ul style="list-style-type: none"> ▪ provide safe, reliable and speedy field service ▪ initiate subsequent call to make appropriate changes after the root-cause has been identified
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) define support process to be done according to the operating environment on the field; and (ii) perform field service to aid and restore standard operating environment.
Remark	

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

1. Title	Recover failed hardware and software components
2. Code	ITSWOS307A
3. Range	Recover the failed hardware and software components, which may include any peripheral device and storage equipment, and restore the faulty components to their normal functions, following company procedure either for Standard Operating Environment (SOE) or non-SOE in the context of providing field support services for an organisation (See Remark 1 for extra requirements on non-SOE) [Operations and Support – Field Support Services]
4. Level	3
5. Credit	2
6. Competency	<p style="text-align: right;"><u>Performance Requirement</u></p> <p>6.1 Know the normal behaviour of desktop hardware, software components, storage or peripheral equipment</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ understand normal behaviour of desktop hardware, software components, storage or peripheral equipment in standard operating environment ▪ operate any desktop hardware, software components, storage or peripheral equipment in standard operating environment <p>6.2 Understand the outcome from root-cause analysis</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ interpret the result from root-cause analysis on the reported symptom ▪ identify the procedures necessary to restore faulty components to normal operation conditions ▪ locate restoration or replacement resources <p>6.3 Recover hardware and software components after failure</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ observe safety procedures and re-install replacement components if necessary ▪ re-install software components and/or tune operational parameters on desktop hardware, storage and peripheral equipment to restore them into standard operating environment <p>6.4 Ensure integrity of corporate ICT infrastructure</p> <p>Be able to confirm any software, hardware, storage and peripheral equipment, which are attached to corporate ICT infrastructure but not in the corporate standard equipment list, do not interfere with corporate operation</p>
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to recover hardware and software components including any peripheral device and storage equipment after failure into normal conditions.
Remark	In case of non-SOE, please make sure that it is properly approved by the company and that the restoration procedure and media (or image) are provided.

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

1. Title	Apply technical changes and patches to the hardware and software components	
2. Code	ITSWOS308A	
3. Range	Distribute ad-hoc technical changes to the hardware environment including but not limited to test and apply latest critical patches (e.g. hot-fixes and security patches of client computing platform) in the context of providing field support services for an organisation [Operations and Support – Field Support Services]	
4. Level	3	
5. Credit	2	
6. Competency	<p>6.1 Understand corporate standard operating environment with particular emphasis on security</p> <p>6.2 Distribute technical changes to the hardware environment</p> <p>6.3 Confirm technical changes meet corporate policy in a professional manner</p>	<p><u>Performance Requirement</u> Be able to</p> <ul style="list-style-type: none"> ▪ explain the latest corporate standard operating environment ▪ recognize the need to keep operating environment up to date to ensure effective operation and maintain data integrity and confidentiality <p>Be able to</p> <ul style="list-style-type: none"> ▪ demonstrate proficiency in the operating computer and attached devices under standard operating environment ▪ inspect hardware installation to determine the version of installation base ▪ apply technical change to the hardware environment if necessary <p>Be able to</p> <ul style="list-style-type: none"> ▪ verify that technical changes have been properly applied to relevant device ▪ validate the changes and report any irregularities <p>according to the organisation's procedures and polices</p>
7. Assessment Criteria	The integrated outcome requirement of this UoCs are the abilities to apply technical changes to the computing platform for the integrity of the ICT infrastructure in order to ensure effective operation and maintain security to the highest standard.	
Remark		

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

1. Title	Deliver problem management services	
2. Code	ITSWOS403A	
3. Range	Deliver problem management service requests based on a set of processes, guidelines and procedures in the context of providing Problem Management services in an organisation or for a client [Operations and Support – Problem Management Service]	
4. Level	4	
5. Credit	1	
6. Competency	<p>6.1 Understand the position of problem management in support services</p> <p>6.2 Respond to problem/ incidents, develop and execute problem management processes</p> <p>6.3 Conclude an service request</p> <p>6.4 Perform problem management services in a professional manner</p>	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ state the goal of problem management ▪ identify potential sources of problem on problem management ▪ be conversant with the workflow in problem management services <p>Be able to</p> <ul style="list-style-type: none"> ▪ record the problem according to established format and procedure ▪ classify and investigate the cause of incoming incident ▪ search Configuration Management database (CMDB) for possible clues and formulate a resolution in reply to incoming incident ▪ record problem resolution ▪ classify processes into reactive and proactive aspects to aid further analysis <p>Be able to</p> <ul style="list-style-type: none"> ▪ monitor resolution progress ▪ document the service request, reported symptoms, actions taken and results on the log ▪ ensure formation of resolution on problem be conducted within agreed service level agreement ▪ make suggestion to improve the CMDB, in particular on the salient points for future reference in resolving similar incidents <p>Be able to</p> <ul style="list-style-type: none"> ▪ deliver problem management services in accordance with the organisation's guidelines as well as any (local and international) laws and regulatory requirements, if applicable ▪ deliver the services in an efficient and effective manner ▪ continuously and proactively improve on the problem management services

7. Assessment Criteria	The integrated outcome requirement of this UoCs are the abilities to deliver resolution on cause of incidents based on the established Configuration Management Database.
Remark	According to ITIL®, Configuration Management Database (CMDB) is commonly accessed in every process. Incidents, changes, etc, are part of CMDB.

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

1. Title	Deliver change management services	
2. Code	ITSWOS405A	
3. Range	Verify, log, track, report and communicate the Request for Change (RFC) schedule and implementation status in the context of performing change management service request in an organisation or for a client [Operations and Support – Change Management Services]	
4. Level	4	
5. Credit	3	
6. Competency	<p>6.1 Have basic knowledge in IT related to change management process</p> <p>6.2 Have knowledge related to a change management process</p> <p>6.3 Verify, filter, log, track, report and communicate on the RFC</p> <p>6.4 Provide assistance in the RFC assessment, scheduling, approval and communications with concerned parties</p> <p>6.5 Review the RFC log, make suggestions and document them for improvement</p>	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify the type of a change request ▪ identify the components required in a change request <p>Be able to</p> <ul style="list-style-type: none"> ▪ execute change management process for implementing change request ▪ identify the stakeholders involved in a change request <p>Be able to</p> <ul style="list-style-type: none"> ▪ verify and assess the RFC to ensure that it contains the required information, e.g., change description, business and system impact analysis, risk analysis or back-out procedures ▪ filter and prioritize the RFC according to its nature ▪ log and submit the RFC to the Change Advisory Board (CAB) for approval if necessary ▪ track the approved RFC scope and schedule of RFC implementation ▪ track, communicate and review the RFC implementation progress, result and sign-off <p>Be able to</p> <ul style="list-style-type: none"> ▪ provide support for the RFC scheduling ▪ provide support for the RFC assessment and approval ▪ provide support regarding coordination and communication with concerned parties in the change management process <p>Be able to</p> <ul style="list-style-type: none"> ▪ collect feedback from users, change requestors and other concerned parties that are crucial to the successful execution of a change management process ▪ make suggestion to improve the change management policies and process

	6.6 Verify, log, track, report and communicate the Request for Change (RFC) schedule and implementation status	Be able to verify, log, track, report and communicate the RFC schedule and implementation status with the end users and relevant stakeholders in accordance with the organisation's change management policies and guidelines as well as any (local and international) laws and regulatory requirements, if applicable
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) communicate and coordinate with the concerned parties in the change management process; (ii) comprehend, assess, filter and submit the RFC for approval; (iii) track, communicate and review the RFC implementation; and (iv) learn from the execution of the RFC processes and make suggestion for improvement.	
Remark	This UoCs comprises the Change Administrator competency requirement as stipulated in the change management process of ITIL®.	

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

1. Title	Deliver availability management services	
2. Code	ITSWOS406A	
3. Range	Deliver, maintain, update and administer the service level performance for availability management services for an organisation [Operations and Support – Availability Management Services]	
4. Level	4	
5. Credit	2	
6. Competency	<p>6.1 Have basic knowledge in IT related to the availability management process</p> <p>6.2 Understand purposes and practices of the availability management process</p> <p>6.3 Comprehend the target/projected service level performance and performance indicators</p> <p>6.4 Identify the discrepancies between the actual service level performance and performance indicators and the target/projected service level performance and performance indicators</p>	<p><u>Performance Requirement</u></p> <p>Be able to appreciate the roles and functions of IT related to the availability management process</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ adopt the principles of and adapt best practices for availability management process ▪ comprehend the performance level indicators <p>Be able to</p> <ul style="list-style-type: none"> ▪ define the availability requirements from the business perspective and create the target/projected service level performance and performance indicators ▪ define the measurements and formula of the various service level performance indicators from the common IT systems (e.g. servers, storage, network, etc.) <p>Be able to</p> <ul style="list-style-type: none"> ▪ gather raw data for the computation of actual service level performance and performance indicators in accordance with the defined measurements and formulae using common system management components (e.g. UNIX, Windows & TCP/IP) ▪ interpret trends of the actual service level performance and performance indicators ▪ quantify the gaps between the actual service level performance and performance indicators and the target/projected service level performance and performance indicators

	<p>6.5 Find out the underlying reasons for the discrepancies between the actual service level performance and performance indicators and the target/projected service level performance and performance indicators</p> <p>6.6 Report the discrepancies and findings</p> <p>6.7 Deliver, maintain, update and administer the service level performance for availability management services in a professional manner</p>	<p>Be able to</p> <ul style="list-style-type: none"> ▪ collaborate the effort of the various service delivery teams to carry out investigations of the underlying reasons for the discrepancies, if any ▪ plan and manage to bundle changes, package and distribute a release <p>Be able to put the discrepancies and the corresponding reasons for discrepancies into a format that facilitates the reporting to the customers and management</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ exercise industry best practices and adhere to standards both local and international ▪ comply with the organisation's guidelines and procedures as well as any (local and international) laws and regulatory requirements, if applicable
7. Assessment Criteria	<p>The integrated outcome requirements of this UoCs are the abilities to:</p> <ul style="list-style-type: none"> (i) identify and define the business availability requirements; (ii) measure and report the actual service level performance; (iii) track the achievement of the service level against the targeted service level; and (iv) collaborate the effort of other technical teams and support teams to maintain the availability plan. 	
Remark		

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

1. Title	Deliver release management services	
2. Code	ITSWOS407A	
3. Range	Deliver, maintain, update and administer the requests for release management services in the context of providing release management services in an organisation or for a client See Remark 2 for examples of items involved in release management services [Operations and Support – Release Management Services]	
4. Level	4	
5. Credit	3	
6. Competency	<p>6.1 Understand the nature of the system(s) that is/are involved in the release request</p> <p>6.2 Comprehend IT knowledge in a centralized and/or distributed environment</p> <p>6.3 Plan, deliver, test, accept a release of hardware, software and associated documentation</p>	<p><u>Performance Requirement</u> Be able to</p> <ul style="list-style-type: none"> ▪ clearly communicate the impact of the release request to those end users who might be affected ▪ clearly communicate with technical persons involved in the release process <p>Be able to apply the required knowledge to</p> <ul style="list-style-type: none"> ▪ design, build and configure the scripts (usually automated but manual procedures are acceptable) for the release request ▪ execute the release request according to the defined scripts ▪ verify that the release request is executed correctly and that the resulting systems work as usual <p>Be able to perform the following tasks, if necessary, in a centralized environment and / or across distributed environments, where appropriate</p> <ul style="list-style-type: none"> ▪ coordinate the activities of the service provider, suppliers and the business to plan and deliver a release ▪ plan and manage to bundle changes, package and distribute a release ▪ manage the associated impact and risk to business and IT including the affected information systems, infrastructure services and documentation ▪ design, build, configure, test and accept release package so that the release does not have a negative impact on the existing system ▪ verify and accept release package after roll-out to make sure that the existing system functions properly as a whole

	<p>6.4 Maintain, update and administer associated documentation</p> <p>6.5 Relate to other management processes</p> <p>6.6 Deliver, maintain, update and administer the requests for release management services in a professional manner</p>	<p>Be able to</p> <ul style="list-style-type: none"> ▪ update associated documentation in the release, eg. service level agreement, business process and support documents (system overview, installation and support procedures, distribution processes, contingency, fallback plan and rollout plan) ▪ document related changes, problems, and known errors ▪ keep evidence of release authorization and related evidence of verification and acceptance <p>Be able to</p> <ul style="list-style-type: none"> ▪ secure new versions of software and its details with documentation in configuration management database (CMDB) for future reference ▪ oversee the details of the roll out of a change, which is under the control and authority of change management <p>Be able to deliver, maintain, update and administer the release management requests in accordance with the organisation's guidelines as well as any (local and international) laws and regulatory requirements, if applicable</p>
7. Assessment Criteria	<p>The integrated outcome requirements of this UoCs are the abilities to:</p> <ul style="list-style-type: none"> (i) plan, deliver, test, and accept a release of hardware, software and associated documentation across a centralized and/or distributed environments; (ii) ensure the release request satisfies the business and IT service requirements; (iii) effectively communicate with end users about the impact of the release request in relation to their day-to-day work; and (iv) effectively communicate with technical people about the release request process as required by the organisation. 	
Remark	<ol style="list-style-type: none"> 1. This UoCs comprises the Release Planner competency requirement as stipulated in the release management process of ITIL®. 2. The items involved in release management services include, but are not limited to, <ul style="list-style-type: none"> a) the SOE of all computing equipments (both hardware and software) in the organisations; b) the compatibility of software and hardware; c) parameter configuration and version control on hardware platform; d) operating system platform; and e) infrastructure services. 	

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

1. Title	Monitor and control the release management services	
2. Code	ITSWOS419A	
3. Range	Plan, monitor, coordinate, track and control the requests for release management services in the context of providing release management services in an organisation or for a client [Operations and Support – Release Management Services]	
4. Level	4	
5. Credit	3	
6. Competency	<p>6.1 Have basic knowledge in IT related to release management process</p> <p>6.2 Have knowledge related to a release management process</p> <p>6.3 Plan and oversee the successful roll-out of new and changed software, associated hardware and documentation</p> <p>6.4 Provide assistance in assessing, scheduling, approving and communicating with concerned parties</p>	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify the frequency and type of release request (such as a release of a new product or a delta release of an existing product) ▪ identify the components required in a release request <p>Be able to</p> <ul style="list-style-type: none"> ▪ plan and oversee the process for a release request ▪ identify the stakeholders involved in a release request <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify the frequency of a release request and the type it belongs to (such as a release of a new product or a delta release of an existing product) for planning and monitoring purposes ▪ identify potential risks and remedial actions to the system involved in the release request ▪ verify the release to ensure that the existing system will function as expected after the release has been applied ▪ verify the defined fallback approach to ensure that the existing system will function as usual after applying the fallback approach due to a failure in the release process ▪ accept or reject the release <p>Be able to</p> <ul style="list-style-type: none"> ▪ provide assistance in Request For Change (RFC) scheduling ▪ provide assistance in RFC assessment and approval ▪ provide assistance in coordinating and communicating with concerned parties in the release and change management processes

	<p>6.5 Review the execution of a release management process and make suggestions for future improvement</p> <p>6.6 Plan, monitor, coordinate, track and control the release requests in a professional manner</p>	<p>Be able to</p> <ul style="list-style-type: none"> ▪ collect feedback from users, release requestors and other concerned parties that are crucial to the successful execution of a release management process ▪ make suggestion to improve the release management policies and process <p>Be able to plan, monitor, coordinate, track and control the request for release management services based on the organisation's release management policies and procedures while observing local and international laws as well as regulatory requirements, if applicable</p>
7. Assessment Criteria	<p>The integrated outcome requirements of this UoCs are the abilities to:</p> <ul style="list-style-type: none"> (i) plan, monitor, coordinate, track and control a release request; (ii) provide assistance in coordinating and communicating with the concerned parties in the release management process; (iii) verify and accept the release; and (iv) make suggestions for future improvement based on the lessons learnt from the execution of a release process. 	
Remark	<ol style="list-style-type: none"> 1. This UoCs comprises the Release Manager competency requirement as stipulated in the release management process of ITIL®. 2. This UoCs assumes competencies in risk assessment and risk mitigation strategies as described in GSS-RM-04 (UoCs id to be confirmed) and GSS-RM-05 (UoCs id to be confirmed). 	

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

1. Title	Deliver configuration management services									
2. Code	ITSWOS408A									
3. Range	Deliver configuration management service request for better asset and operation management in the context of providing configuration management services for an organisation (See remark 1 for the activities involved) [Operations and Support – Configuration Management Services]									
4. Level	4									
5. Credit	1									
6. Competency	<table border="0" style="width: 100%;"> <tr> <td style="width: 30%; vertical-align: top;">6.1 Have good knowledge of configuration management issues</td> <td style="width: 30%; vertical-align: top;"> <u>Performance Requirement</u> Be able to <ul style="list-style-type: none"> ▪ understand the basic process of configuration management ▪ understand the function and structure of the configuration database </td> <td style="width: 40%;"></td> </tr> <tr> <td style="vertical-align: top;">6.2 Maintain an up-to-date configuration management database</td> <td style="vertical-align: top;"> Be able to <ul style="list-style-type: none"> ▪ identify and classify the configuration items according to pre-defined guidelines ▪ implement the approved changes to change configuration management database structure ▪ update (add, change and delete) the configuration items in a timely fashion ▪ reply to service enquiry with information extracted from the configuration database </td> <td></td> </tr> <tr> <td style="vertical-align: top;">6.3 Information reliability and accuracy</td> <td style="vertical-align: top;"> Be able to <ul style="list-style-type: none"> ▪ keep reliable records of details of IT components and assets ▪ provide accurate information and document of system configuration according to organisational procedures </td> <td></td> </tr> </table>	6.1 Have good knowledge of configuration management issues	<u>Performance Requirement</u> Be able to <ul style="list-style-type: none"> ▪ understand the basic process of configuration management ▪ understand the function and structure of the configuration database 		6.2 Maintain an up-to-date configuration management database	Be able to <ul style="list-style-type: none"> ▪ identify and classify the configuration items according to pre-defined guidelines ▪ implement the approved changes to change configuration management database structure ▪ update (add, change and delete) the configuration items in a timely fashion ▪ reply to service enquiry with information extracted from the configuration database 		6.3 Information reliability and accuracy	Be able to <ul style="list-style-type: none"> ▪ keep reliable records of details of IT components and assets ▪ provide accurate information and document of system configuration according to organisational procedures 	
6.1 Have good knowledge of configuration management issues	<u>Performance Requirement</u> Be able to <ul style="list-style-type: none"> ▪ understand the basic process of configuration management ▪ understand the function and structure of the configuration database 									
6.2 Maintain an up-to-date configuration management database	Be able to <ul style="list-style-type: none"> ▪ identify and classify the configuration items according to pre-defined guidelines ▪ implement the approved changes to change configuration management database structure ▪ update (add, change and delete) the configuration items in a timely fashion ▪ reply to service enquiry with information extracted from the configuration database 									
6.3 Information reliability and accuracy	Be able to <ul style="list-style-type: none"> ▪ keep reliable records of details of IT components and assets ▪ provide accurate information and document of system configuration according to organisational procedures 									
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) maintain an up-to-date configuration database; and (ii) ensure information reliability and accuracy for configuration management.									
Remark	<ol style="list-style-type: none"> 1. This includes the following: <ol style="list-style-type: none"> a) ensuring changes to each configuration item are timely and up-to-date; b) providing accurate management information of the system configuration; and c) identifying, maintaining and updating the details of each configuration item. 2. The participant is assumed to have a comprehensive knowledge in IT and its applications. 3. This UoCs comprises the competency to perform configuration management. 									

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

1. Title	Ensure continuous operations of the computing environment	
2. Code	ITSWOS410A	
3. Range	Provide recovery and operational services to enable continuous operations of the computing environment to support Business Continuity Planning (BCP), which meets the organisation standards, in disaster recovery (DR) sites [Operations and Support – IT Service Continuity Management]	
4. Level	4	
5. Credit	3	
6. Competency	<p>6.1 Understand the purposes and practices of IT service continuity and disaster recovery</p> <p>6.2 Understand the organisation's plans for IT service continuity and disaster recovery</p> <p>6.3 Provide recovery and operational services to enable continuous operations of the computing environment to support BCP</p> <p>6.4 Provide recovery and operational services to enable continuous operations of the computing environment in a professional manner</p>	<p>Performance Requirement Be able to adopt the principles of and adapt the best practices for IT service continuity and disaster recovery process for an organisation</p> <p>Be able to comprehend the plans for IT service continuity and disaster recovery</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ perform storage management for both data and system backups according to the required Recovery Time Objective (RTO) and Data Loss Window ▪ maintain network availability and conduct switching of network to DR sites ▪ activate DR procedures and maintain IT service continuity at DR sites ▪ synchronise changes between production and DR environment, which include but not limited to impact analysis, change implementation and control, technical document and DR Plan maintenance ▪ restore services at the prime site after Recovery Service Cessation Time, and install the changes that have been applied at the DR site in the recovered Production site <p>Be able to</p> <ul style="list-style-type: none"> ▪ exercise industry best practices and adhere to industry standards as well as local and international standards ▪ comply with organisation's guidelines and procedures as well as any (local and international) laws and regulatory requirements, if applicable
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to execute the DR plan.	

Remark	<ol style="list-style-type: none"><li data-bbox="443 194 1406 253">1. The participant is assumed to have a comprehensive knowledge in IT and its applications.<li data-bbox="443 255 1406 313">2. This UoCs comprises both business impact assessment and process definition requirement for the IT Service Continuity Management of ITIL®.
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**Information and Communications Technology Industry Training Advisory Committee
Software Products and Software Services (SW) branch
Unit of Competencies**

1. Title	Conduct tests and drills to support the Disaster Recovery Plan	
2. Code	ITSWOS411A	
3. Range	Conduct initial tests of the Disaster Recovery Plan and, thereafter, conduct regular disaster recovery drills, and provide a report following each such test / drill and advise corrective actions identified through such testing in the context of providing IT service continuity management for an organisation [Operations and Support – IT Service Continuity Management]	
4. Level	4	
5. Credit	3	
6. Competency	<p>6.1 Understand the purposes and practices of the disaster recovery (DR) process</p> <p>6.2 Understand the DR plan</p> <p>6.3 Conduct initial test of the DR Plan</p> <p>6.4 Conduct regular disaster recovery drills</p> <p>6.5 Provide a report following each such test and advise corrective actions identified through such testing</p> <p>6.6 Conduct initial tests of the Disaster Recovery Plan and thereafter conduct regular disaster recovery drills in a professional manner</p>	<p>Performance Requirement</p> <p>Be able to adopt the principles of and adapt best practices for IT service continuity and disaster recovery process for an organisation</p> <p>Be able to plan for an exercise to test the DR plan and to conduct disaster recovery drills</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ prepare test procedures ▪ conduct test and identify/correct any errors ▪ update the test procedures <p>Be able to</p> <ul style="list-style-type: none"> ▪ schedule regular drills of the DR Plan ▪ review the procedures before test ▪ conduct the test as planned ▪ identify errors and correct, if possible, on the spot <p>Be able to</p> <ul style="list-style-type: none"> ▪ document the abnormal cases during the test ▪ conduct post-mortem review of the test ▪ prepare report of each test ▪ advise corrective actions to those deficiencies identified in the test <p>Be able to</p> <ul style="list-style-type: none"> ▪ exercise industry best practices and adhere to industry standards as well as local and international standards ▪ comply with the organisation's guidelines and procedures as well as any (local and international) laws and regulatory requirements, if applicable
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) conduct initial tests of the DR Plan; (ii) conduct regular disaster recovery drills; and (iii) provide a report following each such test and advise corrective actions identified through such tests/drills.	

Remark	<ol style="list-style-type: none"><li data-bbox="443 192 1415 253">1. The participant is assumed to have a comprehensive knowledge in IT and its applications.<li data-bbox="443 253 1415 313">2. This UoCs comprises both business impact assessment and process definition required for the IT Service Continuity Management of ITIL®.
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**Information and Communications Technology Industry Training Advisory Committee
Software Products and Software Services (SW) branch
Unit of Competencies**

1. Title	Deliver service level management services	
2. Code	ITSWOS420A	
3. Range	Install and maintain software monitors and conduct analysis on performance with reports aligning to service level agreement (SLA) metrics in the context of providing service level management services for an organisation [Operations and Support – Service Level Management]	
4. Level	4	
5. Credit	3	
6. Competency	<p>6.1 Understand the relationship between service level management and other operating and support activities</p> <p>6.2 Source appropriate software monitors and develop appropriate techniques for installing and maintaining the software monitors</p> <p>6.3 Establish and maintain the monitoring capabilities</p> <p>6.4 Execute monitoring function and analyse the performance with respect to the SLA metrics</p>	<p><u>Performance Requirement</u> Be able to</p> <ul style="list-style-type: none"> ▪ state that service level management is responsible for monitoring the quality of service and service level in operating and supporting activities with reference to the terms as specified in SLA ▪ identify and locate the activities specified in SLA such as, but not limited to, those connecting to availability management and capacity management <p>Be able to identify, review and select suitable software monitors and develop internal techniques for installing and maintaining the software monitors</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify measurable parameters, metrics or monitoring controls in operation and support activities ▪ define properly the various monitoring controls ▪ implement monitoring controls that can be effectively measured to ensure services are being delivered in accordance with SLA ▪ take appropriate action to improve the capabilities of tools and techniques where necessary ▪ replace monitoring controls with more effective and efficient ones when those are proved to be obsolete, ineffective or inefficient <p>Be able to</p> <ul style="list-style-type: none"> ▪ conduct monitoring of the service and support activities ▪ perform numerical analysis on the trends of performance against SLA targets ▪ ensure the monitoring matches the customer's true perception of the service ▪ suggest specific actions to improve service quality

	6.5 Perform monitoring and analysis of SLA metric in a professional manner	<p>Be able to</p> <ul style="list-style-type: none"> ▪ perform monitoring and analysis activities in accordance with the organisation's guidelines as well as any (local and international) laws and regulatory requirements, if applicable ▪ perform the services in an efficient and effective manner ▪ continuously and proactively improve on the SLA metrics
7. Assessment Criteria	<p>The integrated outcome requirements of this UoCs are the abilities to:</p> <ul style="list-style-type: none"> (i) create and maintain monitor definitions and rules based upon the requirements from SLA; (ii) monitor and conduct analysis of output and performance of managed systems according to prescribed standards; and (iii) provide trend analysis reports. 	
Remark	This UoCs involves the trend analysis of the performance against SLA targets.	

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

1. Title	Manage the day-to-day operations of service delivery	
2. Code	ITSWOS421A	
3. Range	Manage the day-to-day operations of service delivery in the context of performing service level management services for an organisation [Operations and Support – Service Level Management]	
4. Level	4	
5. Credit	3	
6. Competency	<p style="text-align: right;"><u>Performance Requirement</u></p> <p>6.1 Understand the terms and conditions in service level agreement (SLA)</p> <ul style="list-style-type: none"> Be able to <ul style="list-style-type: none"> ▪ identify service level management customers and supportive service suppliers ▪ recognize that the SLA being a binding document primarily as an interface with the customers about service details contained in the operational level agreement (OLA) and underpinning contracts ▪ comprehend the terms and conditions in the SLA ▪ relate operating and support services to customer activities and the corresponding clauses in the SLA <p>6.2 Ensure the currency and comprehensiveness of the SLA, OLA and underpinning contracts</p> <ul style="list-style-type: none"> Be able to <ul style="list-style-type: none"> ▪ control the release of SLA, OLA and underpinning contracts by proper change management procedures ▪ communicate the existence of the new SLA amongst the service desk and other support groups with details of when they become operational <p>6.3 Produce service reports and circulate to customers</p> <ul style="list-style-type: none"> Be able to <ul style="list-style-type: none"> ▪ incorporate details of performance details against all SLA targets, together with any trends or specific actions being undertaken to improve service quality ▪ interpret trends of the actual service level performance and performance indicators ▪ estimate the resources required to produce and verify reports ▪ generate reports for management and customers <p>6.4 Manage appropriate service improvement programmes (SIP) to overcome the difficulties and restore service quality</p> <ul style="list-style-type: none"> Be able to instigate a SIP to identify and implement whatever actions are necessary to overcome the difficulties and restore service quality 	

	<p>6.5 Manage the day-to-day operations of service delivery in a professional manner</p>	<p>Be able to</p> <ul style="list-style-type: none"> ▪ manage the day-to-day operations of service delivery in accordance with the organisation's guidelines as well as any (local and international) laws and regulatory requirements, if applicable ▪ manage the day-to-day operations in an efficient and effective manner ▪ continuously and proactively improve on the day-to-day operations of service delivery
7. Assessment Criteria	<p>The integrated outcome requirements of this UoCs are the abilities to:</p> <ul style="list-style-type: none"> (i) ensure day-to-day operations of service delivery in accordance with the SLA; (ii) liaise with other support functions; and (iii) communicate with customers and support parties to ensure improvement requests or initiatives are taken care of. 	
Remark		

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

1. Title	Establish and maintain the system operations process	
2. Code	ITSWOS422A	
3. Range	Define, design, establish, develop and review the system operations function for the entire organisation (See Remark 1 for examples of system operations) [Operations and Support – System Operations]	
4. Level	4	
5. Credit	4	
6. Competency	<p>6.1 Have general business knowledge of the serving industry</p> <p>6.2 Have comprehensive knowledge in IT and its role in the business process of the serving industry</p> <p>6.3 Keep abreast of the new system operations plan and on-going development in system operations</p> <p>6.4 Plan, design, set up and implement changes to the system operations function</p> <p>6.5 Liaise and review with the service customer</p>	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ understand the impact of System Operations functions on the business of the organisation ▪ communicate the impacts of System Operations functions on the end users <p>Be able to</p> <ul style="list-style-type: none"> ▪ comprehend the new system operations plan across the entire IT organisation and the on-going development in system operations, translate them into positioning in system operations function as part of the system operations delivery ▪ translate the new service delivery plans into positioning in system operations function as part of the integral service delivery <p>Be able to plan, design, set up and implement changes to the resources, tools, operations manuals and processes of the system operations function to satisfy the service commitment and service level requirements</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ liaise with other teams in the IT organisation on an agreed system operation service delivery requirement ▪ review the organisation teams' feedback, the operations record and report of the system operations function and devise plan for improvement ▪ upkeep or improve the user satisfaction level

	6.6 Define, design, establish, develop and review the system operations function in a professional manner	<p>Be able to define, design, establish, develop and review the system operations function of an organisation to satisfy the service level requirements</p> <ul style="list-style-type: none"> ▪ based on industry best practices and standards as well as local and international standards ▪ in compliance with the organisation's guidelines as well as any (local and international) laws and regulatory requirements, if applicable
7. Assessment Criteria	<p>The integrated outcome requirements of this UoCs are the abilities to:</p> <ul style="list-style-type: none"> (i) define, design, establish and review System Operations functions; (ii) understand the role of IT and the implication of its operations efficiency and effectiveness on the major business processes of the serving organisation; (iii) upkeep or improve the medium and long term performance of System Operations function as defined in the service level agreement; and (iv) upkeep or improve the user satisfaction level. 	
Remark	<ul style="list-style-type: none"> 1. System operations include, but are not limited to, <ul style="list-style-type: none"> a) IT system/server operations, b) network operations, c) voice and video conference services operations, and d) operations management 2. This UoCs comprises the functional and process management for the system operations function. 	

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

1. Title	Deliver database operations services	
2. Code	ITSWOS413A	
3. Range	Operate and administer the database according to a set of work instructions, procedures and service requests in the context of providing database operations and administrative services for an organisation or for a client [Operations and Support – Database Administration and Support]	
4. Level	4	
5. Credit	14	
6. Competency	<p>6.1 Understand the work instructions, procedures and service requests for the operation and administration of databases</p> <p>6.2 Follow the work instructions and procedures in the operation and administration of databases, and in fulfilling service requests</p> <p>6.3 Perform the operating and administrative activities of databases with a high degree of effectiveness and efficiency</p>	<p><u>Performance Requirement</u> Be able to</p> <ul style="list-style-type: none"> ▪ comprehend the instructions, procedures and service requests specified for the operation and administration of databases ▪ understand the performance requirements set out in the service level agreement, if any, of the organisation ▪ seek clarification from relevant people where necessary <p>Be able to</p> <ul style="list-style-type: none"> ▪ carry out the database's operating and administrative activities in accordance to the work instructions and procedures specified ▪ carry out the activities necessary to fulfil service requests in accordance to the specified work instructions and procedures specified ▪ operate, monitor and provide system statistics on database availability and performance ▪ report to supervisors of any problems and exceptional situations during the execution of these activities <p>Be able to</p> <ul style="list-style-type: none"> ▪ carry out the database operating and administrative activities in the most effective and efficient manner, meeting or exceeding the service level agreement, if any, of the organisation ▪ fulfil the service requests in the most effective and efficient manner ▪ report problems and exceptional situations without delay
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) provide database operational and administrative services with pre-defined procedures and automated systems to enable operations of the database environment as per service level agreement (SLA) requirements; and (ii) fulfil service requests of the database to the satisfaction of the requestors.	
Remark		

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

1. Title	Analyse and fix the hardware and software failure
2. Code	ITSWOS423A
3. Range	Perform root-cause analysis and execute remedial actions when the hardware and software components (including any peripheral device and storage equipment) fail in the context of providing field support services for an organisation [Operations and Support – Field Support Services]
4. Level	4
5. Credit	2
6. Competency	<p><u>Performance Requirement</u></p> <p>6.1 Have knowledge in analysing the reported symptom Be able to comprehend</p> <ul style="list-style-type: none"> ▪ the reported symptom and operating environment from first line field service ▪ the preliminary action taken <p>6.2 Understand the characteristics of the desktop hardware, software components, storage or peripheral equipment Be able to</p> <ul style="list-style-type: none"> ▪ demonstrate in-depth understanding of the operational and technical characteristics of desktop/server hardware, software components, storage or peripheral equipment ▪ link up the reported symptom with possible malfunction device(s) <p>6.3 Perform root-cause analysis and execute remedial actions Be able to</p> <ul style="list-style-type: none"> ▪ confirm the reported symptom from being repeatable ▪ take all necessary safety precautions ▪ isolate devices to perform additional device-level local tests so as to identify the faulty desktop/server hardware, software components, storage or peripheral equipment ▪ initialize recovery procedures if there were failure on desktop/server hardware or software components, storage or peripheral equipment <p>6.4 Conclude the cause of failure quickly in a professional manner Be able to</p> <ul style="list-style-type: none"> ▪ show proficiency in correlating reported symptom with possible faulty device ▪ disconnect and re-assemble devices in a safe, reliable and speedy approach ▪ conclude the cause of failure quickly with precision according to organisational procedures
7. Assessment Criteria	The integrated outcome requirement of this UoCs are the abilities to identify the root cause of field service call.
Remark	This UoCs assumes the existence of other UoCs responsible for the recovery of desktop/server hardware or software components, storage or peripheral equipment.

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

1. Title	Deliver system support services	
2. Code	ITSWOS424A	
3. Range	Perform system maintenance and support services in the context of providing system support services for an organisation (See Remark 1 for examples of items related to system support services) [Operations and Support – System Support Services]	
4. Level	4	
5. Credit	6	
6. Competency	<p>6.1 Understand the system support process (See Remark 2 for an explanation of system support process)</p> <p>6.2 Understand the system operation, maintenance, administration, diagnosis and recovery activities in the execution of the system support services process</p> <p>6.3 Maintain and evaluate the system support services process</p> <p>6.4 Perform the system maintenance and support activities in the system support services in a professional manner</p>	<p><u>Performance Requirement</u> Be able to</p> <ul style="list-style-type: none"> ▪ have a good mastery of the system support processes ▪ acquire the skills to perform the tasks in the support processes <p>Be able to</p> <ul style="list-style-type: none"> ▪ perform the required maintenance, administration, diagnosis and recovery activities in the system support services process ▪ coordinate the concerned parties and stakeholders for the execution of the system support services process <p>Be able to</p> <ul style="list-style-type: none"> ▪ analyse the defined system support services process for its effectiveness and efficiency at regular intervals ▪ identify key factors that are crucial to the effectiveness and efficiency of the defined system support services process ▪ recommend new process for future improvements, if necessary ▪ update the new process once it is approved <p>Be able to</p> <ul style="list-style-type: none"> ▪ effectively and efficiently perform the system support services process, meeting or exceeding the service level agreement of the organisation, if any ▪ fulfil the system support service requests in the most effective and efficient manner ▪ evaluate and maintain the up-to-date system support services process ▪ give technical advice on supported system performance
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to operate, maintain, administer, diagnose and restore the systems in the system support services process for the organisation.	
Remark	1. Examples of items related to server support services include, but are not	

	<p>limited to, the following:</p> <ul style="list-style-type: none">a) Hardware and software components such as server, network, voice, and video;b) Configuration items for version control via application asset management such as application related documents (e.g. system / design / programme specifications, codes and operation documentations); andc) Items related to system management services such as the following:<ul style="list-style-type: none">(i) System Monitoring and tuning;(ii) Service level measurement and reporting;(iii) Software packaging and software distribution;(iv) Configuration Management;(v) User administration and access control;(vi) Directory services support;(vii) Storage allocation and access control;(viii) Data backup and recovery;(ix) Remote Control;(x) Inventory Scan; and(xi) Security Control such as Virus Scan and removal. <p>2. The system support process is an on-going activity. There are NO planned activities except during changes when one may plan to do extra system support.</p> <p>3. This UoCs involves the analysis and evaluation of the defined process for system support services.</p>
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**Information and Communications Technology Industry Training Advisory Committee
Software Products and Software Services (SW) branch
Unit of Competencies**

1. Title	Monitor and control system support services
2. Code	ITSWOS425A
3. Range	Plan, monitor, schedule, support and investigate processes for system support services in the context of providing system support services for an organisation (See Remark 1 for examples of items related to system support services) [Operations and Support – System Support Services]
4. Level	4
5. Credit	7
6. Competency	<p style="text-align: right;"><u>Performance Requirement</u></p> <p>6.1 Understand various principles and best practices of the system support services process</p> <p style="margin-left: 20px;">Be able to</p> <ul style="list-style-type: none"> ▪ adopt the principles of the system support services processes for an organisation ▪ adapt best practices for the system support services processes for an organization <p>6.2 Plan, monitor and oversee the execution of the system support services process</p> <p style="margin-left: 20px;">Be able to</p> <ul style="list-style-type: none"> ▪ plan, monitor and control the execution of the system support services process ▪ coordinate concerned parties and stakeholders to execute the agreed process ▪ perform regular performance monitoring of the system support services process and take corrective actions where necessary ▪ perform proactive monitoring of the system support services process and take preventive actions, if necessary ▪ communicate to the concerned parties and stakeholders on any burning issues that may affect the successful execution of the system support services process <p>6.3 Plan, monitor, schedule, support and investigate processes for system support services in a professional manner</p> <p style="margin-left: 20px;">Be able to plan, monitor, schedule and support system support services that are</p> <ul style="list-style-type: none"> ▪ based on industry best practices, any local and international standards ▪ in compliance with organisation's guidelines and procedures as well as any (local and international) laws and regulatory requirements, if applicable
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to plan, monitor, schedule, support and investigate the execution of system support services processes.
Remark	<p>1. Examples of items related to server support services include, but are not limited to, the following:</p> <p>a) Hardware and software components such as server, network, voice, and video;</p> <p>b) Configuration items for version control via application asset management such as application related documents (e.g. system / design / programme specifications, codes and operation</p>

	<p>documentations); and</p> <p>c) Items related to system management services such as the following:</p> <ul style="list-style-type: none">(i) System Monitoring and tuning;(ii) Service level measurement and reporting;(iii) Software packaging and software distribution;(iv) Configuration Management;(v) User administration and access control;(vi) Directory services support;(vii) Storage allocation and access control;(viii) Data backup and recovery;(ix) Remote Control;(x) Inventory Scan; and(xi) Security Control such as Virus Scan and removal.
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**Information and Communications Technology Industry Training Advisory Committee
Software Products and Software Services (SW) branch
Unit of Competencies**

1. Title	Maintain the security control documents						
2. Code	ITSWOS418A						
3. Range	Prepare and maintain the security control documents in the context of providing security management services for the IT operations of an organisation (See Remark 1 for the content of security control documents) [Operations and Support – Security Management Services]						
4. Level	4						
5. Credit	2						
6. Competency	<table border="0" style="width: 100%;"> <tr> <td style="width: 25%; vertical-align: top;">6.1 Locate security information sources</td> <td style="vertical-align: top;"> <p>Performance Requirement Be able to identify and locate security information sources such as:</p> <ul style="list-style-type: none"> ▪ managerial security policy and guidelines ▪ authorised security control plan ▪ industry best practices from professional bodies of local and international standards </td> </tr> <tr> <td style="vertical-align: top;">6.2 Prepare and maintain the security control documents</td> <td style="vertical-align: top;"> <p>Be able to</p> <ul style="list-style-type: none"> ▪ prepare and maintain security control documents which covers security roles and responsibilities, processes, parameter settings / configuration, security reporting, and ongoing support on the operating environment ▪ act as central hub of current security documents of the corporation ▪ keep records of changes, amendments and distribution for audit trail </td> </tr> <tr> <td style="vertical-align: top;">6.3 Prepare and maintain the security control documents in a professional manner</td> <td style="vertical-align: top;"> <p>Be able to</p> <ul style="list-style-type: none"> ▪ exercise industry best practices and adhere to industry standards as well as local and international standards ▪ comply with the organisation's guidelines and procedures as well as any (local and international) laws and regulatory requirements, if applicable </td> </tr> </table>	6.1 Locate security information sources	<p>Performance Requirement Be able to identify and locate security information sources such as:</p> <ul style="list-style-type: none"> ▪ managerial security policy and guidelines ▪ authorised security control plan ▪ industry best practices from professional bodies of local and international standards 	6.2 Prepare and maintain the security control documents	<p>Be able to</p> <ul style="list-style-type: none"> ▪ prepare and maintain security control documents which covers security roles and responsibilities, processes, parameter settings / configuration, security reporting, and ongoing support on the operating environment ▪ act as central hub of current security documents of the corporation ▪ keep records of changes, amendments and distribution for audit trail 	6.3 Prepare and maintain the security control documents in a professional manner	<p>Be able to</p> <ul style="list-style-type: none"> ▪ exercise industry best practices and adhere to industry standards as well as local and international standards ▪ comply with the organisation's guidelines and procedures as well as any (local and international) laws and regulatory requirements, if applicable
6.1 Locate security information sources	<p>Performance Requirement Be able to identify and locate security information sources such as:</p> <ul style="list-style-type: none"> ▪ managerial security policy and guidelines ▪ authorised security control plan ▪ industry best practices from professional bodies of local and international standards 						
6.2 Prepare and maintain the security control documents	<p>Be able to</p> <ul style="list-style-type: none"> ▪ prepare and maintain security control documents which covers security roles and responsibilities, processes, parameter settings / configuration, security reporting, and ongoing support on the operating environment ▪ act as central hub of current security documents of the corporation ▪ keep records of changes, amendments and distribution for audit trail 						
6.3 Prepare and maintain the security control documents in a professional manner	<p>Be able to</p> <ul style="list-style-type: none"> ▪ exercise industry best practices and adhere to industry standards as well as local and international standards ▪ comply with the organisation's guidelines and procedures as well as any (local and international) laws and regulatory requirements, if applicable 						
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to prepare and maintain the security control documents.						
Remark	<ol style="list-style-type: none"> 1. The security control documents should, at least, cover security roles and responsibilities, processes, parameter settings/configuration, security reporting and ongoing support on the operation environment. 2. The participant is assumed to have comprehensive knowledge in IT and its applications. 3. This UoCs comprises both planning and operating the security for infrastructure environment for the security management services of ITIL®. 						

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

1. Title	Monitor and control the higher severity service request	
2. Code	ITSWOS501A	
3. Range	Monitor, coordinate and control an incident or service request with higher severity, impact or beyond the coverage of the existing guidelines and procedures in the context of providing Help Desk services for an organisation (Please see Remark 1 for explanation of severity) [Operations and Support – Help Desk Service]	
4. Level	5	
5. Credit	4	
6. Competency	<p>6.1 Know the Help Desk guidelines, procedures and process</p> <p>6.2 Have knowledge in Change and Problem Management Services</p> <p>6.3 Understand the roles and responsibilities of all people involved in IT operations</p> <p>6.4 Monitor and control the Help Desk services function</p>	<p><u>Performance Requirement</u> Be able to determine whether an incident / service request fall in the organisation's Help Desk guidelines and procedures</p> <p>Be able to comprehend the impacts of the activities planned, being implemented or recently completed in the Change and Problem Management functions on Help Desk services</p> <p>Be able to identify appropriate personnel to handle an unidentified cause incident</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ keep conversant with the set of process, guideline and procedures deployed in Help Desk ▪ understand the scope, impact and service level agreement of the Help Desk services ▪ monitor the short term performance of the Help Desk service function, intervene or escalate according to the applicable service level requirement ▪ observe for repeated incidents ▪ assess the overall severity and impact of the incidents ▪ handle the incidents collectively ▪ give guidance to deal with major incidents or events not covered in the existing guides or procedures and may work in conjunction with other IT functions ▪ communicate and coordinate with the relevant stakeholders during the exceptional events

	<p>6.5 Keep abreast with the Change and Problem Management function</p> <p>6.6 Identify the follow-up party in incidents with unidentified causes</p> <p>6.7 Identify the idiosyncrasy of the incidents and optimise the resources, tools or processes</p> <p>6.8 Monitor an incident or service request in a professional manner</p>	<p>Be able to</p> <ul style="list-style-type: none"> ▪ assist in the root cause analysis task force and comprehend the root cause analysis report issued by the Problem Management function ▪ update the corresponding Help Desk guidelines and procedures according to the result of the Change or the Problem Analysis activity <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify the most relevant party/parties in incidents with unidentified causes ▪ invoke the problem management function to probe into the root cause of the special incident beyond the coverage of the existing guidelines or procedures ▪ track the time elapsed and communicate with the reporting user and support parties at suitable time interval until incident closure ▪ escalate the incident or service request if the resolving time has exceeded the respective service level agreements <p>Be able to</p> <ul style="list-style-type: none"> ▪ collect feedback from users and other IT Operations and Support functions ▪ review the incident trend and idiosyncrasy ▪ tune the Help Desk short term resource deployment, tools, guidelines or procedures to optimise the service level achievements in resolving future incidents <p>Be able to monitor, coordinate and control an incident or service request beyond the coverage of the existing Help Desk knowledge database according to organisation's guidelines and procedures</p>
7. Assessment Criteria	<p>The integrated outcome requirements of this UoCs are the abilities to:</p> <p>(i) upkeep the short term performance of Help Desk function to the service level agreement level with an established pool of resources and set of process, tool and procedure; and</p> <p>(ii) tune the Help Desk function with respect to resource deployment, process or tool.</p>	
Remark	<ol style="list-style-type: none"> 1. Severity of an incident usually measures against number/percentage of affected users and impact on a business function or process. 2. This UoCs comprises both the supervisory, day-to-day exception management and short term performance responsibility of the Service Centre function and Incident Management process of ITIL®. 	

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

1. Title	Establish and maintain the help desk process	
2. Code	ITSWOS523A	
3. Range	Define, design, establish, develop and review the process of providing Help Desk services for an organisation [Operations and Support – Help Desk Service]	
4. Level	5	
5. Credit	3	
6. Competency		<p style="text-align: center;"><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ understand the impact of Help Desk functions on the business of the organisation ▪ communicate the impacts of Help Desk functions to the end users <p>Be able to</p> <ul style="list-style-type: none"> ▪ comprehend the new service delivery plans across the IT organisation and the on-going development in IT operations ▪ integrate the new service delivery plans in the Help Desk function <p>Be able to plan, design, set up and implement changes to the resources, tools, knowledge base and processes of the Help Desk function to satisfy the service level requirements</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ liaise with the user community on an agreed Help Desk service requirement ▪ review user feedback and the performance reports of Help Desk function and devise plans for improvement ▪ upkeep or improve the user satisfaction level <p>Be able to define, design, establish, develop and review the Help Desk function of an organisation to satisfy service level requirements expected by end users</p> <ul style="list-style-type: none"> ▪ based on industry best practices and standards as well as local and international standards, and ▪ in compliance with organisation's guidelines as well as any (local and international) laws and regulatory requirements, if applicable
	6.1 Have general business knowledge of the serving industry	
	6.2 Have comprehensive knowledge in IT and its role in the business process of the serving industry	
	6.3 Understand new service delivery plans and on-going development in IT operations	
	6.4 Plan, design, set up and implement changes to the Help Desk function	
	6.5 Liaise and review with the users on Help Desk function	
	6.6 Define, design, establish, develop and review the Help Desk function in a professional manner	

7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) define, design, establish and review Help Desk functions; (ii) upkeep or improve the medium and long term performance of Help Desk functions as defined in the service level agreement; and (iii) upkeep or improve the user satisfaction level.
Remark	This UoCs comprises the Help Desk management for the Service Centre function of ITIL®.

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

1. Title	Monitor and control problem management services	
2. Code	ITSWOS502A	
3. Range	Monitor, coordinate and control of day-to-day operation the problem management process to meet the service level requirements in the context of providing Problem Management services in an organisation or for a client [Operations and Support – Problem Management Service]	
4. Level	5	
5. Credit	2	
6. Competency	<p style="text-align: center;"><u>Performance Requirement</u></p> <p>6.1 Understand the workflow in problem management</p> <p style="padding-left: 20px;">Be able to</p> <ul style="list-style-type: none"> ▪ keep abreast with the workflow in problem management ▪ comprehend the service level requirements agreed with problem management service users <p>6.2 Monitor and control the problem as referred from Help Desk agent or incident tracking system</p> <p style="padding-left: 20px;">Be able to</p> <ul style="list-style-type: none"> ▪ respond to problem received from Help Desk ▪ monitor and pick up the problem having propensity to fail against service level requirements ▪ constrain and control the problem affected areas to minimize the business impact of the problem <p>6.3 Coordinate and facilitate problem analysis</p> <p style="padding-left: 20px;">Be able to</p> <ul style="list-style-type: none"> ▪ coordinate and facilitate the support parties to analyse a problem ▪ diagnose the problem structurally in conjunction with the support parties to get to the root cause of the problem ▪ determine and implement the permanent resolution <p>6.4 Coordinate problem review and provide trend analysis information</p> <p style="padding-left: 20px;">Be able to</p> <ul style="list-style-type: none"> ▪ coordinate the support parties to review a problem ▪ document the problem, corrective actions and review result for other support parties' reference ▪ translate the raw information into problem trend analysis report <p>6.5 Review the problem and make suggestions for improvement</p> <p style="padding-left: 20px;">Be able to</p> <ul style="list-style-type: none"> ▪ review the problem cause and trend analysis report to identify actions to prevent reoccurrence ▪ make suggestions to improve the problem determination guide or document the salient points for future reference in resolving similar problem <p>6.6 Perform monitoring of problem management process in a professional manner</p> <p style="padding-left: 20px;">Be able to</p> <ul style="list-style-type: none"> ▪ monitor, coordinate and control problem management processes in accordance with organisation's guidelines as well as any (local and international) laws and regulatory requirements, if applicable ▪ continuously and proactively improve on the problem management processes 	

7. Assessment Criteria	<p>The integrated outcome requirements of this UoCs are the abilities to:</p> <ul style="list-style-type: none"> (i) communicate with Help Desk and support parties in their working language; (ii) facilitate the analysis and review with support parties based on a structured decision framework to derive the root cause and appropriate corrective actions; (iii) formulate appropriate analysis report; (iv) stay calm in the communications with both the users and the support parties; and (v) learn from the problems and make suggestions for improvement.
Remark	<ol style="list-style-type: none"> 1. The participant is assumed to have a comprehensive knowledge in IT and its applications. 2. This UoCs comprises the problem coordinator role requirement for the Problem Management process of ITIL®.

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

1. Title	Establish and maintain the problem management process	
2. Code	ITSWOS524A	
3. Range	Design, establish, develop and review the Problem Management process including the transfer of trouble shooting skills for future improvements in the context of providing Problem Management services in an organisation or for a client [Operations and Support – Problem Management Service]	
4. Level	5	
5. Credit	2	
6. Competency		<p style="text-align: center;"><u>Performance Requirement</u></p> <p>6.1 Understand the structure, problem management policy and workflow of the organisation</p> <p>6.2 Keep abreast of the new service delivery plans and on-going development in IT operations</p> <p>6.3 Plan, design, set up and implement changes to the problem management process</p> <p>6.4 Liaise and review with the other IT functions and process owners</p> <p>6.5 Manage the problem management process in a professional manner</p>
7. Assessment Criteria	<p>The integrated outcome requirements of this UoCs are the abilities to:</p> <p>(i) comprehend plans in the IT organisation and be able to position accordingly in the Problem Management process;</p> <p>(ii) understand the role of IT and its outage implication in the major business processes of the serving organisation;</p>	

	<ul style="list-style-type: none"> (iii) upkeep or improve the medium and long term performance of Problem Management process to the service level requirement level; and (iv) upkeep or improve the system availability and problem resolution rate.
Remark	<ol style="list-style-type: none"> 1. The participant is assumed to have general business knowledge of the serving industry. 2. The participant is assumed to have a comprehensive knowledge in IT and its role in the business process of the serving industry. 3. This UoCs comprises the Problem Management process Owner for the Problem Management process function of ITIL®.

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

1. Title	Maintain a change schedule
2. Code	ITSWOS503A
3. Range	Maintain, update and administer a change schedule in the context of performing change management service request for an organisation [Operations and Support – Change Management Services]
4. Level	5
5. Credit	2
6. Competency	<p style="text-align: right;"><u>Performance Requirement</u></p> <p>6.1 Have basic knowledge in IT related change management process Be able to</p> <ul style="list-style-type: none"> ▪ identify the type of a change request ▪ identify the components required in a change request <p>6.2 Have knowledge related to change management process Be able to</p> <ul style="list-style-type: none"> ▪ plan the execution of the change including the schedule and detailed steps involved in the change ▪ identify the stakeholders involved in a change request <p>6.3 Plan and schedule changes approved by Change Advisory Board (CAB) Be able to</p> <ul style="list-style-type: none"> ▪ plan the change schedule according to the business and IT system, service and project requirements ▪ schedule the CAB approved Request for Change(RFC) into the change schedule ▪ ensure the scheduled change outage are within the service level requirement ▪ update and communicate the change schedule to the concerned parties <p>6.4 Own and act for guardianship of the change schedule for the organisation Be able to</p> <ul style="list-style-type: none"> ▪ own ▪ act for the guardianship ▪ be accountable for the change schedule in satisfying the business and IT service requirement <p>6.5 Maintain and administer a change schedule Be able to maintain and administer a change schedule in accordance with the organisation's guidelines as well as any (local and international) laws and regulatory requirements where applicable</p>
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) plan and schedule approved changes; and (ii) ensure the change schedule satisfies the business and IT service requirements.
Remark	This UoCs comprises the Change Planner competency requirement as stipulated in the change management process of ITIL®

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

1. Title	Manage the day-to-day operation of a change management process	
2. Code	ITSWOS504A	
3. Range	Manage the day-to-day operation of a change management process in the context of performing change management service request in an organisation or for a client [Operations and Support – Change Management Services]	
4. Level	5	
5. Credit	2	
6. Competency		<p style="text-align: center;"><u>Performance Requirement</u></p> <p>6.1 Have knowledge related to change management process</p> <p style="padding-left: 20px;">Be able to</p> <ul style="list-style-type: none"> ▪ plan and manage change management processes including their schedules and detailed steps involved in a change request ▪ identify the stakeholders involved in a change request <p>6.2 Know the structure, roles and responsibilities of Change Advisory Board (CAB)</p> <p style="padding-left: 20px;">Be able to</p> <ul style="list-style-type: none"> ▪ understand the structure of a CAB to set up one ▪ understand the roles and responsibilities of a CAB for convening its meetings ▪ convene, chair and run CAB meetings <p>6.3 Design, implement, enforce, monitor, control and review the change management policy, guidelines and procedures</p> <p style="padding-left: 20px;">Be able to design, implement, enforce, monitor, control and review the change management policy, guidelines and procedures according to the IT service delivery strategy and plan in the organisation</p> <p>6.4 Monitor, filter, control and communicate the Request for Change (RFC) submission, approval, implementation and review process</p> <p style="padding-left: 20px;">Be able to</p> <ul style="list-style-type: none"> ▪ monitor and control the day-to-day RFC submission, approval, implementation and review process ▪ filter and reject the non-compliant RFC ▪ filter and approve the minor impact RFC ▪ filter and recommend to CAB ▪ communicate to the concerned parties on the RFC and its implications <p>6.5 Convene, chair and run CAB meetings</p> <p style="padding-left: 20px;">Be able to</p> <ul style="list-style-type: none"> ▪ set up the CAB which comprises the relevant key stakeholders or their representations from business and IT organisation to jointly evaluate and approve the submitted RFC with major impact ▪ chair, convene and run CAB meetings regularly for approving the submitted RFC

	6.6 Manage the day-to-day operation of a change management process professionally	Be able to manage the day-to-day operation of a change management process in accordance with the organisation's guidelines as well as any (local and international) laws and regulatory requirements where applicable
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) design, implement, enforce, monitor, control and review the change management policy, guidelines and procedures; (ii) monitor, filter, control and communicate the RFC submission, approval, implementation and review process; and (iii) convene, chair and run the CAB.	
Remark	This UoCs comprises the Change Manager competency requirement as stipulated in the change management process of ITIL®.	

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

1. Title	Establish and maintain the change management process	
2. Code	ITSWOS525A	
3. Range	Design, establish, develop and review the change management process in the context of performing change management service request in an organisation or for a client [Operations and Support – Change Management Services]	
4. Level	5	
5. Credit	2	
6. Competency	<p>6.1 Have general business knowledge of the serving industry</p> <p>6.2 Have comprehensive knowledge in IT and its role in the business process of the serving industry</p> <p>6.3 Keep abreast of the new service delivery plans and on-going development in IT operations</p> <p>6.4 Plan, design, set up and implement changes to the change management process</p> <p>6.5 Liaise and review with the other IT functions and processes</p> <p>6.6 Establish the change management process in a professional manner</p>	<p><u>Performance Requirement</u> Be able to understand and communicate any impact of change management processes on the business of the organisation</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ comprehend the new service delivery plans across the IT organisation and the on-going development in IT operations ▪ integrate them into the organisation's change management process as part of the integral service delivery <p>Be able to plan, design, set up and implement changes to the resources, work methods, tools, knowledge base and processes of the change management process to satisfy the service level requirements</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ liaise with the other IT function or process owners on an agreed change management process service requirement ▪ review the support parties' feedback, the performance report of change management process and devise plan for improvement ▪ upkeep or improve system availability and change success rate <p>Be able to design, establish, develop and review the change management process of an organisation</p> <ul style="list-style-type: none"> ▪ based on industry best practices and standards as well as local and international standards, and ▪ in compliance with the organisation's guidelines as well as any (local and international) laws and regulatory requirements, if applicable

7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) establish change management processes for servicing change requests in an organisation; (ii) upkeep or improve the medium and long term performance of change management process to the service level requirement level; and (iii) upkeep or improve system availability and change success rate.
Remark	This UoCs comprises the change management process owner for the change management process function of ITIL®.

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

1. Title	Recommend availability improvement plans	
2. Code	ITSWOS505A	
3. Range	Recommend improvement plans as input to the technology planning process in the context of providing availability management services for an organisation [Operations and Support – Availability Management Services]	
4. Level	5	
5. Credit	3	
6. Competency	<p style="text-align: right;"><u>Performance Requirement</u></p> <p>6.1 Have basic knowledge in IT related to the availability management process</p> <p>6.2 Understand the purposes and practices of the availability management process</p> <p>6.3 Formulate possible improvement actions to close the discrepancies between target/projected service level performance & performance indicators and actual service level performance & performance indicators</p> <p>6.4 Evaluate the various possible improvement actions among others</p> <p>6.5 Select a set of possible improvement actions to formulate an improvement plan</p>	
		<p>Be able to appreciate the roles and functions of IT related to the availability management process</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ adopt the principles of and adapt best practices for the availability management process ▪ plan for an exercise to develop an improvement plan for better availability ▪ comprehend the performance level indicators <p>Be able to</p> <ul style="list-style-type: none"> ▪ understand basic IT techniques/ components that can be used to improve availability (e.g. hardware or software cluster, load balancing, resiliency devices such as RAID disk ▪ work with other specialist teams and compile a list of possible improvement actions to close the discrepancies <p>Be able to</p> <ul style="list-style-type: none"> ▪ set the appropriate evaluation criteria and choose suitable evaluation methods and decision analysis methods to weigh the various possible improvement actions from both business perspective (e.g. financial) and technical perspective ▪ estimate the probable risks inherent to each improvement actions and to come up with possible risk mitigation strategies using common techniques (e.g. CRAMM model) <p>Be able to</p> <ul style="list-style-type: none"> ▪ apply the chosen evaluation criteria and method to select an optimum set of improvement actions and prioritise them ▪ work out a proposed improvement plan based on the inter-dependencies of the improvement actions

	<p>6.6 Recommend the improvement plan to the technology planning process</p> <p>6.7 Recommend improvement plans as input to the technology planning process in a professional manner</p>	<p>Be able to communicate the proposed improvement plan effectively in both business and technical perspectives in order to gain the buy-in from management</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ exercise industry best practices and adhere to industry standards as well as local and international standards ▪ comply with the organisation's guidelines and procedures as well as any (local and international) laws and regulatory requirements, if applicable
7. Assessment Criteria	<p>The integrated outcome requirements of this UoCs are the abilities to:</p> <ul style="list-style-type: none"> (i) devise and maintain the availability plan, which can fulfil the various business availability requirements; (ii) collaborate the effort of other technical teams and support teams to maintain the availability plan; and (iii) communicate effectively with the business users and customers about the availability plan and the corresponding improvement proposals. 	
Remark		

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

1. Title	Monitor and control of service level fulfilment	
2. Code	ITSWOS506A	
3. Range	Monitor, coordinate, track and control fulfilment by all support parties to achieve the service level requirement in the context of providing availability management services for an organisation [Operations and Support – Availability Management Services]	
4. Level	5	
5. Credit	3	
6. Competency		<u>Performance Requirement</u>
	6.1 Have basic knowledge in IT related to the availability management process	Be able to appreciate the roles and functions of IT related to the availability management process
	6.2 Understand the purposes and practices of the availability management process	Be able to adopt the principles of and adapt best practices for the availability management process
	6.3 Devise proper controls to monitor the performance of each individual team	Be able to <ul style="list-style-type: none"> ▪ assess the effectiveness of controls and adopt the most effective and relevant controls towards the achievement of service level requirements ▪ agree targets of operating level agreements and underpinning contracts of availability, reliability and maintainability for the IT infrastructure components that underpin the IT service ▪ ensure that the work done by each team is within the bounds of the controls ▪ ensure that the work done by each team can meet the overall service delivery in accordance with the required service levels
	6.4 Ensure monitoring and reporting is being done in accordance with the devised controls	Be able to define the monitoring and reporting mechanism or procedures and the involved roles and responsibilities
	6.5 Ensure remedial actions are taken whenever the work done by the teams falls out of the bounds of the controls	Be able to assess the effectiveness of the remedial actions for any work done by the teams falling out of the bounds of the controls
	6.6 Monitor, coordinate, track and control fulfilment by all support parties to achieve the service level requirement professionally	Be able to <ul style="list-style-type: none"> ▪ exercise industry best practices ▪ adhere to local and international standards ▪ comply with organisation's guidelines and procedures as well as any (local and international) laws and regulatory requirements, if applicable
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) devise proper controls to ensure fulfilment by all support parties to achieve	

	service level requirement; (ii) ensure that the work done by each team is within the bounds of the controls and that the overall service delivery is in accordance with the required service levels.
Remark	

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

1. Title	Establish and maintain the availability management process	
2. Code	ITSWOS526A	
3. Range	Design, establish, develop and review the processes for availability management services of an organisation in the context of providing availability management services for an organisation [Operations and Support – Availability Management Services]	
4. Level	5	
5. Credit	3	
6. Competency		<p><u>Performance Requirement</u></p> <p>6.1 Have basic knowledge in IT related to availability management process Be able to appreciate the roles and functions of IT related to the availability management process</p> <p>6.2 Understand objectives and practices of the availability management process Be able to adopt the principles of and adapt best practices for the availability management process</p> <p>6.3 Understand the main characteristics of the existing infrastructure topology Be able to explain and articulate the main characteristics of common IT infrastructure topologies</p> <p>6.4 Understand the critical business functions and requirements Be able to</p> <ul style="list-style-type: none"> ▪ gather the business requirements for critical business functions and assess the situation using common techniques (such as ITAMM model) ▪ define availability and recovery criteria for each new and enhanced IT service <p>6.5 Ensure proper resilience is in place to cater for the business functions and requirements Be able to assess the viability of the chosen resilience option to support the critical IT components so as to support critical business functions</p> <p>6.6 Define the scope of availability measurements Be able to</p> <ul style="list-style-type: none"> ▪ identify the IT components or systems whose availability will mean the most to the business ▪ define the availability plan for proactive improvement of IT availability based on the business needs <p>6.7 Design, establish, develop and review the processes for availability management services in a professional manner Be able to</p> <ul style="list-style-type: none"> ▪ exercise industry best practices and adhere to standards as well as local and international standards, ▪ comply with organisation's guidelines and procedures as well as any (local and international) laws and regulatory requirements, if applicable

7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) devise and maintain the availability plan, which can fulfill the various business availability requirements; (ii) understand and articulate the common IT infrastructure topologies; and (iii) identify and evaluate possible improvement actions and recommend an optimum set of actions to close any gaps between actual and target service levels.
Remark	

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

1. Title	Establish and maintain the release management process	
2. Code	ITSWOS527A	
3. Range	Design, establish, develop and review the release management policies, procedures and processes in the context of providing release management services in an organisation or for a client [Operations and Support – Release Management Services]	
4. Level	5	
5. Credit	4	
6. Competency	<p>6.1 Have general business knowledge of the serving industry</p> <p>6.2 Have comprehensive knowledge in IT and its role in the business process of the serving industry</p> <p>6.3 Outline the major activities in release management and their positions in the life-cycle of a release</p> <p>6.4 Understand the relationship among release management, change management and configuration management</p> <p>6.5 Design and implement efficient policies and procedures for the distribution and installation of changes to IT systems</p> <p>6.6 Liaise with the IT functions and processes of change management and configuration management</p>	<p><u>Performance Requirement</u> Be able to understand and communicate any impact of release management policies, procedures and process on the business of the organisation</p> <p>Be able to plan, build, configure, test, accept, communicate, distribute and install a release of hardware, software and associated documentation across a centralized and/or distributed environments</p> <p>Be able to integrate release management with change and configuration management</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ establish a set of practical and efficient policies and procedures to make release management easier to plan, implement and control ▪ define roles and responsibilities of the people involved in release management ▪ effectively communicate with every team member so as to ensure that they understand their own roles and levels of authorities as well as those of others involved in the process <p>Be able to</p> <ul style="list-style-type: none"> ▪ liaise with change management to agree to the exact content and roll-out plan for the release ▪ ensure that all items being rolled out or changed are secure and traceable via the configuration management

	<p>6.7 Review, evaluate and improve the release management process</p> <p>6.8 Design, establish, develop and review the release management process in a professional manner</p>	<p>Be able to</p> <ul style="list-style-type: none"> ▪ manage and analyse customer and user expectations of releases and roll-outs ▪ set Key Performance Indicators (KPIs) to review and evaluate the progress of a release management process ▪ devise plans or review process for future improvement, if necessary <p>Be able to design, establish, develop and review the release management process of an organisation</p> <ul style="list-style-type: none"> ▪ based on industry best practices and standards as well as local and international standards, and ▪ in compliance with the organisation's guidelines 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 UoCs are the abilities to:</p> <p>(i) establish release management policies, procedures and processes for servicing release requests related to both hardware and software in an organisation; and</p> <p>(ii) review, evaluate and improve the release management policies, procedures and processes based on the lessons learnt during the execution of the release management process.</p>	
<p>Remark</p>	<p>This UoCs comprises the release management process owner for the release management process function of ITIL®.</p>	

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

1. Title	Deliver performance and capacity management service	
2. Code	ITSWOS508A	
3. Range	Perform day-to-day service requests for performance and capacity management in the context of providing performance and capacity management services in an organisation or for a client [Operations and Support – Performance and Capacity Management Services]	
4. Level	5	
5. Credit	3	
6. Competency	<p>6.1 Understand the nature of the system(s) that is/are involved in the performance and capacity request</p> <p>6.2 Comprehend IT knowledge in a centralized and / or distributed environment</p> <p>6.3 Review, plan, execute and monitor the performance and capacity request</p>	<p><u>Performance Requirement</u> Be able to</p> <ul style="list-style-type: none"> ▪ clearly communicate the impact of the performance and capacity service request with those end users who might be affected ▪ clearly communicate with technical persons involved in the performance and capacity process <p>Be able to apply the required knowledge to</p> <ul style="list-style-type: none"> ▪ design, build and configure the scripts (usually automated but manual procedures are acceptable) for the performance and capacity request ▪ collect and analyse utilization data and tune the system according to the defined service level as agreed with users ▪ verify that the performance and capacity request is executed correctly and that the result works as agreed <p>Be able to perform the following tasks, if necessary, in a centralized environment and / or across distributed environments, where appropriate</p> <ul style="list-style-type: none"> ▪ coordinate the activities of the monitoring while tuning are taking place ▪ assess current situation regarding performance and capacity management ▪ establish details of the existing procedures and tools ▪ identify gaps between the current situation and the requirements and improvements that can be implemented ▪ identify impacts to current budget and assess cost-effectiveness

	<p>6.4 Collect and maintain the utilization data from a variety of hardware platforms and distributed environments for building a capacity database</p> <p>6.5 Integrate the request into other planning processes</p> <p>6.6 Deliver, maintain, analyse and tune the requests for performance and capacity management services in a professional manner</p>	<p>Be able to</p> <ul style="list-style-type: none"> ▪ collect up-to-date data onto a single platform for storage and analysis (See Remark 2 for examples of data) ▪ anticipate the large data storage for keeping the above ▪ produce report that are required, in particular the capacity plan <p>Be able to</p> <ul style="list-style-type: none"> ▪ closely link with availability and Application Development Management and work proactively ▪ be an integral part to produce Capacity Plan <p>Be able to deliver, maintain, analyse and tune the performance and capacity management requests in accordance with the organisation's guidelines as well as any (local and international) laws and regulatory requirements, if applicable</p>
<p>7. Assessment Criteria</p>	<p>The integrated outcome requirements of this UoCs are the abilities to:</p> <ul style="list-style-type: none"> (i) review, plan, monitor, analyse and tune a performance and capacity request; (ii) ensure the performance and capacity request meets the defined service level as agreed with users; and (iii) effectively communicate with end users and technical people about the impact of the performance and capacity request in relation to their day-to-day work and as required by the organisation. 	
<p>Remark</p>	<ol style="list-style-type: none"> 1. Tune the system includes performance tuning such as upgrading of software and hardware so as to deliver the best system performance as agreed with users. 2. Examples of data include, but are not limited to, <ul style="list-style-type: none"> a) service data from service level agreements (SLAs) b) business data from business plans and strategy c) technical data from components in the IT Infrastructure d) financial data from financial management process; and e) utilization data from daily averaged utilization of each component, the throughput rate and response time. 3. This UoCs comprises the capacity planner competency requirement as stipulated in the capacity management process of ITIL®. 4. This UoCs involves the planning, analysis and evaluation of performance and capacity requests. 	

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

1. Title	Prepare capacity upgrade plan	
2. Code	ITSWOS509A	
3. Range	Predict capacity growth and recommend equipment and develop capacity upgrade plan in the context of providing performance and capacity management services in an organisation or for a client [Operations and Support – Performance and Capacity Management Services]	
4. Level	5	
5. Credit	3	
6. Competency	<p>6.1 Understand the nature of the systems involved in the performance and capacity request</p> <p>6.2 Comprehend the proactive and iterative cycle for performance and capacity management</p> <p>6.3 Make recommendations in a capacity plan</p>	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ ensure appropriate levels of monitoring of resources and system performance are set, and that the information record in the capacity database is kept up-to-date ▪ take account of uncertainty, keep abreast of the marketing of the serving industry and business plans and provide cost-effective and timely processing capacity ▪ ensure adequate IT capacity to meet required levels of service and match the demand and optimize the use of existing capacity ▪ relate the incident and problem management processes with incidents and problems pertaining to poor performance <p>Be able to apply the required knowledge to</p> <ul style="list-style-type: none"> ▪ monitor, analyse, tune and implement the iterative activities in performance and capacity management ▪ influence the demand for computing resources and the use of those resources ▪ predict the behaviour of IT services under a given volume and variety of workload ▪ estimate the resource requirements to support a proposed application change or new application and meet its required service levels <p>Be able to analyse and incorporate following information in the capacity plan</p> <ul style="list-style-type: none"> ▪ IT strategy and plans and current budgets ▪ the organisations' business strategy and plans and financial plans ▪ the details of service level agreements (SLAs), service reviews and conditions for breaches of the SLAs ▪ performance service level that are maintainable and cost justified ▪ procedures to assess and results of

	<p>testing new H/W and S/W products that might improve efficiency and effectiveness</p> <ul style="list-style-type: none"> ▪ current levels and the projected levels of capacity and business services <p>The recommendations should be quantified in terms of:</p> <ul style="list-style-type: none"> ▪ the business benefits to be expected; ▪ the potential impacts of carrying out the recommendations; ▪ the risks involved; ▪ the resources required; and ▪ both the set up and on-going costs. <p>6.4 Deliver, update and publish a capacity plan in a professional manner</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ deliver, update and publish a capacity plan with accurate forecasts and recommendations at pre-defined intervals in line with the business planning lifecycle ▪ distribute the required resources either geographically or functionally within the organisation
7. Assessment Criteria	<p>The integrated outcome requirements of this UoCs are the abilities to:</p> <ul style="list-style-type: none"> (i) anticipate and plan for unexpected capacity growth; (ii) make recommendations on required capacity; (iii) develop a capacity plan in line with business planning and budgeting; and (iv) publish, update and distribute the capacity plan within the organisation at pre-defined intervals.
Remark	<p>This UoCs comprises the capacity planner competency requirement as stipulated in the capacity management process of ITIL®.</p>

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

1. Title	Monitor and control the performance and capacity management services	
2. Code	ITSWOS510A	
3. Range	Plan, monitor, coordinate, track and control the performance and capacity management requests in the context of providing performance and capacity management services in an organisation or for a client [Operations and Support – Performance and Capacity Management Services]	
4. Level	5	
5. Credit	3	
6. Competency	<p>6.1 Have basic knowledge in IT related to performance and capacity management process</p> <p>6.2 Have knowledge related to performance and capacity management process</p> <p>6.3 Plan and oversee the execution of a performance and capacity services plan</p> <p>6.4 Review the lessons learnt after executing a capacity plan and make suggestions for future improvement</p>	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ monitor, collect and analyse the utilization of each resource and service on an on-going basis to ensure the optimum use of the hardware and software resources, that all agreed service levels can be achieved, and that data volumes are as expected ▪ tune and implement the improvements that match the demand and optimize the use of existing capacity <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify the roles and responsibilities of performance and capacity management ▪ execute the day-to-day activities of a performance and capacity request ▪ identify the relationship between activities and their focus among business, resource and service capacity management <p>Be able to</p> <ul style="list-style-type: none"> ▪ review what practice exists already ▪ plan the structure and monitoring items ▪ collect and analyse data ▪ integrate the capacity plan into other planning processes such as Availability Management ▪ implement the process and the plan ▪ train staff who have the necessary technical skills of the hardware platforms, operating systems and applications for execution • establish the Capacity Database across a range of platforms for monitoring <p>Be able to</p> <ul style="list-style-type: none"> ▪ collect feedback from users and other concerned parties that are crucial to the successful execution of a performance and capacity management process and a capacity plan ▪ make suggestions to improve the

		performance and capacity management process and the capacity plan
	6.5 Monitor, coordinate, track and control the performance and capacity requests in a professional manner	Be able to monitor, coordinate, track and control the request for performance and capacity management services based on the organisation's capacity management goals, objectives and capacity plan while observing local and international laws as well as regulatory requirements, if applicable
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) monitor, coordinate, track and control a performance and capacity request; (ii) analyse and tune the request; (iii) provide goals and objectives, roles and responsibilities of a capacity plan and the performance and capacity management process; and (iv) make suggestion for future improvements based on the lessons learnt from the recommendations made in the previous plan.	
Remark	This UoCs comprises the capacity manager competency requirements as stipulated in the capacity management process of ITIL®.	

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

1. Title	Monitor and control of configuration management services
2. Code	ITSWOS511A
3. Range	Monitor, coordinate and control the configuration management database for better asset and operation management in the context of providing configuration management services for an organisation [Operations and Support – Configuration Management Services]
4. Level	5
5. Credit	1
6. Competency	<p style="text-align: center;"><u>Performance Requirement</u></p> <p>6.1 Have good knowledge of digital asset management</p> <p style="margin-left: 40px;">Be able to</p> <ul style="list-style-type: none"> ▪ understand the concept of digital asset management ▪ understand the structure of the organisation of digital assets <p>6.2 Monitor and control the change management database</p> <p style="margin-left: 40px;">Be able to</p> <ul style="list-style-type: none"> ▪ monitor and control the day-to-day configuration management database service request submission, approval and update ▪ review regularly the volume and patterns of the service requests ▪ control access to the change management database ▪ upkeep the security and integrity of the change management database ▪ plan and perform periodic checking and audit of the change management database <p>6.3 Filter and communicate the service requests to appropriate parties</p> <p style="margin-left: 40px;">Be able to</p> <ul style="list-style-type: none"> ▪ filter and reject the non-compliant or incomplete requests according to organisational guidelines ▪ communicate the service requests to the concerned parties according to organisational policies and procedures
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to fulfil configuration management service requests of an organisation by: (i) monitoring and controlling the service requests to appropriate parties; and (ii) filtering and communicating the service requests to appropriate parties.
Remark	<ol style="list-style-type: none"> 1. The participant is assumed to have a comprehensive knowledge in IT and its applications. 2. This UoCs comprises both the frontline and first level competency requirements for handling the configuration management service requests.

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

1. Title	Monitor and control of the implementation of Disaster Recovery Plan	
2. Code	ITSWOS512A	
3. Range	Monitor, coordinate, control and review the implementation of Disaster Recovery (DR) plan and Business Continuity/Contingency Planning (BCP) processes so as to ensure the DR plan and the BCP processes meet service level agreements in the context of IT service continuity management for an organisation [Operations and Support – IT Service Continuity Management]	
4. Level	5	
5. Credit	2	
6. Competency	<p>6.1 Understand the purposes and practices of the DR and BCP process</p> <p>6.2 Monitor, coordinate and control the implementation of DR plan and BCP process</p> <p>6.3 Review periodically the DR plan and BCP process covering business impact analysis of critical applications, facilities and procedures</p> <p>6.4 Monitor, coordinate control and review the implementation of DR plan and BCP process in a professional manner</p>	<p><u>Performance Requirement</u> Be able to adopt the principles of and adapt best practices for DR as well as BCP process for an organisation</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ monitor and control the progress of implementing the DR plan and BCP process ▪ coordinate concerned parties to execute the agreed implementation plan ▪ communicate to the concerned parties on any burning issues that may affect implementation <p>Be able to</p> <ul style="list-style-type: none"> ▪ collect feedback from users, IT colleagues, vendors, etc on the practicality of the DR plan and BCP process ▪ review the current business impact of critical applications, existing capacity and fallback recovery of facilities, and procedures ▪ propose appropriate updates to facilities, procedures and service level agreements ▪ ensure the DR plan and BCP process meets service level agreements <p>Be able to</p> <ul style="list-style-type: none"> ▪ exercise industry best practices and adhere to standards as well as local and international standards ▪ comply with organisation's guidelines and procedures as well as any (local and international) laws and regulatory requirements, if applicable
7. Assessment Criteria	The integrated outcome UoCs requirements of this UoCs are the abilities to review periodically the DR plan to ensure it meets service level agreements.	
Remark	<ol style="list-style-type: none"> 1. The participant is assumed to have a comprehensive knowledge in IT and its applications. 2. This UoCs comprises both business impact assessment and process definition requirement for the IT Service Continuity Management of ITIL®. 	

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

1. Title	Manage the service relationship with customers and suppliers	
2. Code	ITSWOS514A	
3. Range	Manage the service relationship with customers and suppliers in the context of performing service level management services for an organisation [Operations and Support – Service Level Management]	
4. Level	5	
5. Credit	3	
6. Competency	<p>6.1 Locate customers and suppliers and their linkage</p> <p>6.2 Establish service level requirements from views of customer</p> <p>6.3 Finalize the contents of the service level agreement (SLA) and the initial service level targets</p> <p>6.4 Establish underpinning contracts and operational level agreement (OLA)</p>	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ locate Information and Communication Technology (ICT) services consumers and the corresponding service suppliers ▪ identify the activities being conducted between the customers and suppliers <p>Be able to</p> <ul style="list-style-type: none"> ▪ gather data from managerial and operational users within the customer community for full understanding of quality and service level requirements on operation and support activities ▪ search from reliable sources on comparable data for reference to aid negotiation with customers ▪ check that the in-house support infrastructure and that of the service suppliers are capable of meeting customer requirements <p>Be able to</p> <ul style="list-style-type: none"> ▪ review the needs from the customer and draw out requirements ▪ use in-house SLA template to negotiate with the customer to finalise the contents of the SLA and the initial service level targets ▪ develop the SLA alongside with the negotiation with the customer ▪ agree with customer to the SLA <p>Be able to</p> <ul style="list-style-type: none"> ▪ set out specific back-to-back targets for support groups that underpin the targets included in the SLAs ▪ investigate existing contractual arrangements and upgrade them, if necessary, before committing to the SLA with the customer ▪ determine remedial or improvement actions with the support groups to improve weak areas where targets are not being met

	<p>6.5 Review service regularly with the customer</p> <p>6.6 Manage the service relationship with the customers and suppliers in a professional manner</p>	<p>Be able to</p> <ul style="list-style-type: none"> ▪ agree with the customer on the frequency and format of service review meeting ▪ review the SLA periodically with the customer (e.g. annually in line with financial cycle) to ensure that they are still current and indeed still relevant to the business ▪ review the service achievement in the last period and to preview any issues for the coming period ▪ determine remedial or improvement actions with the customer to improve weak areas where targets are not being met <p>Be able to</p> <ul style="list-style-type: none"> ▪ manage the service relationship with the customers and suppliers in accordance with organisation's guidelines as well as any (local and international) laws and regulatory requirements, if applicable ▪ continuously and proactively improve on the relationships with customers and suppliers
7. Assessment Criteria	<p>The integrated outcome requirements of this UoCs are the abilities to:</p> <ul style="list-style-type: none"> (i) gather business requirements, create and sign SLA; (ii) ensure the support infrastructure is able to deliver the service according to the SLA; and (iii) regularly review with the customers and the support parties on the service performance and the achieved SLA. 	
Remark		

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

1. Title	Manage the exceptional system operations services	
2. Code	ITSWOS528A	
3. Range	Manage the system operations in exceptional situations and the corresponding recovery action to a level acceptable in the service level agreement in the context of providing system operations services for an organisation (See Remark 1 for examples of system operations) [Operations and Support – System Operations]	
4. Level	5	
5. Credit	3	
6. Competency	<p>6.1 Understand the role of IT and the implications of its operations efficiency and effectiveness on the major business processes of the serving organisation</p> <p>6.2 Have general business knowledge of the serving organisation</p> <p>6.3 Understand the business implication of the system operations</p> <p>6.4 Coordinate, monitor and control the system's critical operations</p> <p>6.5 Decide on operational fallback, execute disaster recovery plan and restore operation to normal during a major operational event</p> <p>6.6 Review the operational decision for future improvement</p>	<p><u>Performance Requirement</u> Be able to</p> <ul style="list-style-type: none"> ▪ understand the role of system operations in the IT service delivery to the serving organisation ▪ understand the normal, fallback and disaster operations plans and associated positioning, e.g., resources, facilities, support parties, logistics, time required to execute an operational fallback or recovery activity <p>Be able to understand the implication on the business unit and of the serving organisation when executing a certain operational decision</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ participate in the appropriate governance body so as to monitor and control the following items <ul style="list-style-type: none"> ➢ the highest severity operational problem ➢ a major system implementation, drill, upgrade and/or cutover ▪ enforce and grant exceptional access rights to system operations (e.g. data centre and IT system/server) during critical operational situation <p>Be able to</p> <ul style="list-style-type: none"> ▪ coordinate and make the stakeholders aware of the implication of the execution and the non-execution of a particular operations decision during a major operational event ▪ ensure all resources, facilities, logistics and procedures are positioned before executing a decision <p>Be able to lead the post-mortem operations management review to find out the root cause</p>

	<p>6.7 Manage the system operations in exceptional situations and the corresponding recovery action</p>	<p>Be able to</p> <ul style="list-style-type: none"> ▪ manage the system operations in exceptional situations ▪ coordinate and enact the necessary recovery action <p>so as to minimize the impact of the exceptional incidence to the organisation in accordance with organisation's guidelines as well as any (local and international) laws and regulatory requirements, if applicable.</p>
<p>7. Assessment Criteria</p>	<p>The integrated outcome requirements of this UoCs are the abilities to:</p> <ul style="list-style-type: none"> (i) comprehend plans in the IT organisation and able to position accordingly in the system operations function; (ii) understand the role of IT and its outage implication in the major business processes of the serving organisation; (iii) upkeep or improve the medium and long term performance of system operations function to the level required in the service level agreement; and (iv) upkeep or improve the user satisfaction level. 	
<p>Remark</p>	<ol style="list-style-type: none"> 1. System operations include, but are not limited to, <ul style="list-style-type: none"> a) IT system/server operations, b) network operations, c) voice and video conference services operations, and d) operations management 2. Examples of exceptional situations of system operations include, but are not limited to, system/server fault, system/server upgrade, system/server migration and crisis. 3. This UoCs comprises the operations management for the system operations function. 	

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

1. Title	Monitor and control the database operations services	
2. Code	ITSWOS517A	
3. Range	Monitor, control, coordinate changes, troubleshoot and support the database of a non-routine nature or beyond the coverage of existing procedure in the context of providing database operations services for an organisation [Operations and Support – Database Administration and Support]	
4. Level	5	
5. Credit	8	
6. Competency	<p>6.1 Understand the non-routine situations that are not covered by existing procedures in the operation and administration of databases</p> <p>6.2 Carry out activities to handle the non-routine situations that are not covered by existing procedures in the operation and administration of databases</p> <p>6.3 Perform the non-routine activities with a high degree of expertise and professionalism</p>	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify unusual, non-routine situations when monitoring, controlling, coordinating changes, supporting and trouble-shooting during the database's operation and administration ▪ identify the activities required to handle the non-routine situations for which existing procedures do not cover ▪ understand the performance requirements set out in the service level agreement, if any, of the organisation ▪ seek clarification from relevant people where necessary <p>Be able to</p> <ul style="list-style-type: none"> ▪ monitor the operations and capacity of databases and identify non-routine situations ▪ perform the necessary activities required to handle the non-routine situations for which existing procedures do not cover ▪ perform database technical support according to service level agreement ▪ seek approval from supervisors if necessary <p>Be able to</p> <ul style="list-style-type: none"> ▪ understand the potential risks of performing the non-routine activities, and consider the appropriate controls to minimize the risk ▪ perform non-routine activities in the most effective and efficient manner; meeting or exceeding the service level agreement, if any, of the organisation ▪ obtain approval from supervisors, where necessary, for the non-routine activities in a timely manner ▪ keep the disruption to the operation and administration of databases to the minimum
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to carry out the non-routine activities in the operation and administration of databases in an	

	organisation in the most effective and efficient manner while satisfying the service level agreement and with proper approval.
Remark	

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

1. Title	Establish and maintain system support services process	
2. Code	ITSWOS529A	
3. Range	Define, design, establish, develop and review the system support services process on servicing items related to system support services, and provide support resources with appropriate skills for servicing the related items in the context of providing system support services for an organisation (See Remark 1 for examples of items related to system support services) [Operations and Support – System Support Services]	
4. Level	5	
5. Credit	8	
6. Competency	<p>6.1 Have good technical knowledge of the system support services of the serving industry</p> <p>6.2 Have comprehensive knowledge in IT and its role in the performance and capacity management process of the serving industry</p> <p>6.3 Know the major activities in system support services and the resources required</p> <p>6.4 Define, design and develop the process for system support services</p> <p>6.5 Review the process for system support services</p> <p>6.6 Provide support resources with appropriate skills for the provision of system support services</p>	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ understand the support activities in system support services functions ▪ communicate the impacts of system support services functions to other technical support team members <p>Be able to</p> <ul style="list-style-type: none"> ▪ outline the major activities in system support services ▪ identify the resources required in each of these major activities in system support services <p>Be able to define, design and develop the process for servicing items related to system support services with technical advice based on operations and infrastructure knowledge</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ analyse the defined system support services process for its effectiveness and efficiency at regular intervals ▪ identify key factors that are crucial to the effectiveness and efficiency of the defined system support services process ▪ review the defined system support services and recommend new process for future improvements, if necessary <p>Be able to identify and allocate the resources required (including the appropriate skills) in each of these major activities in the defined system support services process according to the organisation's guidelines</p>

	6.7 Define, design, establish, develop and review the process for system support services in a professional manner	<p>Be able to define, design, establish, develop and review the system support services process of an organisation</p> <ul style="list-style-type: none"> ▪ based on industry best practices and standards as well as local and international standards, and ▪ in compliance with organisation's guidelines as well as any (local and international) laws and regulatory requirements, if applicable
7. Assessment Criteria	<p>The integrated outcome requirements of this UoCs are the abilities to:</p> <ul style="list-style-type: none"> (i) establish effective and efficient system support services process to satisfy the evolving demands of the business in a timely manner; (ii) review, evaluate and improve the system support services process based on recommendations made during previous executions of the process; and (iii) include enough resources with appropriate skills in the provision of system support services. 	
Remark	<p>1. Examples of items related to server support services include, but are not limited to, the following:</p> <ul style="list-style-type: none"> a) Hardware and software components such as server, network, voice, and video; b) Configuration items for version control via an application asset management such as application related documents (e.g. system / design / programme specifications, codes and operation documentations); and c) Items related to system management services such as the following: <ul style="list-style-type: none"> (i) System Monitoring and tuning; (ii) Service level measurement and reporting; (iii) Software packaging and software distribution; (iv) Configuration Management; (v) User administration and access control; (vi) Directory services support; (vii) Storage allocation and access control; (viii) Data backup and recovery; (ix) Remote Control; (x) Inventory Scan; and (xi) Security Control such as Virus Scan and removal. 	

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

1. Title	Deliver security services for operations	
2. Code	ITSWOS521A	
3. Range	Plan, implement, operate and administer security services for infrastructure environment in accordance with the current security policy and guidelines in the context of providing security management services for the IT operations of an organisation [Operations and Support – Security Management Services]	
4. Level	5	
5. Credit	3	
6. Competency		<u>Performance Requirement</u>
	6.1 Have knowledge about operating environment for security management	Be able to <ul style="list-style-type: none"> ▪ understand the security policy and guidelines from management ▪ recognise the importance of confidentiality, integrity and availability to business in security management processes
	6.2 Understand the purposes and practices of the security management process	Be able to <ul style="list-style-type: none"> ▪ state the primary need is to protect business information against potential risks ▪ adopt the principles of the security management process and its best practices
	6.3 Plan and implement security services for infrastructure environment	Be able to <ul style="list-style-type: none"> ▪ establish a set of practical and efficient policies and procedures to control and manage the security of the infrastructure environment ▪ define security management processes ▪ draw up a security control plan ▪ seek support from management to implement the security measures ▪ perform the construction of secure infrastructure environment
	6.4 Operate and administer security services for infrastructure environment	Be able to <ul style="list-style-type: none"> ▪ execute the security management process to protect an infrastructure ▪ monitor and operate the security system that controls infrastructure environment ▪ administer the security system according to established procedures
	6.5 Plan, implement, operate and administer security services for infrastructure professionally	Be able to exercise industry best practices and adhere to both local and international standards
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to plan, implement, operate and administer security services for infrastructure environment.	
Remark	<ol style="list-style-type: none"> 1. The participant is assumed to have a comprehensive knowledge in IT and its applications. 2. This UoCs comprises both planning and operating the security services for the infrastructure environment for the security management services of ITIL®. 	

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

1. Title	Define operational security protection processes	
2. Code	ITSWOS522A	
3. Range	Define process for security control to protect the system from security threats in accordance with security control policy in the context of providing security management services for the IT operations of an organisation [Operations and Support – Security Management Services]	
4. Level	5	
5. Credit	2	
6. Competency	<p>6.1 Understand security control requirements and types of security threats</p> <p>6.2 Define process to protect the infrastructure from security threats</p> <p>6.3 Monitor, investigate and perform corrective actions in accordance with security control policy</p> <p>6.4 Define process for security control in accordance with security control policy in a professional manner</p>	<p><u>Performance Requirement</u> Be able to</p> <ul style="list-style-type: none"> ▪ digest the security policy and guidelines from management ▪ comprehend the security control plan ▪ identify different types of security threats to business processes <p>Be able to</p> <ul style="list-style-type: none"> ▪ define process and measures to protect the infrastructure from security threats ▪ recommend the appropriate anti-virus software (signatures) and security patches <p>Be able to</p> <ul style="list-style-type: none"> ▪ monitor alerts and reported exceptions ▪ investigate the alerts to determine the root cause ▪ carry out corrective actions in accordance with security control policy <p>Be able to</p> <ul style="list-style-type: none"> ▪ locate reliable support sources with current information on security threats for collaboration and mutual support ▪ exercise industry best practices and adhere to industry standards as well as local and international standards ▪ comply with organisation's guidelines and procedures as well as any (local and international) laws and regulatory requirements, if applicable
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) define process to protect the infrastructure from security threats; and (ii) monitor, investigate and perform corrective actions in accordance with security control policy.	
Remark	<ol style="list-style-type: none"> 1. Examples of security threats include, but are not limited to, virus attacks, unauthorised intrusion and security breach. 2. The participant is assumed to have a comprehensive knowledge in IT and its applications. 3. This UoCs comprises both planning and operating security services for the infrastructure environment for the security management services of ITIL®. 	

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

1. Title	Conduct operation security risk assessment and audit	
2. Code	ITSWOS530A	
3. Range	Perform regular security risk assessment and internal security audit for the operations and implement the recommendations based on result of security risk assessment and audit in the context of providing security management services for the IT operations of an organisation [Operations and Support – Security Management Services]	
4. Level	5	
5. Credit	2	
6. Competency		<u>Performance Requirement</u>
	6.1 Know corporate security requirements and business processes	Be able to <ul style="list-style-type: none"> ▪ comprehend the given security control plan ▪ demonstrate understanding on user administration and system administration processes
	6.2 Plan for risk assessment and security audit	Be able to <ul style="list-style-type: none"> ▪ observe schedule requirements on security risk assessment and internal security audit ▪ communicate with target operating units and agree with them on the schedule
	6.3 Perform regular security risk assessment and internal security audit	Be able to <ul style="list-style-type: none"> ▪ identify and classify the risk affecting the security environment ▪ perform regular security risk assessment ▪ perform regular internal security audit to ensure compliance to established guidelines and procedures ▪ recommend follow up actions to tighten security control
	6.4 Implement the recommendations based on result of security risk assessment and audit	Be able to <ul style="list-style-type: none"> ▪ assess the cost, benefit and effectiveness of the recommendations ▪ seek endorsement from management on the recommendations ▪ implement the recommendations
	6.5 Perform regular security risk assessment and internal security audit and implement the recommendations based on result of security risk assessment and audit in a professional manner	Be able to <ul style="list-style-type: none"> ▪ minimize disturbance to target operating units when conducting risk assessment and internal audit ▪ comply with organisation's guidelines and procedures as well as any (local and international) laws and regulatory requirements, if applicable
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) perform regular security risk assessment and internal security audit; and (ii) implement the recommendations based on the results of security risk assessment and audit.	
Remark	1. The participant is assumed to have comprehensive knowledge in IT and its applications. 2. This UoCs comprises both planning and operating the security for infrastructure environment for the security management services of ITIL®.	

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

1. Title	Manage the highest severity incident request
2. Code	ITSWOS601A
3. Range	Manage or co-manage the highest severity incident and critical situation with responsibility to trigger the IT fallback plan or give advice to business unit manager to invoke business continuity plan in the context of providing Help Desk services in an organisation or for a client [Operations and Support – Help Desk Service]
4. Level	6
5. Credit	3
6. Competency	<p style="text-align: right;"><u>Performance Requirement</u></p> <p>6.1 Understand the business implication of the IT systems</p> <ul style="list-style-type: none"> ▪ Be able to <ul style="list-style-type: none"> ▪ understand the role of IT in the major business processes of the serving organisation ▪ understand the business impact of the IT problems to effectively communicate with the end users <p>6.2 Coordinate, monitor and control the highest severity incident</p> <ul style="list-style-type: none"> ▪ Be able to <ul style="list-style-type: none"> ▪ monitor and control the highest severity incident ▪ coordinate with the relevant business unit managers, IT support party managers and the problem management process owner to ensure the incident is recovered with minimum disruption to users ▪ communicate with IT and business unit management on the implication of the incident and advise on the necessary invoking of corresponding business continuity plan <p>6.3 Manage the highest severity incident in a professional manner</p> <ul style="list-style-type: none"> ▪ Be able to perform the following tasks according to the organisation's guidelines as well as any (local and international) laws and regulatory requirements, if applicable <ul style="list-style-type: none"> ▪ coordinate, monitor, and control the highest severity incident ▪ review the incident and suggest future improvements ▪ effectively communicate with end users on the business impact of the incident ▪ effectively communicate with technical personnel to resolve the incident to the level as agreed in the service level agreement
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) communicate and jointly devise mitigation and remedial actions with the business unit and IT managers during a major incident; and (ii) upkeep or improve the medium and long term performance of incident management process to the level agreed in the service level agreement.
Remark	This UoCs comprises the highest severity level incident management for the Incident Management process of ITIL®.

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

1. Title	Manage exceptional problems
2. Code	ITSWOS603A
3. Range	Manage the chronic, repetitive, high impact or cross platform problems in the context of providing Problem Management services for an organisation [Operations and Support – Problem Management Service]
4. Level	6
5. Credit	2
6. Competency	<p style="text-align: center;"><u>Performance Requirement</u></p> <p>6.1 Understand the business implication of the IT systems</p> <p style="margin-left: 40px;">Be able to</p> <ul style="list-style-type: none"> ▪ understand the role of IT in the major business processes of the serving organisation ▪ understand the business impact of the IT problems <p>6.2 Understand the IT infrastructure, system function and the inter-relationship of the IT systems</p> <p style="margin-left: 40px;">Be able to</p> <ul style="list-style-type: none"> ▪ show good understanding of the IT infrastructure, system function and the inter-relationship of the IT systems ▪ demonstrate good understanding of the system characteristics and historical performance ▪ express good knowledge about the problem trend analysis methodology <p>6.3 Lead, monitor and control chronic, repetitive, high impact or cross platform problems</p> <p style="margin-left: 40px;">Be able to</p> <ul style="list-style-type: none"> ▪ monitor and control chronic, repetitive high impact or cross platform problems ▪ lead the problem management meetings and facilitate the support parties to ensure the problem root cause is identified and corrective actions are implemented <p>6.4 Review problems for future improvement</p> <p style="margin-left: 40px;">Be able to</p> <ul style="list-style-type: none"> ▪ coordinate and facilitate the post-mortem problem review to suggest preventive actions in case of recurrence ▪ propose change to the IT infrastructure, systems or process to improve availability or minimize the problem impact <p>6.5 Manage chronic, repetitive, high impact or cross platform problems in a professional manner</p> <p style="margin-left: 40px;">Be able to</p> <ul style="list-style-type: none"> ▪ manage the problems in an efficient and effective manner ▪ manage the problems in accordance with organisation's guidelines as well as any (local and international) laws and regulatory requirements, if applicable
7. Assessment Criteria	<p>The integrated outcome requirements of this UoCs are the abilities to:</p> <ul style="list-style-type: none"> (i) understand the role of IT and its outage implication in the major business processes of the serving organisation; (ii) express good knowledgeably about IT infrastructure, system function and the inter-relationship of the IT systems; (iii) lead and facilitate the support parties to identify the chronic, repetitive, high impact or cross platform problems; and (iv) propose change to the IT infrastructure, systems or process to improve availability or minimize the problem impact.

Remark	<ol style="list-style-type: none">1. The participant is assumed to have general business knowledge of the serving industry.2. The participant is assumed to have a comprehensive knowledge in IT and its role in the business process of the serving industry.3. This UoCs comprises the Problem Management Manager for the Problem Management process of ITIL®.
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**Information and Communications Technology Industry Training Advisory Committee
Software Products and Software Services (SW) branch
Unit of Competencies**

1. Title	Manage the emergency change request	
2. Code	ITSWOS605A	
3. Range	Manage the emergency change request in the context of performing change management service request in an organisation or for a client [Operations and Support – Change Management Services]	
4. Level	6	
5. Credit	2	
6. Competency	<p>6.1 Know the structure and responsibilities of the Emergency Change Advisory Board (ECAB)</p> <p>6.2 Know IT and its applications</p> <p>6.3 Log and filter the submitted emergency change request</p> <p>6.4 Convene, chair and run the ECAB on the emergency change request</p> <p>6.5 Monitor and review the implementation of the approved emergency change request</p> <p>6.6 Manage the emergency change request in a professional manner</p>	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ understand the roles and responsibilities of the Emergency CAB for convening its meetings ▪ convene, chair and run the ECAB <p>Be able to determine whether a emergency change request should be submitted to ECAB</p> <p>Be able to log, filter and decide whether to reject or recommend the submitted an emergency change request to ECAB for approval</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ make recommendation about the emergency change request to ECAB ▪ convene, chair and run the ECAB ▪ lead the ECAB to decide whether to accept or reject a submitted emergency change request <p>Be able to</p> <ul style="list-style-type: none"> ▪ monitor the implementation of the approved emergency change request to ensure the request can be performed within the level agreed on the service level agreement ▪ review the implementation of the approved emergency change request for future improvements <p>Be able to</p> <ul style="list-style-type: none"> ▪ manage any emergency change request in accordance with organisation's guidelines and procedures as well as any (local and international) laws and regulatory requirements, if applicable ▪ effectively communicate with stakeholders to gain their support for performing the emergency change request
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) properly handle the emergency change request; (ii) effectively communicate with stakeholders to gain their support for	

	performing the emergency change request; and (iii) effectively monitor and critically review the implementation of the approved emergency change request for future improvements.
Remark	This UoCs comprises the Emergency Change Manager competency requirement as stipulated in the change management process of ITIL®.

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

1. Title	Establish and maintain the performance and capacity management processes	
2. Code	ITSWOS609A	
3. Range	Define, design, establish, develop and review the processes of performance and capacity management services in the context of providing performance and capacity management services in an organisation or for a client [Operations and Support – Performance and Capacity Management Services]	
4. Level	6	
5. Credit	4	
6. Competency	<p>6.1 Have general technical knowledge of the IT services and the supporting infrastructure of the serving industry</p> <p>6.2 Have comprehensive knowledge in IT and its role in the performance and capacity management process of the serving industry</p> <p>6.3 Outline the major activities in performance and capacity management and ensure their outputs meet the needs of business, service and resource capacity management</p>	<p><u>Performance Requirement</u> Be able to ensure the capacity of the IT infrastructure matches the evolving demands of the business in the most cost-effective and timely manner. This encompasses</p> <ul style="list-style-type: none"> ▪ monitoring of performance and throughput of IT services and the supporting infrastructure components ▪ undertaking tuning activities to make the most efficient use of existing resources ▪ understanding the demands currently being made for IT resources and being forecasted for future requirements ▪ influencing the demand for resources, perhaps in conjunction with Financial Management ▪ the production of a capacity plan which enables the IT Service provider to provide services of the quality defined in service level agreements (SLAs) <p>Be able to</p> <ul style="list-style-type: none"> ▪ monitor, collect, analyse, tune, implement and control a performance and capacity request ▪ produce a capacity plan that documents the current levels of resource utilization and service performance, and after consideration of the business strategy and plans, forecasts the future requirements for resources to support the IT services that underpin the business activities

	<p>6.4 Understand the relationship among business, service and resource capacity management</p>	<p>Be able to</p> <ul style="list-style-type: none"> ▪ balance cost against capacity and supply against demand ▪ understand the business requirements, the organisation's operation and IT infrastructure ▪ ensure that all the current and future capacity and performance aspects of the business requirements are provided cost-effectively ▪ recognise the rate of technological change will probably increase and new technology should be harnessed to ensure that the IT services continue to satisfy changing business expectations
	<p>6.5 Define the goal and scope of performance and capacity management services for the organisation of the serving industry</p>	<p>Be able to</p> <ul style="list-style-type: none"> ▪ establish and publish a Capacity Plan at pre-defined intervals to reflect the changing business need for budgetary cycle ▪ define roles and responsibilities of the activities involved in Performance and capacity management ▪ summarize the recommendations made in the previous plan and their status and new recommendations
	<p>6.6 Liaise with all aspects of Service Delivery and Service Support for all operational performance and capacity issues</p>	<p>Be able to</p> <ul style="list-style-type: none"> • ensure that the future business requirements for IT services are considered, planned and implemented in a timely fashion and in accordance with the organisation's business strategy and plans and financial plans • ensure that the performances and targets of the SLAs of all services are monitored, measured, analysed and reported and meeting business requirements
	<p>6.7 Review, evaluate and improve the performance and capacity management process</p>	<p>Be able to</p> <ul style="list-style-type: none"> ▪ manage and analyse effectiveness and efficiency at regular intervals ▪ set Key Performance Indicators (KPIs) to review and evaluate the progress of a performance and capacity management process ▪ devise plans or review process for future improvement, if necessary

	6.8 Design, establish, develop and review the performance and capacity management process in a professional manner	<p>Be able to design, establish, develop and review the performance and capacity management process of an organisation</p> <ul style="list-style-type: none"> ▪ based on industry best practices and standards as well as local and international standards, and ▪ in compliance with organisation's guidelines as well as any (local and international) laws and regulatory requirements, if applicable
7. Assessment Criteria	<p>The integrated outcome requirements of this UoCs are the abilities to:</p> <p>(i) establish performance and capacity management goals, objectives, process and capacity plan to ensure that the capacity of the IT infrastructure matches the evolving demands of the business in the most cost-effective and timely manner; and</p> <p>(ii) review, evaluate and improve the performance and capacity management goals, objectives, process and capacity plan based on the recommendations made in the previous plan during the execution of the performance and capacity management process.</p>	
Remark	<p>This UoCs comprises the Performance and Capacity Management Process Owner for the capacity management process function of ITIL®.</p>	

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

1. Title	Establish and maintain configuration management process
2. Code	ITSWOS610A
3. Range	Define, design, establish, develop and review the processes for configuration management services in the context of providing configuration management services for an organisation (See Remark 1 for examples of configuration management services) [Operations and Support – Configuration Management Services]
4. Level	6
5. Credit	2
6. Competency	<p style="text-align: center;"><u>Performance Requirement</u></p> <p>6.1 Comprehend asset administration process Be able to</p> <ul style="list-style-type: none"> ▪ understand asset administration process ▪ define procurement, tagging, tracking, disposal and keeping of license records <p>6.2 Define and implement processes for IT asset management services Be able to</p> <ul style="list-style-type: none"> ▪ define process and implement the IT asset management process ▪ define process for installing and distributing software ▪ define hardware (H/W) and software (S/W) inventory and configuration standards <p>6.3 Design, establish, develop and review processes for configuration management services Be able to</p> <ul style="list-style-type: none"> ▪ define, design, establish and develop the configuration management services policy, guidelines and procedures according to the IT service support strategy and plan in the organisation ▪ review the configuration management services policy, guidelines and procedures to meet the current business requirements and IT technology capability according to organisational policy ▪ inform and communicate the policy, guidelines and procedures to concerned parties according to organisational guidelines
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to define, design, establish and develop processes for configuration management services.
Remark	<ol style="list-style-type: none"> 1. Examples of configuration management services include, but not limited to, software installation as well as asset management services related, but not limited, to procurement, tagging, tracking, disposal and keeping of license records. 2. The participant is assumed to have a comprehensive knowledge in IT and its applications. 3. This UoCs comprises the competency requirement to define, design, establish and develop processes for configuration management services.

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

1. Title	Perform disaster impact assessment and mitigation	
2. Code	ITSWOS611A	
3. Range	Assess disaster impacts, and define processes and procedures to mitigate such risks in the context of IT service continuity and disaster recovery for an organisation [Operations and Support – IT Service Continuity Management]	
4. Level	6	
5. Credit	3	
6. Competency	<p>6.1 Understand purposes and practices of IT service continuity and disaster recovery</p> <p>6.2 Assess disaster impacts</p> <p>6.3 Define processes and procedures to mitigate such risks</p> <p>6.4 Perform different risk mitigation measures</p> <p>6.5 Assess disaster impacts, and define processes and procedures to mitigate such risks in a professional manner</p>	<p>Performance Requirement Be able to adopt the principles of and adapt best practices for IT service continuity and disaster recovery process for an organisation</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify and classify the critical business functions ▪ identify and classify the different disaster scenarios that can impact the critical business processes <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify risks to particular IT service components that support the mission critical business processes ▪ assess the probability that certain threat or vulnerability will occur and the extent an organisation will be affected by the threat or vulnerability ▪ assess the level of risk in terms of the associated threat and vulnerability ▪ adopt a balanced approach of risk mitigation and recovery <p>Be able to</p> <ul style="list-style-type: none"> ▪ implement a comprehensive backup and recovery process, including off-site storage ▪ eliminate single points of failure ▪ implement stringent physical security controls <p>Be able to</p> <ul style="list-style-type: none"> ▪ exercise industry best practices and adhere to industry standards as well as local and international standards ▪ comply with organisation's guidelines and procedures as well as any (local and international) laws and regulatory requirements, if applicable
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) assess disaster impacts to business; and (ii) define processes and procedures to mitigate such risks.	
Remark	<ol style="list-style-type: none"> 1. The participant is assumed to have a comprehensive knowledge in IT and its applications. 2. This UoCs comprises both business impact assessment and process definition requirement for the IT Service Continuity Management of ITIL®. 	

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

1. Title	Establish and maintain the service level management process	
2. Code	ITSWOS612A	
3. Range	Define, design, establish, develop and review the processes for service level management (SLM) in the context of performing service level management services for an organisation [Operations and Support – Service Level Management]	
4. Level	6	
5. Credit	3	
6. Competency	<p>6.1 Understand current service level management operating environment</p> <p>6.2 Define, design, establish and maintain the SLM processes</p> <p>6.3 Plan, design, develop and establish the SLM tools</p> <p>6.4 Communicate with customers and suppliers on current developments in SLM</p> <p>6.5 Manage the SLM processes in a professional manner</p>	<p><u>Performance Requirement</u> Be able to be conversant with the following items associated with SLM</p> <ul style="list-style-type: none"> ▪ the customers and suppliers ▪ the current processes and procedures ▪ the supporting infrastructure <p>Be able to</p> <ul style="list-style-type: none"> ▪ understand and communicate the benefits of SLM processes ▪ estimate the costs associated with implementing and executing SLM ▪ identify the risks inherent to the implementation of SLM ▪ define the roles, tasks and responsibilities involved in the SLM processes ▪ quantify activities, resources, funding and quality criteria ▪ determine Key Performance Indicators (KPIs) and metrics to judge the efficiency and effectiveness of the SLM processes and functions <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify support tools, particularly for service level agreement (SLA) monitoring ▪ produce a service catalogue which should list all of the services being provided, a summary of their characteristics and details of the customers and maintainers of each ▪ plan the most appropriate SLA structure to ensure that all services and all customers are covered in a manner best suited to the organisation's needs <p>Be able to notify and discuss with related customers and suppliers on potential changes to processes for improvement in effectiveness and efficiency in service level management</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ design, establish, develop and review the SLM process in accordance with organisation's guidelines as well as any (local and international) laws and regulatory requirements, if applicable

	<ul style="list-style-type: none"> ▪ continuously and proactively improve on the SLM processes
7. Assessment Criteria	<p>The integrated outcome requirements of this UoCs are the abilities to:</p> <ul style="list-style-type: none"> (i) develop, implement and improve the delivery and support processes, working methods and tools; (ii) communicate with customers and support parties to ensure improvement requests or initiatives are taken care of; and (iii) liaise with other support functions.
Remark	

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

1. Title	Manage exceptional database operations process	
2. Code	ITSWOS615A	
3. Range	Manage the database operations, administration and support services in exceptional situations (such as database fault, upgrade, migration or crisis) and the corresponding recovery action in the context of providing database operations services for an organisation [Operations and Support – Database Administration and Support]	
4. Level	6	
5. Credit	8	
6. Competency	<p>6.1 Understand the management of databases in exceptional situations</p> <p>6.2 Manage the recovery actions for databases in exceptional situations</p> <p>6.3 Manage the performance of recovery actions for databases with a high degree of expertise and professionalism</p>	<p><u>Performance Requirement</u> Be able to</p> <ul style="list-style-type: none"> ▪ identify the exceptional situations, e.g. database fault, data corruption, slow response time etc. when managing the operation and administration of databases (upgrade and migration are not exceptions), and the corresponding recovery actions required to handle the exceptional situations ▪ understand the performance requirements set out in the service level agreement, if any, of the organisation ▪ seek clarification from relevant people where necessary <p>Be able to</p> <ul style="list-style-type: none"> ▪ monitor the database operations and identify any exceptional situations ▪ carry out or manage the execution of the necessary recovery actions to handle the exceptional situations in the operation, administration and support services of the databases ▪ seek endorsement from stakeholders if necessary <p>Be able to</p> <ul style="list-style-type: none"> ▪ recover the databases from exceptional situations in the most effective and efficient manner, meeting or exceeding the service level agreement, if any, of the organisation ▪ obtain endorsement from stakeholders, where necessary, for the recovery actions in a timely manner ▪ keep the disruption to the operation, administration and support services of databases to the minimum
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to perform the recovery actions in the operation, administration and support services of databases in an organisation in the most effective and efficient manner, while satisfying the service level agreement and with proper endorsement from stakeholders.	
Remark		

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

1. Title	Establish and maintain database operations process	
2. Code	ITSWOS616A	
3. Range	Design, evaluate, establish, develop and review the database operations, administration and support function in the context of providing database operations services for an organisation [Operations and Support – Database Administration and Support]	
4. Level	6	
5. Credit	14	
6. Competency	<p>6.1 Have knowledge of the requirements of database operations, administration and support functions</p> <p>6.2 Design, develop and establish database operations, administration and support functions</p> <p>6.3 Evaluate and review database operations, administration and support functions</p> <p>6.4 Manage database operations, administration and support functions with a high degree of expertise and professionalism</p>	<p><u>Performance Requirement</u> Be able to</p> <ul style="list-style-type: none"> ▪ identify the processes necessary for database operations, administration and support functions ▪ identify the relevant stakeholders and their needs <p>(See Remark 1 for examples of the required processes)</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ specify and/or manage the specification of the processes necessary for database operations, administration and support functions, in accordance with standard guidelines of the organisation ▪ coordinate the development of these processes, taking into consideration the needs of stakeholders ▪ obtain endorsement from stakeholders where appropriate <p>Be able to</p> <ul style="list-style-type: none"> ▪ compare the effectiveness of the processes for database operations, administration and support functions with the organisation's requirements, and decide whether any modification to the processes is required ▪ make changes to existing processes if necessary ▪ obtain endorsement from stakeholders where appropriate <p>Be able to</p> <ul style="list-style-type: none"> ▪ manage the performance of processes for database operations, administration and support functions in the most effective and efficient manner ▪ proactively enhance the processes on an on-going basis to improve performances of database operations, administration and support functions ▪ provide periodic updates of performance statistics to stakeholders
7. Assessment Criteria	The integrated outcome UoCs requirements of this UoCs are the abilities to design and manage the database operations, administration and support	

	functions to achieve a high level of performance standards.
Remark	<ol style="list-style-type: none"> 1. Examples of the processes for database operations, administration and support functions include, but are not limited to, <ol style="list-style-type: none"> a) Batch maintenance operations; b) Configuration management; c) Security management d) Capacity management, including data storage management such as defining, classifying, storing and restoring, data storage projection, and recovering data according to data retention policy; e) Upgrades; f) Problem diagnostics; g) Fixing application; h) Performance tuning such as SQL tuning; i) Schema management; j) Data integrity management; and k) Vendor management, especially for multi-vendor environment.

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

1. Title	Manage the complex system support services		
2. Code	ITSWOS617A		
3. Range	Evaluate and recommend the highest level support for the complex, heterogeneous products and solutions that enhance productivity in the context of providing system support services for an organisation (See Remark 1 for examples of items related to system support services) [Operations and Support – System Support Services]		
4. Level	6		
5. Credit	7		
6. Competency	<table border="0" style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> <p>6.1 Have mastery level technical knowledge of the system support services in the serving industry</p> <p>6.2 Have comprehensive knowledge in IT and its role in the operation and support management process of the serving industry</p> <p>6.3 Know the system support services process and the required support</p> <p>6.4 Establish and review the highest level support activities in system support services</p> <p>6.5 Evaluate and recommend the highest level support in a professional manner</p> </td> <td style="width: 50%; vertical-align: top;"> <p><u>Performance Requirement</u> Be able to</p> <ul style="list-style-type: none"> ▪ understand the systems' internal operation and its integration with other external systems, use of appropriate technical tool to get the technical information for analysis or diagnosis ▪ provide technical consultancy advice on the system conditions and recommended solutions to other support parties <p>Be able to identify the required level of support that are crucial to the effective and efficient execution of the defined system support services process</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ establish the support framework, tools and knowledge positioning for the highest level support for the complex, heterogeneous products and solutions in system support services ▪ review the required highest level support activities to meet the changes in the technical environment <p>Be able to</p> <ul style="list-style-type: none"> ▪ effectively and efficiently perform the highest level support function across the heterogeneous systems in meeting or exceeding the service level agreement of the organisation, if any ▪ give expert level technical and consultancy advice on the supported system performance, system integration and solutions to the system problems </td> </tr> </table>	<p>6.1 Have mastery level technical knowledge of the system support services in the serving industry</p> <p>6.2 Have comprehensive knowledge in IT and its role in the operation and support management process of the serving industry</p> <p>6.3 Know the system support services process and the required support</p> <p>6.4 Establish and review the highest level support activities in system support services</p> <p>6.5 Evaluate and recommend the highest level support in a professional manner</p>	<p><u>Performance Requirement</u> Be able to</p> <ul style="list-style-type: none"> ▪ understand the systems' internal operation and its integration with other external systems, use of appropriate technical tool to get the technical information for analysis or diagnosis ▪ provide technical consultancy advice on the system conditions and recommended solutions to other support parties <p>Be able to identify the required level of support that are crucial to the effective and efficient execution of the defined system support services process</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ establish the support framework, tools and knowledge positioning for the highest level support for the complex, heterogeneous products and solutions in system support services ▪ review the required highest level support activities to meet the changes in the technical environment <p>Be able to</p> <ul style="list-style-type: none"> ▪ effectively and efficiently perform the highest level support function across the heterogeneous systems in meeting or exceeding the service level agreement of the organisation, if any ▪ give expert level technical and consultancy advice on the supported system performance, system integration and solutions to the system problems
<p>6.1 Have mastery level technical knowledge of the system support services in the serving industry</p> <p>6.2 Have comprehensive knowledge in IT and its role in the operation and support management process of the serving industry</p> <p>6.3 Know the system support services process and the required support</p> <p>6.4 Establish and review the highest level support activities in system support services</p> <p>6.5 Evaluate and recommend the highest level support in a professional manner</p>	<p><u>Performance Requirement</u> Be able to</p> <ul style="list-style-type: none"> ▪ understand the systems' internal operation and its integration with other external systems, use of appropriate technical tool to get the technical information for analysis or diagnosis ▪ provide technical consultancy advice on the system conditions and recommended solutions to other support parties <p>Be able to identify the required level of support that are crucial to the effective and efficient execution of the defined system support services process</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ establish the support framework, tools and knowledge positioning for the highest level support for the complex, heterogeneous products and solutions in system support services ▪ review the required highest level support activities to meet the changes in the technical environment <p>Be able to</p> <ul style="list-style-type: none"> ▪ effectively and efficiently perform the highest level support function across the heterogeneous systems in meeting or exceeding the service level agreement of the organisation, if any ▪ give expert level technical and consultancy advice on the supported system performance, system integration and solutions to the system problems 		
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to perform and give consultancy advice on the highest level support for the complex, heterogeneous products and solutions that enhance productivity in system support services.		
Remark	1. Examples of items related to server support services include, but are not limited to, the following: a) Hardware and software components such as server, network, voice,		

	<p>and video;</p> <ul style="list-style-type: none">b) Configuration items for version control via application asset management such as application related documents (e.g. system / design / programme specifications, codes and operation documentations); andc) Items related to system management services such as the following:<ul style="list-style-type: none">(i) System Monitoring and tuning;(ii) Service level measurement and reporting;(iii) Software packaging and software distribution;(iv) Configuration Management;(v) User administration and access control;(vi) Directory services support;(vii) Storage allocation and access control;(viii) Data backup and recovery;(ix) Remote Control;(x) Inventory Scan; and(xi) Security Control such as Virus Scan and removal.
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**Information and Communications Technology Industry Training Advisory Committee
Software Products and Software Services (SW) branch
Unit of Competencies**

1. Title	Conduct security investigation	
2. Code	ITSWOS619A	
3. Range	Investigate security incidents to identify any security loopholes / breaches and make recommendations for improvement in the context of providing security management services for the IT operations of an organisation [Operations and Support – Security Management Services]	
4. Level	6	
5. Credit	2	
6. Competency	<p>6.1 Familiarise with corporate security issues</p> <p>6.2 Investigate security incidents to identify any security loopholes/breaches</p> <p>6.3 Make recommendations for improvement</p> <p>6.4 Investigate security incidents to identify any security loopholes/breaches and make recommendations for improvement in a professional manner</p>	<p>Performance Requirement Be able to be conversant with corporate security issues such as</p> <ul style="list-style-type: none"> ▪ security policy and guidelines ▪ security control plan and policy ▪ risk assessment and internal audit processes ▪ routine security check procedures and schedule ▪ distribution of security control documents ▪ procedure to report and contain security threats <p>Be able to</p> <ul style="list-style-type: none"> ▪ monitor and control the day-to-day security checking ▪ investigate security incidents to identify any security loopholes/ breaches ▪ make recommendations for improvement <p>Be able to</p> <ul style="list-style-type: none"> ▪ assess the cost, benefit and effectiveness of the recommendations ▪ implement the recommendations <p>Be able to</p> <ul style="list-style-type: none"> ▪ exercise industry best practices and adhere to both local and international standards ▪ comply with organisation's guidelines and procedures as well as any (local and international) laws and regulatory requirements, if applicable
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) investigate security incidents to identify any security loopholes/breaches; and (ii) make recommendations for improvement.	
Remark	<p>1. The participant is assumed to have comprehensive knowledge in IT and its applications.</p> <p>2. This UoCs comprises both planning and operating security services for infrastructure environment for the security management services of ITIL®.</p>	

Appendix D.7 UoCs in Quality Assurance

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

1. Title	Perform quality assurance (QA) activities on a software product (See Remark 1 for the meaning of "software product".)	
2. Code	ITSWQA401A	
3. Range	Perform QA activities on a software product according to its defined QA plan to assure its quality [Quality Assurance – Product Level QA]	
4. Level	4	
5. Credit	2	
6. Competency	<p>6.1 Know various QA activities for software product</p> <p>6.2 Know how to relate the defined QA plan with implied conditions</p> <p>6.3 Perform product related QA activities</p> <p>6.4 Perform Quality Monitoring and Feedback</p>	<p><u>Performance Requirement</u> Be able to understand the interrelationship of various QA activities for software product</p> <p>See Remark 2 for some examples of software project QA activities</p> <p>Be able to link up implied conditions, such as compliance reviews, reporting and improvement and recommendations, as part of any QA plan even though they are not explicitly specified</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ perform various QA activities related to the software product as specified in its QA plan ▪ evaluate and report QA process evaluation outcomes of the software product ▪ report on non-compliances from review and audit activities ▪ formulate corrective actions (CAs) for the non-compliances that are in agreement with the product QA plan ▪ identify the concerned parties and stakeholders related to any non-compliances ▪ verify the completion of CAs by checking whether the corresponding QA requirements in the product QA plan have been satisfied <p>Be able to</p> <ul style="list-style-type: none"> ▪ apply suitable tools and techniques for quality analysis & reporting (See Remark 3 for examples of these techniques) ▪ monitor process adjustments with reference to exception reports and recommendations to ensure quality improvement ▪ identify, recommend and document lessons learnt as well as corrective actions, if any, so as to improve the effectiveness and efficiency of the QA activities ▪ perform regular management reporting <ul style="list-style-type: none"> ➢ on the product QA activities and results ➢ from QA's perspective on the product's compliance with standards and processes

	<p>6.5 Perform QA activities in a professional manner</p> <p>Be able to perform QA activities as well as Quality Monitoring and Feedback on a software product</p> <ul style="list-style-type: none"> ▪ in an efficient and effective manner ▪ in accordance with the defined QA plan, industry best practices, organisation's policies and procedures, any (local and international) laws and regulatory requirements, if applicable ▪ with endorsement from stakeholders
<p>7. Assessment Criteria</p>	<p>The integrated outcome requirements of this UoCs are the abilities to:</p> <p>(i) perform various QA activities; and</p> <p>(ii) perform Quality Monitoring and Feedback on a software product as defined in its QA plan so as to assure the quality of the product.</p>
<p>Remark</p>	<ol style="list-style-type: none"> 1. Within this UoCs, "software product" takes a boarder meaning of software project, software product, and software services. 2. Examples of software project QA activities include, but are not limited to, compliance reviews, reporting, and improvement recommendations. 3. Examples of tools and techniques for software project quality analysis and reporting include, but are not limited to, Pareto analysis, cause/effect diagrams, trend analysis, and statistical sampling.

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

1. Title	Evaluate the quality of a software product (See Remark 1 for the meaning of “software product”.)	
2. Code	ITSWQA402A	
3. Range	Perform objective evaluation of the quality of a software product throughout the product development life cycle within the context of product level QA (See Remark 2 for the meaning of product development life cycle) [Quality Assurance – Product Level QA]	
4. Level	4	
5. Credit	2	
6. Competency	<p>6.1 Know how to evaluate the quality of various software artefacts</p> <p>6.2 Summarize product quality issues and lessons learned</p> <p>6.3 Conduct casual and trend analysis to drive quality process improvement</p> <p>6.4 Perform objective evaluation of a software product in a professional manner</p>	<p><u>Performance Requirement</u> Be able to</p> <ul style="list-style-type: none"> ▪ understand the evaluation criteria for the quality of various software artefacts based on the defined software product QA plan ▪ understand the tools and techniques available to assist in the evaluation <p>See Remark 3 for examples of software artefacts in a software product</p> <p>Be able to objectively summarize quality issues and lessons learnt of a software product throughout its entire product development period based on the defined software product QA plan</p> <p>See Remark 4 for examples of software project quality issues and lessons learned</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ select and utilize suitable tools and techniques for the analysis ▪ conduct casual and trend analysis with the help of suitable tools and techniques to drive quality process improvement <p>See Remark 5 for examples of tools and techniques for the analysis</p> <p>Be able to perform objective evaluation of a software product based on the defined software QA plan</p> <ul style="list-style-type: none"> ▪ in an efficient and effective manner ▪ in accordance with industry best practices, organisation’s policies and guidelines as well as any (local and international) laws and regulatory requirements, where applicable ▪ with endorsement from stakeholders
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) evaluate of the quality of a software product objectively; and (ii) provide adequate recommendations throughout the product development life cycle to drive quality process improvement based on the defined software QA plan.	
Remark	1. Within this UoCs, “software product” takes a boarder meaning of software project, software product, and software services.	

	<ol style="list-style-type: none">2. Within this UoCs, “product development life cycle” may include various activities of software services as well as the life cycle of a software project.3. Examples of software artefacts include, but are not limited to, programme source and software documents such as software requirements specification and software design documents.4. Examples of software project quality issues and lesson learnt include, but are not limited to, the causes of activities leading to quality changes, types of quality changes, reasons for selecting specific corrective actions, and classification of quality change causes for further analysis.5. Examples of tools and techniques for casual and trend analysis include, but are not limited to, Pareto analysis, cause/effect diagrams, and statistical sampling.
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**Information and Communications Technology Industry Training Advisory Committee
Software Products and Software Services (SW) branch
Unit of Competencies**

1. Title	Implement quality assurance (QA) policies and procedures		
2. Code	ITSWQA501A		
3. Range	Implement QA policies and procedures of an organisation to govern all its QA activities [Quality Assurance – Organisational Level QA]		
4. Level	5		
5. Credit	4		
6. Competency	<table border="0" style="width: 100%;"> <tr> <td style="width: 30%; vertical-align: top;"> <p>6.1 Understand the requirements of a QA implementation plan</p> <p>6.2 Execute the organisational level QA plans</p> <p>6.3 Review the execution of the organisational QA plans</p> <p>6.4 Implement QA policies and procedures in a professional manner</p> </td> <td style="vertical-align: top;"> <p style="text-align: center;"><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ know what is required to perform the execution of approved QA strategies and plans including checkpoints for audit ▪ understand organisational level QA strategies, policies and procedures <p>Be able to</p> <ul style="list-style-type: none"> ▪ develop the organisational level QA plans based on the approved QA strategies ▪ execute the defined QA strategies and plans in accordance with the organisation’s QA policies and procedures ▪ manage QA activities by checking whether the QA strategies and plans are being followed by individual teams during the development of software products and the provision of software services ▪ support measurement programmes at corporate, organisational QA, and product level QA ▪ provide training for QA activities <p>Be able to</p> <ul style="list-style-type: none"> ▪ review QA activities for individual software products/services against the following aspects of the organisational QA strategies <ul style="list-style-type: none"> ➢ Effectiveness ➢ Efficiency ➢ Value ▪ evaluate the effectiveness of each execution <p>Be able to</p> <ul style="list-style-type: none"> ▪ implement QA policies and procedures in an efficient and effective manner ▪ implement QA policies and procedures in accordance with organisation’s policies and procedures as well as local and international laws and regulatory requirements ▪ propose and revise QA strategies, policies, and procedures for continuous improvements ▪ obtain endorsement from stakeholders </td> </tr> </table>	<p>6.1 Understand the requirements of a QA implementation plan</p> <p>6.2 Execute the organisational level QA plans</p> <p>6.3 Review the execution of the organisational QA plans</p> <p>6.4 Implement QA policies and procedures in a professional manner</p>	<p style="text-align: center;"><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ know what is required to perform the execution of approved QA strategies and plans including checkpoints for audit ▪ understand organisational level QA strategies, policies and procedures <p>Be able to</p> <ul style="list-style-type: none"> ▪ develop the organisational level QA plans based on the approved QA strategies ▪ execute the defined QA strategies and plans in accordance with the organisation’s QA policies and procedures ▪ manage QA activities by checking whether the QA strategies and plans are being followed by individual teams during the development of software products and the provision of software services ▪ support measurement programmes at corporate, organisational QA, and product level QA ▪ provide training for QA activities <p>Be able to</p> <ul style="list-style-type: none"> ▪ review QA activities for individual software products/services against the following aspects of the organisational QA strategies <ul style="list-style-type: none"> ➢ Effectiveness ➢ Efficiency ➢ Value ▪ evaluate the effectiveness of each execution <p>Be able to</p> <ul style="list-style-type: none"> ▪ implement QA policies and procedures in an efficient and effective manner ▪ implement QA policies and procedures in accordance with organisation’s policies and procedures as well as local and international laws and regulatory requirements ▪ propose and revise QA strategies, policies, and procedures for continuous improvements ▪ obtain endorsement from stakeholders
<p>6.1 Understand the requirements of a QA implementation plan</p> <p>6.2 Execute the organisational level QA plans</p> <p>6.3 Review the execution of the organisational QA plans</p> <p>6.4 Implement QA policies and procedures in a professional manner</p>	<p style="text-align: center;"><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ know what is required to perform the execution of approved QA strategies and plans including checkpoints for audit ▪ understand organisational level QA strategies, policies and procedures <p>Be able to</p> <ul style="list-style-type: none"> ▪ develop the organisational level QA plans based on the approved QA strategies ▪ execute the defined QA strategies and plans in accordance with the organisation’s QA policies and procedures ▪ manage QA activities by checking whether the QA strategies and plans are being followed by individual teams during the development of software products and the provision of software services ▪ support measurement programmes at corporate, organisational QA, and product level QA ▪ provide training for QA activities <p>Be able to</p> <ul style="list-style-type: none"> ▪ review QA activities for individual software products/services against the following aspects of the organisational QA strategies <ul style="list-style-type: none"> ➢ Effectiveness ➢ Efficiency ➢ Value ▪ evaluate the effectiveness of each execution <p>Be able to</p> <ul style="list-style-type: none"> ▪ implement QA policies and procedures in an efficient and effective manner ▪ implement QA policies and procedures in accordance with organisation’s policies and procedures as well as local and international laws and regulatory requirements ▪ propose and revise QA strategies, policies, and procedures for continuous improvements ▪ obtain endorsement from stakeholders 		
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) execute the QA strategies and plans effectively; and (ii) review and improve the QA strategies and plan continuously in accordance with changes in industry best practices and standards as well as changes in the competitive environments.		
Remark	Within this UoCs, “software product” refers to software product, software service or software project.		

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

1. Title	Assist in quality assurance (QA) certification and international standards adoption
2. Code	ITSWQA502A
3. Range	Assist in QA certification and international standards adoption for an organisation, if required [Quality Assurance – Organisational Level QA]
4. Level	5
5. Credit	4
6. Competency	<p style="text-align: center;"><u>Performance Requirement</u></p> <p>6.1 Understand available relevant certification standards</p> <p style="margin-left: 40px;">Be able to</p> <ul style="list-style-type: none"> ▪ evaluate the needs for certification ▪ explore and identify the most relevant and suitable certification standards according to the nature of software products/services provided by the organisation <p>6.2 Plan and obtain a suitable software QA certification of international standards</p> <p style="margin-left: 40px;">Be able to</p> <ul style="list-style-type: none"> ▪ plan, manage and execute the required process for obtaining the certification (See Remark 2 for examples of related activities) ▪ seek the right training for the organisation <p>6.3 Maintain the certification of international standards</p> <p style="margin-left: 40px;">Be able to</p> <ul style="list-style-type: none"> ▪ provide training for compliance with the certification standards and processes continuously ▪ improve practices of QA processes continuously to maintain the certification ▪ increase the competitiveness of the organisation through certification of international standards
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) obtain QA certification for an organisation; and (ii) maintain QA standards of an organisation so as to increase the competitiveness of the organisation.
Remark	<p>1. Within this UoCs, “software product” refers to software product, software service or software project.</p> <p>2. Examples of the related activities should include</p> <ol style="list-style-type: none"> a) evaluation of certification bodies and/or consultants, if possible, to be engaged in the certification process; b) selection of and preparation for the appropriate assessment methods for different types of products, process, or projects against management criteria as well as against industry models (if a model has been adopted); c) quality management (QM) system tuning based on assessment results and feedback gathered; and d) integration with other types of IT models such as Cobit, ITIL, and ISO17799.

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

1. Title	Plan and execute organisational level quality initiatives
2. Code	ITSWQA503A
3. Range	Plan and execute organisational level quality initiatives (e.g. establishing and maintaining an organisational knowledge database for QA, and training) for an organisation to help improve its QA standards [Quality Assurance – Organisational Level QA]
4. Level	5
5. Credit	4
6. Competency	<p style="text-align: center;"><u>Performance Requirement</u></p> <p>6.1 Understand organisational level quality initiatives</p> <p style="margin-left: 40px;">Be able to</p> <ul style="list-style-type: none"> ▪ articulate the vision and mission statements of QA for software product provided by the organisation at the organisation level ▪ understand the requirements for planning and executing these quality initiatives <p>6.2 Plan and execute quality initiatives</p> <p style="margin-left: 40px;">Be able to</p> <ul style="list-style-type: none"> ▪ plan for the execution of quality initiatives ▪ develop and setup the QA acceptance/reject criteria ▪ promote the quality culture in the organization <p>6.3 Plan and execute the organisational quality initiatives in a professional manner</p> <p style="margin-left: 40px;">Be able to</p> <ul style="list-style-type: none"> ▪ plan and execute the organisational quality initiatives in an efficient and effective manner ▪ adopt and adapt the current trends of industry best practices and international standards in QA to improve the organisational quality initiatives ▪ plan and execute the organisational quality initiatives in accordance with the organisation's policies and procedures as well as local and international laws and regulatory requirements ▪ obtain endorsement from stakeholders
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to plan and execute organisational quality initiatives (e.g. establishing and maintaining an organisational knowledge database for QA, and training) for an organisation to help improve its QA standards.
Remark	Within this UoCs, "software product" refers to software product, software service or software project.

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

1. Title	Plan and conduct training for quality assurance (QA) activities										
2. Code	ITSWQA504A										
3. Range	Plan and conduct training for QA activities of an organisation so as to assure the quality of its software products (See Remark 1 for the meaning of “software product”, See Remark 2 for examples of the QA activities) [Quality Assurance – Organisational Level QA]										
4. Level	5										
5. Credit	4										
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 Understand the training requirements for QA activities</td> <td> Be able to <ul style="list-style-type: none"> ▪ identify training needs such as standards, industry best practices, QA procedures and continuous professional development (CPD) to assure the quality of the software product provided by an organisation ▪ identify the people involved, i.e. the trainers and the trainees </td> </tr> <tr> <td>6.2 Plan the training for QA activities</td> <td> Be able to prepare and plan QA training programmes for the entire organisation to <ul style="list-style-type: none"> ▪ promote their knowledge and understanding of QA ▪ enhance their skills in performing required QA activities </td> </tr> <tr> <td>6.3 Conduct training for QA activities</td> <td>Be able to conduct and assist in the required QA training programmes</td> </tr> <tr> <td>6.4 Plan and conduct training for QA activities in a professional manner</td> <td> Be able to plan and conduct QA training according to <ul style="list-style-type: none"> ▪ organisation’s policies and procedures ▪ industry best practices ▪ local and international standards and laws as well as regulatory requirements </td> </tr> </table>		<u>Performance Requirement</u>	6.1 Understand the training requirements for QA activities	Be able to <ul style="list-style-type: none"> ▪ identify training needs such as standards, industry best practices, QA procedures and continuous professional development (CPD) to assure the quality of the software product provided by an organisation ▪ identify the people involved, i.e. the trainers and the trainees 	6.2 Plan the training for QA activities	Be able to prepare and plan QA training programmes for the entire organisation to <ul style="list-style-type: none"> ▪ promote their knowledge and understanding of QA ▪ enhance their skills in performing required QA activities 	6.3 Conduct training for QA activities	Be able to conduct and assist in the required QA training programmes	6.4 Plan and conduct training for QA activities in a professional manner	Be able to plan and conduct QA training according to <ul style="list-style-type: none"> ▪ organisation’s policies and procedures ▪ industry best practices ▪ local and international standards and laws as well as regulatory requirements
	<u>Performance Requirement</u>										
6.1 Understand the training requirements for QA activities	Be able to <ul style="list-style-type: none"> ▪ identify training needs such as standards, industry best practices, QA procedures and continuous professional development (CPD) to assure the quality of the software product provided by an organisation ▪ identify the people involved, i.e. the trainers and the trainees 										
6.2 Plan the training for QA activities	Be able to prepare and plan QA training programmes for the entire organisation to <ul style="list-style-type: none"> ▪ promote their knowledge and understanding of QA ▪ enhance their skills in performing required QA activities 										
6.3 Conduct training for QA activities	Be able to conduct and assist in the required QA training programmes										
6.4 Plan and conduct training for QA activities in a professional manner	Be able to plan and conduct QA training according to <ul style="list-style-type: none"> ▪ organisation’s policies and procedures ▪ industry best practices ▪ local and international standards and laws as well as regulatory requirements 										
7. Assessment Criteria	The integrated outcome UoCs requirements of this UoCs are the abilities to plan and conduct QA training for an organisation so as to assure the quality of its software products.										
Remark	<ol style="list-style-type: none"> 1. Within this UoCs, “software product” refers to software product, software service or software project. 2. QA activities related to the production of software products of an organisation include <ol style="list-style-type: none"> a) organisational level QA activities such as software process improvement activities (e.g. capability measurements) b) product level QA activities such as traditional software QA activities (e.g. inspections) 										

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

1. Title	Prepare quality assurance (QA) requirements of a software product (See Remarks 1 and 2 for meaning of “prepare” and “software product”, respectively)	
2. Code	ITSWQA505A	
3. Range	Prepare quality assurance requirements of a software product of an organisation to assure the quality of the product [Quality Assurance – Product Level QA]	
4. Level	5	
5. Credit	2	
6. Competency	<p>6.1 Know how to identify the quality requirements and quality measurement criteria of a software product</p> <p>6.2 Establish quality requirements of the software product</p> <p>6.3 Ensure that the overall QA plan is in alignment with the client’s quality requirements</p> <p>6.4 Prepare QA requirements of a software product in a professional manner</p>	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify the quality requirements of a software product including the business functional capabilities and quality attributes of the software product and / or software services ▪ identify the appropriate quality metrics to measure the quality requirements of the software product ▪ know about various documentations of QA <p>Be able to</p> <ul style="list-style-type: none"> ▪ assist the project team to establish the quality requirements of the software product based on inputs from stakeholders and the related project authorities ▪ establish product-specific or phase-specific metrics ▪ assist the project team to develop their own quality control (QC) plans ▪ prepare and negotiate an overall QA plan of the software product for project team to follow <p>See Remark 3 for the meaning of QC in a software product</p> <p>Be able to communicate with clients to ensure that the overall QA plan aligns with the client’s quality requirements</p> <p>Be able to prepare QA requirements of a software product</p> <ul style="list-style-type: none"> ▪ in an efficient and effective manner ▪ in accordance with industry best practices, organisation’s guidelines as well as any (local and international) laws and regulatory requirements, where applicable ▪ with endorsement from stakeholders

7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to prepare the quality assurance requirements of a software product of an organisation to assure the quality of the product.
Remark	<ol style="list-style-type: none"> 1. Within this UoCs, “prepare” also refers to mean propose, negotiate, or draft; and “product” refers to product, service or a software project. 2. Within this UoCs, “software product” takes a boarder meaning of software project, software product, and software services. 3. Within this UoCs, “Quality Control (QC)” of a software product refers to the testing and inspections of a software product being developed and / or software services being provided.

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

1. Title	Plan quality assurance (QA) activities for a software product (See Remark 1 for the meaning of "software product")
2. Code	ITSWQA506A
3. Range	Plan QA activities for a software product of an organisation to assure the quality of that product [Quality Assurance – Product Level QA]
4. Level	5
5. Credit	3
6. Competency	<p style="text-align: center;"><u>Performance Requirement</u></p> <p>6.1 Know various components of a project QA plan</p> <p style="margin-left: 20px;">Be able to</p> <ul style="list-style-type: none"> ▪ understand the requirements of a project QA plan covering topics such as those mentioned in Remark 2 ▪ identify and establish specific QA objectives from the general project scope for the QA activities <p>6.2 Know how to select adequate tools and techniques for the required QA activities</p> <p style="margin-left: 20px;">Be able to</p> <ul style="list-style-type: none"> ▪ analyse the project input before selecting tools and techniques for QA activities ▪ understand the appropriate tools and techniques available for the required QA activities <p>6.3 Develop a software project QA plan</p> <p style="margin-left: 20px;">Be able to</p> <ul style="list-style-type: none"> ▪ develop a software project QA plan that covers topics as suggested in Remark 2 ▪ select appropriate tools and techniques to perform the required QA activities <p>6.4 Develop a software project QA plan in a professional manner</p> <p style="margin-left: 20px;">Be able to</p> <ul style="list-style-type: none"> ▪ develop a software project QA plan in an efficient and effective manner ▪ develop a software project QA plan in accordance with industry best practices, organisation's guidelines as well as any (local and international) laws and regulatory requirements, where applicable ▪ communicate with project managers and stakeholders so as to obtain their consensus on the project QA plan from them as appropriate ▪ obtain endorsement from stakeholders
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) develop a QA plan for a software product to assure its quality; and (ii) obtain consensus on the QA plan from project manager and stakeholders.
Remark	<ol style="list-style-type: none"> 1. Within this UoCs, "software product" takes a broader meaning of software project, software product, and software services. 2. A project QA plan includes, but is not limited to, topics such as <ol style="list-style-type: none"> a) Schedule; b) Scope; c) Review activities; d) Audit activities; e) Resources; f) Checklist; g) Measurement programme; h) QA Tools; and i) Reporting mechanisms.

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

1. Title	Establish a quality assurance (QA) entity	
2. Code	ITSWQA601A	
3. Range	Establish a QA entity to govern all QA activities related to the production of software products of an organisation within the context of organisational level QA (See Remark 1 for the meaning of “software product”, See Remark 2 for examples of the QA activities.) [QA – Organisational Level QA]	
4. Level	6	
5. Credit	4	
6. Competency	<p>6.1 Have knowledge of the requirements of establishing a QA entity in an organisation</p> <p>6.2 Formulate the needs to establish a QA entity and appropriate supporting infrastructure for an organisation and the resources required</p> <p>6.3 Prepare a QA proposal</p> <p>6.4 Liaise with the senior management to agree on a QA proposal in alignment with corporate policy</p>	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ know the different supporting infrastructures of a QA entity in an organisation ▪ know the resources required for each component of a QA entity ▪ identify the needs of establishing a QA entity ▪ identify the required resources based on the supporting infrastructure <p>Be able to</p> <ul style="list-style-type: none"> ▪ assist the organisation to formulate its vision and mission statements on QA ▪ formulate the vision and mission statement of a QA entity ▪ formulate the needs of establishing a QA entity in an organisation ▪ select and recommend an appropriate supporting infrastructure for the organisation ▪ formulate the required resources based on the supporting infrastructure <p>Be able to prepare a proposal with budget considerations by presenting a business case for the establishment a QA entity</p> <p>See Remark 3 for the content of the QA proposal</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ clearly and unambiguously present and communicate the business case for the establishment of a QA entity to the senior management so as to obtain their support ▪ work with the senior management so as to ensure that the QA proposal aligns with the corporate policy

	<p>6.5 Secure the resources (including recruitment) to set up the agreed QA entity</p> <p>6.6 Establish a QA entity in a professional manner</p>	<p>Be able to</p> <ul style="list-style-type: none"> ▪ work with senior management to allocate and assign required resources in the QA proposal ▪ negotiate with senior management for any further resources (e.g. promised in the QA proposal but not allocated due to change of business environment or resources that were not in the QA proposal) that might be needed for establishing the QA entity <p>Be able to establish a QA entity</p> <ul style="list-style-type: none"> ▪ in an efficient and effective manner ▪ in accordance with organisation's guidelines as well as any (local and international) laws and regulatory requirements, where applicable ▪ with the endorsement of stakeholders.
<p>7. Assessment Criteria</p>	<p>The integrated outcome requirements of this UoCs are the abilities to establish a QA entity for an organisation to manage all its QA activities related to the production of its software product.</p>	
<p>Remark</p>	<ol style="list-style-type: none"> 1. Within this UoCs, "software product" refers to software product, software service or software project. 2. QA activities related to the production of software products of an organisation include <ol style="list-style-type: none"> a) organisational level QA activities such as software process improvement activities (e.g. capability measurements); and b) product level QA activities such as traditional software QA activities (e.g. inspections). 3. The QA proposal should include, but not limited to, the following items: <ol style="list-style-type: none"> a) Quality Charter; b) Quality Council; c) Management Committees; d) Teams and Work Groups; e) Process Improvement Teams; f) Roles and responsibilities; g) Communication channels; h) Monitoring Compliance to Organisational Policies and Procedures; i) Enforcement of Organisational Policies and Procedures; and j) Preventive, Detective and Corrective Control Procedures. 	

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

1. Title	Formulate quality assurance (QA) policies and procedures	
2. Code	ITSWQA602A	
3. Range	Formulate QA policies and procedures for an organisation to govern all its QA activities within the context of organisational level QA [Quality Assurance – Organisational Level QA]	
4. Level	6	
5. Credit	4	
6. Competency	<p>6.1 Understand the vision and mission statements of QA as laid down by an organisation</p> <p>6.2 Formulate QA policies and procedures</p> <p>6.3 Formulate QA policies and procedures in a professional manner</p>	<p><u>Performance Requirement</u></p> <p>Be able to articulate the vision and mission statements of QA for software products or services at the organisational level</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ develop QA strategies, policies, procedures for the software products or services provided by the organisation in accordance with industry standards ▪ develop and setup the QA acceptance or rejection criteria <p>Be able to</p> <ul style="list-style-type: none"> ▪ improve the QA policies and procedures continuously ▪ ensure that the QA policies and procedures match up with international QA standards ▪ facilitate the establishment of organisation wide measurement programmes ▪ obtain endorsement from stakeholders
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to formulate and state clearly quality assurance policies and procedures of an organisation to govern all its QA activities at organisational level.	
Remark		

Appendix D.8 UoCs in Generic Skills

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

1. Title	Manage operation based on existing environment and routines	
2. Code	ITSWG401A	
3. Range	Manage the operation of the organisation based on the approved routines and responses to the environment [Generic Skills – Business Acumen]	
4. Level	4	
5. Credit	4	
6. Competency		<p><u>Performance Requirement</u></p> <p>6.1 Have knowledge in the operation routines of an organisation</p> <p>6.2 Coordinate and manage the execution of operation routines</p> <p>6.3 Manage the operation routines in a professional manner</p>
		<p>Be able to understand operation routines of an organisation and the purpose of each individual routine in achieving the organisation's business strategies</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ arrange the required resources for the execution of operation routines in fulfilling the defined purposes ▪ manage the execution to ensure the defined purposes of the operation routines are fulfilled <p>Be able to ensure the operation routines are carried out within the specified timeline, within budget, response to the existing environment, and fulfilling the defined business purposes and strategies</p>
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: coordinate the operation resources and manage the execution of the operation routines for an organisation in fulfilment of the organisation's business purposes and strategies within time and budget.	
Remark		

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

1. Title	Communicate (oral and written) information with team members and clients	
2. Code	ITSWG402A	
3. Range	Communicate (oral and written) general business and technical information related to software products and software services with team members and clients effectively [Generic Skills – Communications Skills]	
4. Level	4	
5. Credit	4	
6. Competency	<p>6.1 Understand characteristics of effective communication</p> <p>6.2 Know the audience and the information needed to be conveyed</p> <p>6.3 Consolidate information for delivery</p> <p>6.4 Deliver message related to business or software products and software services to team members and clients effectively</p>	<p><u>Performance Requirement</u> Be able to recognize that good communication is accurate, clear, concise, coherent, and appropriate to the subject</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ understand the target audience ▪ collect profile of audience whenever possible ▪ understand the content to be conveyed ▪ understand time allocation and venue constraints on the delivery of information <p>Be able to</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 ▪ check for accuracy, clearness, conciseness and cohesion in the draft ▪ edit the draft to comply with corporate objectives, style and format ▪ seek recommendation or approval from management before release of information where necessary <p>Be able to</p> <ul style="list-style-type: none"> ▪ prepare written report in English as well as Chinese for the ICT industry ▪ communicate information related to business or software products and software services in English, Putonghua or Cantonese
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) understand the needs of the audience; and (ii) communicate business and technical information related to software products and software services to team members and clients effectively.	
Remark		

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

1. Title	Listen to clients and team members effectively	
2. Code	ITSWG403A	
3. Range	Listen to clients and team members effectively in the context of business communication related to software products and software services as an effective receiving party [Generic Skills – Communications Skills]	
4. Level	4	
5. Credit	2	
6. Competency	<p>6.1 Know the behaviour in listening</p> <p>6.2 Develop listening skills</p>	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ understand the role of listening in a two-way communication process and adopt an 'other-centred' approach during interaction ▪ recognise the potential benefits of genuine listening such as <ul style="list-style-type: none"> ➢ obtaining respect, rapport and trust ➢ observing and learning something we may not have known ▪ understand that listening involves hearing, understanding, and evaluating the received message and responding, without prejudice, to the given information ▪ recognise that listening could be in passive, selective or active mode and that active listening is the preferred mode ▪ appreciate that active listening demands focus and concentration; and that listening skills take time and practice to learn <p>Be able to</p> <ul style="list-style-type: none"> ▪ assess personal listening behaviour ▪ identify and remove barriers to effective listening such as multi-tasking or inability to put one's own emotions on hold while listening ▪ develop rich vocabulary capacity to assimilate complexity of thoughts ▪ focus on messages from the speaker ▪ listen correctly, carefully, adequately, intelligently, unassumingly, quietly for the content and intent of the message ▪ develop strategy for using listening time effectively such as recap of key points after a brief pause

	<p>6.3 Demonstrate proficiency in listening to clients and team members on business information related to software products and software services</p>	<p>Be able to</p> <ul style="list-style-type: none"> ▪ apply and practice active listening skills together with other techniques such as paraphrasing, perception checking, questioning, clarifying, summarizing, and empathizing ▪ capture hidden words from clients and team members ▪ reach a shared understanding and acceptance with others about common goals and priorities
<p>7. Assessment Criteria</p>	<p>The integrated outcome requirements of this UoCs are the abilities to:</p> <ul style="list-style-type: none"> (i) demonstrate active listening skills; (ii) understand the speakers effectively; and (iii) capable in listening to clients and team members , capturing relevant business information related to software products and software services 	
<p>Remark</p>		

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

1. Title	Present effectively to team members and clients	
2. Code	ITSWG404A	
3. Range	Present information related to general business and technical information effectively to team members and clients in the context of a two-way communication process to encourage audience to respond to the theme as shown in a presentation [Generic Skills – Communications Skills]	
4. Level	4	
5. Credit	2	
6. Competency	<p>6.1 Know the principles of presentation</p> <p>6.2 Prepare for a presentation</p> <p>6.3 Deliver effective presentation on information related to general business and technical information to team members and clients in logical order</p>	<p><u>Performance Requirement</u></p> <p>Be able to recognise that</p> <ul style="list-style-type: none"> ▪ the purpose of presentation is to persuade the audience for a target, it is more than the ability to speak or read out loudly ▪ people are overloaded with information and they could forget them fast ▪ perception is more powerful than lots of fact for conveyance of a message ▪ effective presentation tries to get attention from audience, feed them with meaningful information, make the presentation memorable and induce response towards the target <p>Be able to</p> <ul style="list-style-type: none"> ▪ know the audience and tailor the approach ▪ prepare ideas for the objectives or target of presentation, develop the corresponding narrative and supplemental materials ▪ arrange presentation materials in logical order ▪ make proper usage of audiovisuals if that should fit the setting, support the message or awaken the audience ▪ note that effective media messages could be pictorial, colourful and creative but their use should be in moderation ▪ check visibility of projected text and image for contrast with background and clarity <p>Be able to</p> <ul style="list-style-type: none"> ▪ start with a cheerful greeting, stating the objective and showing an outline of the presentation ▪ present information related to general business and technical information effectively in logical sequence such as <ul style="list-style-type: none"> ➤ Key Point 1, Supporting Material, Transition ➤ Key Point 2, Supporting Material, Transition ➤ Key Point 3, Supporting Material ➤ Closing: Summary and ' To do '

	<p>6.4 Improve effectiveness of presentation</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ relate what is relevant to the audience and to the intended target ▪ explain the use of special terms or short forms ▪ invite interaction from audience via techniques such as ask questions or use recalls ▪ relate the information, technique, product or service in the presentation to the audience from their perspective ▪ develop good vocal qualities and intonation, use intentional pauses and avoid using fillers (er, um, ah) ▪ use clear, simple, emotive words ▪ monitor feedback and adapt as appropriate
7. Assessment Criteria	The integrated outcome requirement of this UoCs are the abilities to deliver a presentation on information related to general business and technical information effectively to team members and clients, in which the intended messages is clearly conveyed.
Remark	

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

1. Title	Develop policies and guidelines for the appraisal of the enactment of professionalism	
2. Code	ITSWG501A	
3. Range	Develop policies and guidelines for the appraisal of enactment of professionalism in an organisation in order to perform proper management of ethics and professionalism [Generic Skills – Management of Ethics and Professionalism]	
4. Level	5	
5. Credit	3	
6. Competency		<p style="text-align: center;"><u>Performance Requirement</u></p> <p>6.1 Understand the requirements of Ethics and Professionalism Appraisal Policy</p> <p>6.2 Prepare the Ethics and Professionalism Appraisal Policy</p> <p>6.3 Prepare the Ethics and Professionalism Improvement Policy</p> <p>6.4 Prepare the Ethics and Professionalism Remedial Policy</p> <p>6.5 Communicate the benefits of the Appraisal Policy</p>
		<p>Be able to</p> <ul style="list-style-type: none"> ▪ identify the items (see Remark) required for an Ethics and Professionalism Appraisal Policy ▪ reference any appropriate standards and guidelines regarding Ethics and Professionalism Appraisal Policy ▪ identify the stakeholders involved in setting an Ethics and Professionalism Appraisal Policy <p>Be able to develop an Appraisal Policy that covers, at least, the following items</p> <ul style="list-style-type: none"> ▪ the objectives of the appraisal process ▪ who is responsible for appraisals ▪ how employees will be assessed ▪ how training needs and development opportunities will be identified ▪ the assessment interview process <p>Be able to develop the Improvement Policy that covers, at least, the following items</p> <ul style="list-style-type: none"> ▪ the objectives of the improvement process ▪ who will be assessed ▪ who will be responsible for the follow-up assessment, ▪ how the person will be assessed, ▪ how training needs and development opportunities will be provided for the person to improve ▪ the expected time for next assessment ▪ the minimum requirements for passing the next assessment <p>Be able to develop the Remedial Policy that covers, at least, the following items</p> <ul style="list-style-type: none"> ▪ the objectives of a remedial policy ▪ method of study ▪ assessment team ▪ guidelines for the remedial actions for different levels of professionalism behaviour ▪ appeal mechanism <p>Be able to state the benefits of the appraisal policy to the stakeholders, such as supervisors, employees and services users</p>

	<p>6.6 Develop the policies and guidelines for the appraisal of the enactment of professionalism in an organisation in a professional manner</p>	<p>Be able to develop the policies and guidelines for the management of the enactment of professionalism</p> <ul style="list-style-type: none"> ▪ in an efficient and effective manner ▪ in accordance with the organisation's policies and procedures ▪ in accordance with local and international laws and regulatory requirements ▪ with the endorsement of stakeholders involved
<p>7. Assessment Criteria</p>	<p>The integrated requirements of this UoCs are the abilities to:</p> <ul style="list-style-type: none"> (i) prepare clear and effective policies and guidelines (Appraisal, Personal Improvement and Remedial Policies) for the appraisal mechanism for the management of the enactment of ethics and professionalism; (ii) provide clear and effective Appraisal, Personal Improvement and Remedial Policies to the members of organisation for them to adhere to and obtain benefits from; and (iii) communicate the Appraisal, Personal Improvement and Remedial Policies with all staff of the organisation so as to strengthen the relationship between managers and employees.. 	
<p>Remark</p>	<p>Items of an Ethics and Professionalism Appraisal Policy include:</p> <ul style="list-style-type: none"> a) Appraisal Policy Statement; b) Objectives of the Staff Appraisal Policy; c) Recipients for the Policy; d) Related Information; e) Contacts; f) Terms and Definitions; g) History; and h) Exclusions Definitions. 	

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

1. Title	Define and establish an appraisal mechanism for the enactment of professionalism	
2. Code	ITSWG502A	
3. Range	Define and establish an appraisal mechanism for the enactment of professionalism in an organisation in order to perform proper management of ethics and professionalism [Generic Skills – Management of Ethics and Professionalism]	
4. Level	5	
5. Credit	4	
6. Competency		<p style="text-align: center;"><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify the items (see Remark) required for an appraisal process for the enactment of professionalism in an organisation ▪ reference any appropriate standards and guidelines regarding appraisal processes ▪ identify the stakeholders involved in setting up an appraisal process <p>6.1 Understand the requirements of appraisal mechanism for the enactment of professionalism in an organisation</p> <p>6.2 Define and establish the appraisal mechanism and train appraisers</p> <p>On the basis of the approved policies and guidelines, be able to define and establish appraisal mechanisms, such as</p> <ul style="list-style-type: none"> ▪ set the duration period of an assessment cycle ▪ list the steps in the appraisal process ▪ convey the procedures to all appraisers and appraisees well in advance ▪ determine the appropriate appraiser to undertake the appraisal process for each individual appraisee ▪ provide related information for the appraiser including <ul style="list-style-type: none"> ➢ development plan of the organisation ➢ job descriptions for the individual ➢ work programme for individual work packages ➢ targets which have been set for each individual appraisee ➢ exclusions <p>6.3 Train appraisers</p> <p>Be able to provide appraisers with adequate training to enable them to make fair and objective assessments and to carry out effective appraisal interviews</p> <p>6.4 Define and establish the appraisal process in a professional way</p> <p>Be able to define and establish the appraisal process</p> <ul style="list-style-type: none"> ▪ in an efficient and effective manner ▪ in accordance with the organisation's policies and procedures ▪ in accordance with local and international laws and regulatory requirements ▪ with the endorsement of stakeholders involved
7. Assessment Criteria	The integrated requirements of this UoCs are the abilities to: (i) set up an effective appraisal mechanism efficiently for the enactment of professionalism in an organisation; (ii) keep the appraisal scheme simple and straightforward; and	

	(iii) train the appraisers
Remark	Items of an appraisal process for the enactment of professionalism in an organisation include: a) assessment period; b) appraisers; c) appraisal procedures; and d) annual review forms.

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

1. Title	Monitor the defined appraisal mechanism for the enactment of professionalism
2. Code	ITSWG503A
3. Range	Monitor the existing appraisal mechanism for the enactment of professionalism in an organisation in order to perform proper management of ethics and professionalism [Generic Skills – Management of Ethics and Professionalism]
4. Level	5
5. Credit	4
6. Competency	<p>Performance Requirement</p> <p>6.1 Understand the monitoring requirements of the defined appraisal mechanism for the enactment of professionalism in an organisation</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify the items required for monitoring an appraisal process for the enactment of professionalism in an organisation ▪ reference any appropriate standards and guidelines regarding the monitoring of appraisal processes ▪ identify the stakeholders involved in monitoring an appraisal process <p>6.2 Monitor the defined appraisal mechanism</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ collect, analyse and review the assessment data (see Remark 1) so as to distinguish any anomalies and misconducts from appropriate professional acts ▪ collect, analyse and review the assessment results (see Remark 2) that are passed to appraisees so as to distinguish anomalies and misconducts from appropriate professional acts ▪ ensure that the assessment results are properly filed <p>See Remarks 1 and 2 for examples of Assessment Data and Results, respectively</p> <p>6.3 Monitor the appraisal mechanism in a professional way</p> <p>Be able to monitor the appraisal mechanism so as to</p> <ul style="list-style-type: none"> ▪ ensure consistency in the assessment process ▪ adhere to the principles of equal opportunities and confidentiality in the appraisal process ▪ ensure fair and equitable involvement ▪ ensure that the appraisal summary with development objectives are attached to the individual's personnel file ▪ ensure that the appraisal summaries are kept confidential to the line managers and the post holders, and will only be viewed by a third party in the event of arbitration
7. Assessment Criteria	The integrated requirements of this UoCs are the abilities to: (i) make sure that the appraisal system is carried out consistently and effectively; (ii) ensure that both related parties are kept informed of the assessment results; and (iii) keep all documents properly stored.
Remark	1. Assessment data include, but are not limited to, the following: a) examples of completed work and reports from the appraisee;

- b) the results of any objective measurement of performance against the targets;
- c) reports and comments from partners or individuals;
- d) staff development plans for each appraisee;
- e) records from supervision meetings; and
- f) notes from the previous appraisal meeting.

2. Assessment results that are passed to appraisees include, but are not limited to, the following:
- a) agreed work programme notes from appraisal meeting;
 - b) information about achievements or difficulties at work;
 - c) results of achievements against any targets set;
 - d) feedback from colleagues, partners or individuals; and
 - e) proposals for areas of work to develop or learn.

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

1. Title	Review and improve the existing appraisal mechanism of the enactment of professionalism	
2. Code	ITSWG504A	
3. Range	Review the existing appraisal mechanism and make suggestions for future improvement in an organisation in order to perform proper management of ethics and professionalism [Generic Skills – Management of Ethics and Professionalism]	
4. Level	5	
5. Credit	3	
6. Competency	<p>6.1 Understand the review requirements of the existing appraisal mechanism for the enactment of professionalism in an organisation</p> <p>6.2 Perform the review of the existing appraisal mechanism</p> <p>6.3 Make suggestions on the existing appraisal mechanism</p> <p>6.4 Perform the review of the existing appraisal mechanism in a professional way</p>	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify the items required for reviewing an appraisal process for the enactment of professionalism in an organisation ▪ reference any appropriate standards and guidelines regarding the review of appraisal processes ▪ identify the stakeholders involved in reviewing an appraisal process <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify trustees who will receive a report that consolidates the appraisal results of individual staff members and will contribute to the review and amendment of the appraisal mechanism ▪ consolidate the appraisals with the outcomes of Line Management sessions ▪ recommend additional levels of appraisal such as peer, upward and external appraisal as appropriate ▪ determine mutually agreed performance targets for the year ahead ▪ evaluate whether further training on appraisal process is required so that staff are clear what is expected of them and can benefit fully from the appraisal process <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify areas for improvement to the existing appraisal mechanism ▪ obtain approvals from stakeholders on the suggestions made <p>Be able to perform the review of the existing appraisal mechanism</p> <ul style="list-style-type: none"> ▪ in an efficient and effective manner ▪ in accordance with the organisation's policies and procedures ▪ with a proactive and inclusive approach to resolve issues that emerge ▪ with the endorsement of relevant stakeholders
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) evaluate that the appraisal system is effective; (ii) make adjustments in the appraisal system from past experience; and (iii) justify training in appraisal assessment for the staff.	
Remark		

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

1. Title	Protect intellectual property rights and data privacy, and observe relevant laws	
2. Code	ITSWG505A	
3. Range	Protect intellectual property rights and data privacy within the context of upholding ethics and professionalism in an organisation [Generic Skills – Ethics and Professionalism – Business Ethics]	
4. Level	5	
5. Credit	4	
6. Competency	<p style="text-align: center;"><u>Performance Requirement</u></p> <p>6.1 Know the intellectual property rights and data privacy requirements</p> <p>6.2 Understand the legal protection applicable to copyright work</p> <p>6.3 Understand different types of licenses</p> <p>6.4 Respect and protect the proprietary interests of the information owners</p>	
	<p>Be able to</p> <ul style="list-style-type: none"> ▪ identify the various legal and regulatory rights to protect the company data and results of creative effort ▪ identify different types of intellectual property such as: <ul style="list-style-type: none"> ➢ copyright which covers literary, dramatic and musical works, artistic works, cinematographic films, sound recordings, broadcasts, published editions; ➢ patents ➢ trademarks ➢ trade secret <p>Be able to</p> <ul style="list-style-type: none"> ▪ understand the Copyright Acts in different countries ▪ understand the Doctrine of Fair Use and be able to determine whether a particular case is of Fair Use <p>Be able to</p> <ul style="list-style-type: none"> ▪ distinguish various types of licenses in relation to any of the exclusive rights owned by the copyright owner including: <ul style="list-style-type: none"> ➢ fixed term or indefinite period ➢ over a particular geographical area or industry section ➢ exclusively or non-exclusively ➢ using a copy in a certain way/certain number of times ▪ identify public domain and royalty materials <p>Be able to</p> <ul style="list-style-type: none"> ▪ prepare the Copyrights Guidelines for the members of organisation ▪ protect against copyright infringement activities in the organisation ▪ raise the level of awareness about copyright infringement in the organisation ▪ reject any job assignments that infringe on copyrights ▪ identify the copyright ownership for outsourcing works and draw the attention to the copyright issue during the contract preparation ▪ seek copyright clearance through Clearinghouses, Stock Houses, Multimedia Networking Legal Counsel 	

	<p>6.5 Protect the data privacy</p> <p>6.6 Perform the protection of intellectual property and data privacy in a professional way</p>	<p>Be able to prepare data privacy guidelines and principles for the members of the organisation, and launch appropriate measures according to the various principles and legal requirements, e.g. Personal Data (Privacy) Ordinance, for data privacy protection</p> <ul style="list-style-type: none"> ▪ Collection limitation principle ▪ Data quality principle ▪ Purpose specification principle ▪ Use limitation principle ▪ Security safeguards principle ▪ Openness principle ▪ Individual participation principle <p>Be able to perform the protection of intellectual property and data privacy</p> <ul style="list-style-type: none"> ▪ in an efficient and effective manner ▪ in accordance with the organisation's policies and procedures ▪ in accordance with local and international laws and regulatory requirements ▪ with the endorsement of stakeholders involved
<p>7. Assessment Criteria</p>	<p>The integrated requirements of this UoCs are the abilities to:</p> <p>(i) protect intellectual property such that no copyright infringement activities are carried out in the organisation; and</p> <p>(ii) protect the data privacy such that there is no leakage of company as well as personal data in all information systems managed by the organisations.</p>	
<p>Remark</p>		

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

1. Title	Collect and digest ICT development and application information	
2. Code	ITSWG506A	
3. Range	Collect and digest ICT development and application information in order to achieve continuous professional development [Generic Skills –Continuous Professional Development]	
4. Level	5	
5. Credit	3	
6. Competency	<p>6.1 Know the new business direction, technologies and skills required by the organisation and industry</p> <p>6.2 Know the related training opportunities available</p> <p>6.3 Search for the right training opportunities and gain the financial support and endorsement</p> <p>6.4 Have the habit of being constantly aware of new technologies and skills training to suit the needs of organisation and the society</p>	<p><u>Performance Requirement</u> Be able to recognize the ever-changing business environment, technologies and skilled required by the organisation and industry for continuous professional development</p> <p>Be able to know the related training opportunities available in the organisation or industry (both on-the-job training or course training)</p> <p>Be able to identify the right training opportunities (both continuous professional development institutions and courses) and gain necessary financial support and endorsement</p> <p>Be able to be proactive in learning new things such as skills (both technical and soft skills) and technologies required for particular tasks in the industry</p>
7. Assessment Criteria	The integrated requirements of this UoCs are the abilities to collect and digest ICT development and application information to cope with new skills (both technical and soft) and technologies required for particular tasks in the industry.	
Remark		

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

1. Title	Acquire new knowledge and skills	
2. Code	ITSWG507A	
3. Range	Acquire new knowledge and skills to enhance professional development and organisation opportunities [Generic Skills – Continuous Professional Development]	
4. Level	5	
5. Credit	3	
6. Competency	<p>6.1 Know the training opportunities available for acquiring new knowledge and skills</p> <p>6.2 Take up training courses, self-study, practice exercises, and review course materials</p> <p>6.3 Achieve and attain required learning outcomes, if any</p>	<p><u>Performance Requirement</u> Be able to</p> <ul style="list-style-type: none"> ▪ collect and digest new ICT development and application information required by industry ▪ know the related training opportunities available in the organisation or industry (both on-the-job training or course training) ▪ be proactive in identifying and learning new skills required for the betterment of the industry for continuous professional development <p>Be able to</p> <ul style="list-style-type: none"> ▪ take up the training course, self-study, practice exercise, and review course material to acquire new knowledge and skills ▪ attend lectures, if any, and participate in the classroom tutorial to acquire new knowledge and skills <p>Be able to achieve and attain certain learning objectives and required learning outcomes and standards, if any, by passing any required assessment of the training course in accordance with corporate continuous professional development and training policies.</p>
7. Assessment Criteria	The integrated requirements of this UoCs are the abilities to acquire and update new knowledge and skills to enhance professional development and organisation opportunities and competitiveness.	
Remark		

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

1. Title	Identify business opportunities
2. Code	ITWGS508A
3. Range	Identify business opportunities related to IT in alignment with the business strategies and policies of the organisation [Generic Skills – Business Acumen]
4. Level	5
5. Credit	3
6. Competency	<p style="text-align: right;"><u>Performance Requirement</u></p> <p>6.1 Have basic insights into the business of the industry</p> <p style="margin-left: 20px;">Be able to</p> <ul style="list-style-type: none"> ▪ identify the current trends of business opportunities that are important to the organisation’s growth ▪ think creatively about any business opportunities that ICT can bring along <p>6.2 Understand the strategic innovation of ICT</p> <p style="margin-left: 20px;">Be able to suggest ways to</p> <ul style="list-style-type: none"> ▪ create new market opportunities ▪ promote good values to customers ▪ transform technological innovations into business opportunities for the business and the organisation <p>6.3 Identify business opportunities</p> <p style="margin-left: 20px;">Be able to</p> <ul style="list-style-type: none"> ▪ exploit existing business needs in order to transform any technological innovations into business opportunities ▪ analyse the viability and sustainability of the business opportunities ▪ identify business opportunities that align with organisation’s strategic objectives in accordance with the policies and procedures of an organisation as well as any (local and international) laws and regulatory requirements, where applicable
7. Assessment Criteria	The integrated requirements of this UoCs are the abilities to: (i) identify business opportunities related to the application of IT to satisfy business needs; and (ii) identify business opportunities in alignment with strategic objectives of an organisation.
Remark	

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

1. Title	Review and adjust business strategies and policies	
2. Code	ITSWG524A	
3. Range	Review and adjust business strategies and policies for an organisation in response to changes and performance results [Generic Skills – Business Acumen]	
4. Level	5	
5. Credit	4	
6. Competency		<p style="text-align: center;"><u>Performance Requirement</u></p> <p>6.1 Understand the current development trends of a business Be able to summarize the business trends related to the organisation</p> <p>6.2 Review the existing business strategies and policies against the business trends and business performance of the organisation Be able to</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 <p>6.3 Analyse the strengths, weaknesses, opportunities and threats (SWOT) of an organisation 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> <p>6.4 Adjust the business strategies and policies according to the review results and the approved vision and mission statements of the organisation Be able to make appropriate adjustment of the strategies and policies for an organisation in accordance with organisation's business goals, objectives, policies and guidelines as well as any (local and international) laws and regulatory requirements, where applicable for the long-term sustainability of the business</p>
7. Assessment Criteria	The integrated requirements of this UoCs are the abilities to review the effectiveness of the existing business strategies and policies of an organisation and adjust the business strategies and policies for sustainable development and in alignment with the organisation's approved vision and mission statements.	
Remark	The adjusted business strategies and policies will be communicated to all employees of the organisation.	

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

1. Title	Develop sales and marketing strategies and establish the marketing teams	
2. Code	ITSWG510A	
3. Range	Develop sales and marketing strategies and establish the marketing teams for the enactment of the relevant sales and marketing strategies in the context of performing Sales and Marketing functions related to a particular software product and/or software services in an organisation [Generic Skills – Sales and Marketing]	
4. Level	5	
5. Credit	4	
6. Competency	<p>6.1 Understand the basic principles of sales and marketing</p> <p>6.2 Develop and establish sales and marketing strategies and plans</p> <p>6.3 Establish a marketing team to develop and execute marketing and brand strategy, tactics and plans</p> <p>6.4 Establish sales force and execute the marketing and sales plan to achieve sales target and results</p>	<p>Performance Requirement Be able to apply and use the marketing strategy and tactics (e.g. 4Ps – Product, Price, Promotion and Place) to analyse, research and establish sales and marketing strategy</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify the uniqueness and differentiation of the product/services offered by the organisation that are in line with organisation’s vision, mission and strategic plans ▪ analyse, research, and develop the competitive strategies of the product/services <p>Be able to establish a professional marketing team so as to develop, execute and follow up on the marketing and brand strategy, tactics and plans</p> <p>Be able to establish a sales force to executes the sales plan so as to achieve sales target and results which are in line with the organisation’s sales and marketing strategies, while observing applicable local and international laws as well as regulatory requirements</p>
7. Assessment Criteria	The integrated requirements of this UoCs are the abilities to: (i) develop sales and marketing strategies; and (ii) establish marketing teams to execute marketing and sales plans in line with the organisation’s vision, mission and strategy..	
Remark		

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

1. Title	Manage product/services brand	
2. Code	ITSWG511A	
3. Range	Manage product/services brand in the context of performing Sales and Marketing functions related to a particular software product and/or software services in an organisation [Generic Skills – Sales and Marketing]	
4. Level	5	
5. Credit	4	
6. Competency	<p>6.1 Understand the basic principles of product / service marketing and branding</p> <p>6.2 Develop and establish a marketing strategy for the product / services brand</p> <p>6.3 Set up and establish a marketing team to develop, execute and manage product / services brand</p> <p>6.4 Develop, establish and review corporate and product identity</p>	<p><u>Performance Requirement</u> Be able to apply the marketing strategies and tactics (e.g. 4Ps – Product, Price, Promotion and Place) to analyse, research and establish product/service branding strategy</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify the uniqueness and differentiation of the product/services brand offered by the organisation ▪ analyse, research, and develop the competitive strategy of the product/services brand <p>Be able to set up and establish a professional marketing team so as to develop, execute and follow up on the marketing strategy, tactics and plans for product/service brand</p> <p>Be able to establish, develop, review and enhance corporate and product / service brand identity in compliance with organisation'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 are the abilities to manage product / service branding with effective marketing strategy, plan and execution.	
Remark		

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

1. Title	Communicate (oral and written) technical information	
2. Code	ITSWG512A	
3. Range	Communicate (oral and written) technical information related to software development, maintenance, and service provision, such as user requirements and software project/service agreements, effectively with all stakeholders in the business environment [Generic Skills – Communications Skills]	
4. Level	5	
5. Credit	4	
6. Competency		<u>Performance Requirement</u>
	6.1 Understand characteristics of effective technical communication	Be able to recognize that good communication is accurate, clear, concise, coherent, and appropriate to the subject
	6.2 Know the audience and information needed to be conveyed	Be able to <ul style="list-style-type: none"> ▪ identify target audience or stakeholders who will be receivers of technical information ▪ collect profile of audience whenever possible ▪ understand corporate objectives, style, format and content to be conveyed ▪ understand time allocation and venue constraints on the delivery of information
	6.3 Consolidate information for delivery	Be able to <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 ▪ check for accuracy, clearness, conciseness and cohesion in the draft ▪ edit the draft to comply with corporate objectives, style and format ▪ seek recommendation or approval from management before release of information where necessary
	6.4 Deliver corporate message related to software development, maintenance, and service provision effectively	Be able to <ul style="list-style-type: none"> ▪ prepare written report in English as well as Chinese for the ICT industry ▪ communicate information related to software development, maintenance, and service provision with stakeholders, such as customers, senior management or staff in English, Putonghua or Cantonese ▪ bridge the gap between IT people and non-technical persons such as senior management and customers by communicating technical terms in generic terms ▪ bridge the business requirements and technical issues in corporate communications
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (iii) understand the needs of the audience; and (iv) communicate technical information to non-technical audience effectively.	
Remark		

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

1. Title	Listen to all stakeholders effectively	
2. Code	ITSWG513A	
3. Range	Listen to all stakeholders effectively in the context of business communication related to software development, maintenance, and service provision, such as user requirements and software project/service agreements, as a receiving party in a communication process during team works [Generic Skills – Communications Skills]	
4. Level	5	
5. Credit	2	
6. Competency	<p>6.1 Know the behaviour in listening</p> <p>6.2 Develop listening skills</p>	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ understand the role of listening in a two-way communication process and adopt an 'other-centred' approach during interaction ▪ recognise the potential benefits of genuine listening such as <ul style="list-style-type: none"> ➢ obtaining respect, rapport and trust ➢ creating better self-image ➢ observing and learning something we may not have known ▪ understand that listening involves hearing, understanding and evaluating the received message and responding without prejudice to the given information ▪ recognise that listening could be in passive, selective or active mode and that active listening is the preferred mode ▪ appreciate that active listening demands focus and concentration; and that listening skills take time and practice to learn <p>Be able to</p> <ul style="list-style-type: none"> ▪ assess personal listening behaviour ▪ identify and remove barriers to effective listening such as multi-tasking or inability to put one's own emotions on hold while listening ▪ develop rich vocabulary capacity to assimilate complexity of thoughts ▪ focus on messages from the speaker ▪ listen correctly, carefully, adequately, intelligently, unassumingly, quietly for the content and intent of the message ▪ develop strategy for using listening time effectively such as recap of key points after a brief pause

	<p>6.3 Demonstrate proficiency in listening to information related to software development, maintenance, and service provision</p>	<p>Be able to</p> <ul style="list-style-type: none"> ▪ identify stakeholders in the communication process ▪ apply and practice active listening skills together with other techniques such as paraphrasing, perception checking, questioning, clarifying, summarizing, and empathizing ▪ capture hidden words from customers, senior management and other staff ▪ reach a shared understanding and acceptance with others about common goals and priorities
<p>7. Assessment Criteria</p>	<p>The integrated outcome requirements of this UoCs are the abilities to:</p> <ul style="list-style-type: none"> (iv) demonstrate active listening skills; (v) understand the speakers effectively; and (vi) be capable in listening to all stakeholders, capturing relevant information related to software development, maintenance, and service provision 	
<p>Remark</p>		

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

1. Title	Present effectively	
2. Code	ITSWG514A	
3. Range	Present information related to software development, maintenance, and service provision, such as user requirements and project/service agreements, effectively in the context of two-way communication process to encourage audience to respond to the theme as shown in a presentation [Generic Skills – Communications Skills]	
4. Level	5	
5. Credit	2	
6. Competency	<p>6.1 Know the principles of presentation</p> <p>6.2 Prepare for a presentation</p> <p>6.3 Deliver presentation on information related to software development, maintenance, and service provision in logical order</p>	<p><u>Performance Requirement</u></p> <p>Be able to recognise that</p> <ul style="list-style-type: none"> ▪ the purpose of presentation is to persuade the audience for a target, it is more than the ability to speak or read out loudly ▪ people are overloaded with information and they could forget them fast ▪ perception is more powerful than lots of fact for conveyance of a message ▪ effective presentation tries to get attention from audience, feed them with meaningful information, make the presentation memorable and induce response towards the target <p>Be able to</p> <ul style="list-style-type: none"> ▪ know the audience and tailor the approach ▪ prepare ideas for the objectives or target of presentation, develop the corresponding narrative and supplemental materials ▪ arrange presentation materials in logical order ▪ make proper usage of audiovisuals if that should fit the setting, support the message or awaken the audience ▪ note that effective media messages could be pictorial, colourful and creative but their use should be in moderation ▪ check visibility of projected text and image for contrast with background and clarity <p>Be able to</p> <ul style="list-style-type: none"> ▪ start with a cheerful greeting, stating the objective and showing an outline of the presentation ▪ present information related to software development, maintenance, and service provision in logical sequence such as <ul style="list-style-type: none"> ➤ Key Point 1, Supporting Material, Transition ➤ Key Point 2, Supporting Material, Transition ➤ Key Point 3, Supporting Material ➤ Closing: Summary and ' To do '

	<p>6.4 Improve effectiveness of presentation</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ relate what is relevant to the audience and to the intended target ▪ explain the use of special terms or short forms ▪ invite interaction from audience via techniques such as ask questions or use recalls ▪ relate the information, technique, product or service in the presentation to the audience from their perspective ▪ develop good vocal qualities and intonation, use intentional pauses and avoid using fillers (er, um, ah) ▪ use clear, simple, emotive words ▪ monitor feedback and adapt as appropriate
<p>7. Assessment Criteria</p>	<p>The integrated outcome requirement of this UoCs are the abilities to deliver a persuasive presentation on information related to software development, maintenance, and service provision in which the presenter would induce the audience to act in response to the introduced arguments.</p>
<p>Remark</p>	

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

1. Title	Team building	
2. Code	ITSWG515A	
3. Range	Build the team with skills, knowledge and expertise, capable of undertaking management tasks or tasks related to software development, maintenance, and service provision [Generic Skills – Social Skills]	
4. Level	5	
5. Credit	2	
6. Competency	<p>6.1 Know the background information about team building</p> <p>6.2 Build an effective management, software development, maintenance, or service provision team</p>	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ know the organisation’s structure, mission and vision ▪ understand where works from a team fit in the context of the organisation’s goals, principles, vision or values ▪ recognise team-oriented environment is characterized by shared purpose, shared vision, shared mission and a performance development system that enables people to grow both individually and professionally ▪ appreciate that team members need to <ul style="list-style-type: none"> ➢ build trust among themselves ➢ allow differences ➢ recognise individual strengths, styles and skills ➢ keep lines of communication flexible ➢ ensure tolerance ➢ allow mistakes <p>Be able to</p> <ul style="list-style-type: none"> ▪ determine the roles of team members and the position of the team in an operating unit ▪ build solid relation with targeted followers ▪ respond and support others in order to build shared social capital ▪ establish a systematic workplace integration and follow-up process ▪ integrate team building with current work goals ▪ define a team’s objectives to fulfil the accomplishment of corporate goals ▪ assemble a team with members having suitable combination of skills, knowledge and expertise capable of undertaking assigned tasks ▪ create a work culture that values collaboration ▪ keep team members informed of developments ▪ deal with conflicts in team ▪ lead and negotiate with team members to arrive at common resolutions ▪ reward and recognise team behaviours ▪ demonstrate leadership and creativity
7. Assessment Criteria	The integrated outcome requirement of this UoCs are the abilities to build a collaborative team capable of working effectively on management tasks or tasks related to software development, maintenance, and service provision.	
Remark		

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

1. Title	Interpersonal and people networking skills	
2. Code	ITSWG516A	
3. Range	Exercise effective interpersonal and people networking skills in the context of team work related to software development, maintenance, and service provision in an organisation [Generic Skills – Social Skills]	
4. Level	5	
5. Credit	2	
6. Competency	<p>6.1 Know the behaviour in interpersonal and people networking skill</p> <p>6.2 Exercise interpersonal and people networking skills</p> <p>6.3 Demonstrate proficiency in interpersonal and people networking skill to achieve positive team relationships</p>	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ understand the importance of communication among members in a team ▪ recognise potential benefits of effective interpersonal and people networking skill such as <ul style="list-style-type: none"> ➢ building mutual trust and mutual support among members ➢ appreciating each other's strengths as well as accommodating limitations. ➢ learning from each other ➢ contributing to build a harmonious and efficient team ▪ understand the importance of respecting different backgrounds and values, keeping an open-minded attitude towards different opinions and ideas, and showing empathy without prejudice <p>Be able to</p> <ul style="list-style-type: none"> ▪ develop self confidence ▪ be open-minded to different ideas and opinions ▪ accept new members and gain acceptance in new teams ▪ behave properly such as be polite and express emotion appropriately ▪ listen and respond actively to other members ▪ present and articulate ideas candidly and respect positive and negative responses ▪ provide assistance to members and appreciate assistance offered by them <p>Be able to</p> <ul style="list-style-type: none"> ▪ exercise effective interpersonal and people networking skills ▪ reduce and resolve conflicts among team members ▪ agree on common values and goals and reach consensus on plans, actions and priorities with team members
7. Assessment	The integrated outcome requirements of this UoCs are the abilities to exercise	

Criteria	effective interpersonal and people networking skills to achieve positive team relationships.
Remark	

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

1. Title	Negotiate with all stakeholders effectively	
2. Code	ITSWG517A	
3. Range	Negotiate with all stakeholders in the context of resolving conflicts arising from operational interaction related to software development, maintenance, and service provision in the business environment [Generic Skills – Social Skills]	
4. Level	5	
5. Credit	2	
6. Competency	<p>6.1 Know the typical scenario in negotiation</p> <p>6.2 Identify facts relevant to negotiation process</p> <p>6.3 Negotiate to reach a resolution related to software development, maintenance, and service provision</p>	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ recognise that activities in negotiation process could be classified into preparation, opening, bargaining and closing phases ▪ appreciate the importance of preparation to support successful negotiation <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify the reasons for negotiation such as <ul style="list-style-type: none"> ➢ there is a conflict of interest between different parties ➢ there are no established rules for resolving the conflict ➢ the parties prefer to develop their own new rules ➢ the parties would like to reach for an agreement instead of taking their dispute to a higher authority ▪ locate the identity of stakeholders, their wishes and rationale ▪ identify the key stakeholders ▪ find out the background and interdependence between parties, their persuasive abilities, the personalities of the negotiators and the deadline to conclude the negotiation ▪ identify one's own goal and bottom line in negotiation <p>Be able to</p> <ul style="list-style-type: none"> ▪ do homework and prepare to discuss every aspect and respond to every question and comment ▪ avoid presenting too many issues at one time, and present the easiest or fundamental ones first ▪ present arguments calmly without personalization, and make sure that they are logically supported ▪ summarize frequently to enhance understanding ▪ maintain persistence and not to expect negotiation could end soon ▪ negotiate or bargain in terms of their needs, advantages, and benefits ▪ make one's proposal consistent with their value but within one's bottom line ▪ admit, when appropriate, the validity of the other party's arguments ▪ use Objective Criteria for Decision-Making

	<ul style="list-style-type: none"> ▪ think creatively for options with mutual benefit ▪ achieve a positive relationship with the person with whom you are bargaining
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: <ul style="list-style-type: none"> (i) identify and focus on facts in the negotiation process; and (ii) reach a resolution related to software development, maintenance, and service provision skilfully and effectively.
Remark	

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

1. Title	Manage contract	
2. Code	ITSWG518A	
3. Range	Manage contract related to software development, maintenance, and service provision for an organisation based on its policies and guidelines [Generic Skills – Contract Management]	
4. Level	5	
5. Credit	5	
6. Competency	<p>6.1 Acquire general management skills for managing contracts</p> <p>6.2 Understand the general impact of finance, accounting and government laws on contracts</p> <p>6.3 Manage contractors' performance</p> <p>6.4 Manage contractual change requests</p> <p>6.5 Adhere to the highest standard of ethical business practices in all business dealings</p>	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ demonstrate various management skills including time management, situational leadership, planning, creativity, risk awareness, numerical analysis, communication, influencing, teamwork, improvement, presentations, ICT and eSkills ▪ be aware of the need to support others in a helpful, flexible way ▪ adopt a courteous and positive attitude, when working under close supervision and in accordance with pre-determined rules/procedures <p>Be able to</p> <ul style="list-style-type: none"> ▪ comply with the rules ▪ review compliance options and challenges, and ▪ recommend the preferred approach with reasons <p>Be able to review outputs from different processes and from different providers, and compare them against the contractual requirements</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ ensure that contractual changes are properly approved and those with a need to know are aware of such changes ▪ update the contract for any legal implications of actions taken due to changes <p>Be able to</p> <ul style="list-style-type: none"> ▪ understand and comply with all ethical and business practice standards of the organisation ▪ identify and resolve conflicts in standards, discrepancies and omissions between the organisations with which one is working with using generally-recognized international principles ▪ promote decisions that support the best long-term interests of the businesses, their customers, shareholders and the communities in which they operate ▪ freely share and encourage discussion of the code of ethics and practice standards with others and bring attention to and encourage corrective actions when there is observed non-compliance with these standards by others ▪ work with fellow professionals to identify and promote changes to this code of ethics and practice standards, which is intended to enhance the field's professionalism
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) provide general supports in managing contracts; and (ii) adhere to code of ethics and practice standards to enhance professionalism.	

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

1. Title	Manage procurement	
2. Code	ITSWG519A	
3. Range	Manage procurement of items related to software development, maintenance, and service provision for an organisation according to its policies and guidelines [Generic Skills – Procurement Management]	
4. Level	5	
5. Credit	5	
6. Competency		<p><u>Performance Requirement</u></p> <p>6.1 Have knowledge of procurement policies and skills</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify the relevant standards, guidelines and policies applicable to the organisation ▪ refer to the appropriate experts for advice and guidance where necessary ▪ identify the stakeholders involved <p>6.2 Conduct procurement in a way that contributes to a positive image for the individuals and organisations</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ ensure that procurement relationships developed, implemented and managed by corresponding procurement professionals are based on well recognized and sustainable ethical and business practice standards ▪ build respect, credibility, and ongoing value for the individuals and organisations that work in the procurement process ▪ encourage the highest professional standards among all co-workers <p>6.3 Represent ones skills, knowledge and experiences with honesty and integrity</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ make certain that the relevant procurement professionals and organisations are advised accurately with fully-informed decisions that lead to better procurement outcomes ▪ represent accurately and honestly when sharing information about other professionals or organisations in the procurement process <p>6.4 Champion the health and safety concerns into decision-making</p> <p>Be able to promote the strategic importance of health and safety, sustainable procedures and workforce, equalities issues and design quality within the organisation and the procurement partners</p> <p>6.5 Continuously increase the economic value derived through procurement by building one's professional skills and knowledge through ongoing education, expanded experience, and a focus on innovation</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ promote the fact that it is the skills of the professional that design, implement and manage procurement relationships that ultimately produces economic value for the organisation ▪ ensure continuous improvement in procurement outcomes by developing the skills and knowledge of the field's professionals and proactively seek relevant professional certifications ▪ continuously understand and mitigate current and emerging risks associated with

	<ul style="list-style-type: none"> ▪ procurement ▪ minimize total procurement costs through a focus on learning and the promotion of best practices on an industry-wide basis and proactively seek new ways of doing business that expand the economic value derived through procurement
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: <ul style="list-style-type: none"> (i) provide general supports in managing procurement; (ii) increase economic value in the procurement process; and (iii) explore new ways, if any, in procurement.
Remark	

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

1. Title	Utilize the given IT and related resources	
2. Code	ITSWG520A	
3. Range	Utilize and replenish, if necessary, the given IT and related resources for exploiting their full potential value in the context of managing resources for an organisation so as to meet its goals and objectives [Generic Skills – Resource Management]	
4. Level	5	
5. Credit	4	
6. Competency	<p>6.1 Utilize IT and related resources</p> <p>6.2 Check any misuse on the IT and related resources</p> <p>6.3 Make replenishment on the IT and related resources</p>	<p>Performance Requirement Be able to monitor and review that the given IT and related resources are used efficiently to achieve the organisation's goals and objectives</p> <p>Be able to proactively monitor and review areas of misuses and abuses of IT and related resources, which will adversely affect the organisation's return of investment</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ plan the availability of IT and related resources, and ▪ obtain the relevant resources <p>so that the company actions could be executed smoothly with enough resources</p>
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) assign IT and related resources effectively; (ii) supply IT and related resources to cope with IT strategic plan; and (iii) proactively monitor and review the uses of IT and related resources so as to prevent any misuses and abuses of IT related resources.	
Remark		

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

1. Title	Recruit, retain and develop IT staff	
2. Code	ITSWG521A	
3. Range	Recruit, retain and develop IT staff for the sustainability of the organisation [Generic Skills – Human Resources and Staff Management]	
4. Level	5	
5. Credit	8	
6. Competency	<p>6.1 Know the forward corporate plan</p> <p>6.2 Recruit and /or retain IT staff</p> <p>6.3 Develop IT staff</p> <p>6.4 Maintain the best mix of skill set in the organisation</p>	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ maintain close connection with operation units on human resource requirements ▪ identify when a need to recruit arises ▪ understand human resources recruitment processes ▪ understand the value of the experience of existing staff against a new recruit <p>Be able to</p> <ul style="list-style-type: none"> ▪ devise retention strategies for existing staff force ▪ provide incentives to lock-in existing staff ▪ re-develop existing staff to meet new requirements ▪ execute necessary activities to recruit right talents for unfilled posts <p>Be able to</p> <ul style="list-style-type: none"> ▪ understand the needs of staff development ▪ conduct review sessions for analysing staff development needs ▪ provide classroom and on-the-job training for staff development ▪ provide team building for team development ▪ provide reward schemes to recognise performance <p>Be able to keep people with the best possible mix of skill sets in the organisation for effective and efficient operations</p>
7. Assessment Criteria	<p>The integrated outcome requirement of this UoCs are the abilities to:</p> <p>(i) recruit, develop and retain IT staff for the sustainability of the organisation; and</p> <p>(ii) maintain the best mix of skill sets in the organisation in order to achieve the most effective and efficient operations.</p>	
Remark		

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

1. Title	Manage staff performance and appraisal	
2. Code	ITSWG522A	
3. Range	Manage staff performance and appraisal for the effective performance in an organisation [Generic Skills – Human Resources and Staff Management]	
4. Level	5	
5. Credit	7	
6. Competency	<p>6.1 Understand staff development initiatives</p> <p>6.2 Manage staff performance</p> <p>6.3 Manage staff appraisal</p> <p>6.4 Keep professional practice in managing staff performance and appraisal</p>	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ understand the importance of staff development ▪ understand staff performance is a means to measure the effectiveness of business operation and an opportunity for staff development initiatives <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify key goals to be achieved for the organisation ▪ communicate clearly to the staff concerned about top priority objectives to be achieved ▪ motivate staff for better performance ▪ devise incentive schemes to appeal staff for better performance <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify key objectives for each individual staff to achieve for an agreed period of time ▪ define the assessment criteria and performance requirements ▪ communicate and evaluate staff performance both during the appraisal period and at the end ▪ develop reward systems to recognize performance and the importance of the appraisal exercise <p>Be able to</p> <ul style="list-style-type: none"> ▪ apply objective criteria to performance assessment ▪ maintain consistent standard across staff on appraisal activities
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) understand staff development initiatives; and (ii) manage staff performance and appraisals.	
Remark		

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

1. Title	Acquire and protect the copyrights and IP rights related to IT	
2. Code	ITSWG523A	
3. Range	Acquire and protect the copyrights and IP rights related to IT in the context of risk management within an organisation [Generic Skills – Risk Management]	
4. Level	5	
5. Credit	4	
6. Competency	<p>6.1 Have the knowledge of copyrights and IP rights</p> <p>6.2 Acquire and protect the copyrights and IP rights</p> <p>6.3 Ensure that the appropriate copyrights and IP rights are acquired by the organisation with a high degree of expertise and professionalism</p>	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ understand the copyrights and IP rights issues involved in the organisation related to the usage of IT ▪ understand the processes of acquiring copyrights and IP rights ▪ seek clarification on any copyrights and IP rights issues from relevant people if necessary <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify the needs of copyrights and IP rights ▪ acquire the necessary copyrights and IP rights identified ▪ take actions to protect the copyrights and IP rights acquired by the organisation <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify and acquire the necessary copyrights and IP rights according to the standards and guidelines of the organisation ▪ take actions to protect the copyrights and IP rights acquired by the organisation after proper consultation with appropriate internal stakeholders and/or external legal professionals ▪ ensure that all issues concerning copyrights and IP rights of the organisation are properly managed and under control
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) ensure that the organisation will not infringe on copyrights and IP rights in the usage of IT; and (ii) properly manage and enforce the copyrights and IP rights related to IT owned by the organisation.	
Remark		

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

1. Title	Adopt and adapt international standards as appropriate	
2. Code	ITWGS601A	
3. Range	Adopt and adapt international standards for an organisation related to the development and maintenance of software products and software services so as to meet its business goals and objectives within the context of performing specific professional responsibilities and meeting organisational needs [Generic Skills – Specific Professional Responsibilities]	
4. Level	6	
5. Credit	5	
6. Competency		<p style="text-align: center;"><u>Performance Requirement</u></p> <p>6.1 Have knowledge of the relevant international standards</p> <p style="margin-left: 20px;">Be able to</p> <ul style="list-style-type: none"> ▪ identify the relevant international standards that are applicable to the organisation ▪ refer to the appropriate experts for guidance where necessary <p>6.2 Adopt international standards</p> <p style="margin-left: 20px;">Be able to</p> <ul style="list-style-type: none"> ▪ understand and apply the focuses of various international standards in the industry ▪ evaluate and identify the best standards for organisational needs <p>6.3 Adapt international standards</p> <p style="margin-left: 20px;">Be able to</p> <ul style="list-style-type: none"> ▪ comprehend the structure of the chosen international standards (e.g. interrelationship between different components of the standards) ▪ tailor and adjust the details of the standards according to local requirements <p>6.4 Set international standards</p> <p style="margin-left: 20px;">Be able to</p> <ul style="list-style-type: none"> ▪ participate in setting standards for appropriate levels of competence ▪ strive to achieve those competence standards <p>6.5 Adopt and adapt international standards in a professional way</p> <p style="margin-left: 20px;">Be able to</p> <ul style="list-style-type: none"> ▪ make use of international standards for the organisation in an efficient and effective manner ▪ take the initiative to improve international standards where appropriate ▪ obtain the endorsement of relevant stakeholders
7. Assessment Criteria	The integrated requirements of this UoCs are the abilities to: (i) adopt and adapt international standards for the organisation to meet its business goals and objectives;; and (ii) set international standards where appropriate.	
Remark		

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

1. Title	Comply with organisational policies and procedures, relevant laws and regulatory requirements
2. Code	ITSWG602A
3. Range	Comply with organisational policies and procedures, relevant laws and regulatory requirements within the context of performing specific professional responsibilities and maintaining professional competence for an organisation related to the development and maintenance of software products and software services for an organisation to meet its business goals and objectives [Generic Skills – Specific Professional Responsibilities]
4. Level	6
5. Credit	5
6. Competency	<p><u>Performance Requirement</u></p> <p>6.1 Have knowledge of regulatory requirements</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ comprehend the latest regulatory requirements applicable to the organisation ▪ refer to the appropriate experts for guidance where necessary <p>6.2 Observe rules to maintain professional competence</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ observe existing local and international laws ▪ observe organisational policies and procedures ▪ develop organisational policies and procedures in conformance with regulatory requirements ▪ obtain prior approvals for system resources and access, such as communication port, file space, other system peripherals, computer time as well as data of another person <p>6.3 Comply to organisational policies and procedures, relevant laws and regulatory requirements in a professional manner</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ 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
7. Assessment Criteria	The integrated requirements of this UoCs are the abilities to: (i) observe organisational policies and legal requirements; and (ii) obtain prior approval for system access and resources according to aforementioned policies and requirements.
Remark	

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

1. Title	Seek and provide professional peer review	
2. Code	ITSWG603A	
3. Range	Seek and provide professional peer review within the context of performing specific professional responsibilities and meeting organisational needs for an organisation related to the development and maintenance of software products and software services for an organisation to meet its business goals and objectives [Generic Skills – Specific Professional Responsibilities]	
4. Level	6	
5. Credit	4	
6. Competency	<p>6.1 Have good knowledge of issues in preparation of peer review</p> <p>6.2 Seek and provide peer review</p> <p>6.3 Deliver evaluations in a professional manner</p>	<p><u>Performance Requirement</u> Be able to understand and identify professional and legal implications, regulatory requirements, financial liabilities and potential liabilities in areas commonly found in peer review such as insurance, copyrights, software licensing and intellectual property rights.</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ seek and utilize peer review ▪ provide critical review of others' work <p>Be able to</p> <ul style="list-style-type: none"> ▪ deliver objective, thorough and credible evaluations ▪ deliver objective and comprehensive recommendations and presentations on system descriptions and alternatives
7. Assessment Criteria	The integrated requirements of this UoCs are the abilities to: (i) seek and provide peer review; and (ii) deliver evaluations in a professional manner.	
Remark		

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

1. Title	Lead and motivate a team	
2. Code	ITSWG604A	
3. Range	Lead and motivate a team in the context of managing and leading an organisation, which is related to the development and maintenance of software products and software services, to execute business strategies and plans [Generic Skills – Management and Leadership – Personal Attribute]	
4. Level	6	
5. Credit	6	
6. Competency	<p>6.1 Have knowledge of the theories and techniques of leading and motivating a team</p> <p>6.2 Apply suitable skills in leading and motivating a team</p> <p>6.3 Lead and motivate a team with a high degree of expertise and professionalism to execute business strategies and plans</p>	<p><u>Performance Requirement</u> Be able to</p> <ul style="list-style-type: none"> ▪ understand the specific and unique needs of a team ▪ understand the various theories and techniques available for leading and motivating a team <p>Be able to</p> <ul style="list-style-type: none"> ▪ analyse and diagnose the specific and unique needs of a team, referencing appropriate theories and/or methodologies ▪ reference suitable sources to assist in the analysis and diagnosis ▪ steer and align team efforts with organisational objectives ▪ motivate team members to share knowledge and experience <p>Be able to</p> <ul style="list-style-type: none"> ▪ gain the respect and trust of the team members ▪ adjust leadership and motivational skills to cater to different situations ▪ encourage full participation in meeting social responsibilities as well as quality performance ▪ lead the team to execute business strategies and plans in order to achieve results to the best of the team's capabilities and potentials
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) demonstrate effective leadership in a team situation; (ii) motivate the team towards achieving certain goals; and (iii) lead a team to execute business strategies and plans in order to achieve excellent results that are aligned with organisational objectives.	
Remark		

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

1. Title	Apply analytical methods and techniques in problem solving	
2. Code	ITSWG605A	
3. Range	Apply analytical methods and techniques in problem solving in the context of managing and leading an organisation to achieve its business goals and objectives [Generic Skills – Management and Leadership – Personal Attribute]	
4. Level	6	
5. Credit	6	
6. Competency	<p>6.1 Have knowledge of various analytical methods and techniques</p> <p>6.2 Apply analytical methods and techniques to problem solving</p> <p>6.3 Enhance effectiveness and efficiency in problem-solving in the organisation through the use of analytical methods and techniques in order to achieve its business goals and objectives</p>	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ understand the various analytical methods and techniques related to problem solving ▪ understand the IT tools, if any, available in relation to the various methods <p>Be able to</p> <ul style="list-style-type: none"> ▪ make use of the appropriate analytical methods and techniques to solve problems faced by the organisation ▪ make use of appropriate IT tools, if any, available to assist in the problem-solving <p>Be able to</p> <ul style="list-style-type: none"> ▪ apply analytical methods and techniques in the most effective and efficient manner ▪ apply IT tools, if any, to assist in the problem-solving in the most effective and efficient manner ▪ manage problem situations occurred in the process of achieving business goals and objectives and demonstrate that these problems are under control and resolved through the use of analytical methods and techniques ▪ keep stakeholders informed of the activities and progress of the problem situation
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to manage and control the problem solving process in the organisation via proper use of analytical methods and techniques in order to achieve its business goals and objectives.	
Remark		

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

1. Title	Delegate responsibilities	
2. Code	ITSWG606A	
3. Range	Delegate responsibilities in the context of managing and leading an organisation, which is related to the development and maintenance of software products and software services, in order to achieve business goals or accomplish software development projects [Generic Skills - Management and Leadership – Personal Attribute]	
4. Level	6	
5. Credit	3	
6. Competency	<p>6.1 Have knowledge of the theories and techniques of delegation</p> <p>6.2 Apply suitable skills in delegating responsibilities</p> <p>6.3 Delegate responsibilities to staff with a high degree of expertise and professionalism in order to achieve business goals or accomplish software development projects</p>	<p><u>Performance Requirement</u> Be able to</p> <ul style="list-style-type: none"> ▪ understand the specific strengths and weaknesses of each staff ▪ understand the needs for delegation ▪ understand the various theories and techniques available for delegation of responsibilities <p>Be able to</p> <ul style="list-style-type: none"> ▪ analyse the strengths and weaknesses of staff ▪ delegate responsibilities to staff according with their strengths and abilities ▪ clarify the understanding of staff on their responsibilities <p>Be able to</p> <ul style="list-style-type: none"> ▪ delegate responsibilities to staff in a clear, effective and unambiguous manner ▪ exploit the full potential of staff in the delegation, and develop staff to the best of their capabilities and potentials in achieving business goals or accomplishing software development projects ▪ achieve the best synergy among staff in the delegation
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to (i) delegate responsibilities to suitable staff; (ii) develop staff potentials via proper job / task allocations; and (iii) exploit staff's full potentials via proper job / task allocations. in order to achieve business goals or accomplishing software development projects.	
Remark		

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

1. Title	Forecast and monitor business performance	
2. Code	ITSWG607A	
3. Range	Forecast and monitor business performance for the sustainability of an organisation [Generic Skills – Business Acumen]	
4. Level	6	
5. Credit	4	
6. Competency	<p>6.1 Understand business performance reports and analytics</p> <p>6.2 Define key performance indicators</p> <p>6.3 Forecast the business performance</p> <p>6.4 Monitor the business performance</p>	<p><u>Performance Requirement</u></p> <p>Be able to interpret business performance reports and managerial accounts to monitor the current organisational performance and forecast its future performance under various business conditions/scenarios</p> <p>Be able to define key performance indicators of the organisation such as profits/loss, market share, and business growth metrics</p> <p>Be able to predict, project and forecast the business performance using statistical models based on existing business performance metrics</p> <p>Be able to monitor the business performance on an appropriate regular basis with reference to the business performance report and managerial accounts</p>
7. Assessment Criteria	The integrated requirements of this UoCs are the abilities to forecast and monitor the business performance of an organisation in accordance with the corporate governance and compliance policies.	
Remark		

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

1. Title	Identify opportunities to increase, strengthen, and enhance competitive advantage								
2. Code	ITSWG608A								
3. Range	Identify opportunities to increase, strengthen, and enhance the competitive advantage of the organisation so as to achieve its long-term business goals and objectives through the deployment of ICT application [Generic Skills – Business Acumen]								
4. Level	6								
5. Credit	4								
6. Competency	<table border="0" style="width: 100%;"> <tr> <td style="width: 60%;"></td> <td style="text-align: center;">Performance Requirement</td> </tr> <tr> <td>6.1 Identify the available ICT applications to increase, strengthen, and enhance the competitive advantage of the organisation</td> <td>Be able to identify the available ICT applications to increase, strengthen, and enhance the competitive advantage of the organisation</td> </tr> <tr> <td>6.2 Test and evaluate the use of ICT applications that can increase, strength, and enhance the competitive advantage of the organisation</td> <td>Be able to test and evaluate the use of ICT applications that can increase, strength, and enhance the competitive advantage of the organisation e.g. improve operational efficiency</td> </tr> <tr> <td>6.3 Deploy the ICT applications that can increase, strengthen, and enhance the competitive advantage of the organisation</td> <td>Be able to deploy the ICT applications that can increase, strengthen, and enhance the competitive advantage of the organisation in accordance with the organisation's guidelines as well as any (local and international) laws and regulatory requirements, if applicable</td> </tr> </table>		Performance Requirement	6.1 Identify the available ICT applications to increase, strengthen, and enhance the competitive advantage of the organisation	Be able to identify the available ICT applications to increase, strengthen, and enhance the competitive advantage of the organisation	6.2 Test and evaluate the use of ICT applications that can increase, strength, and enhance the competitive advantage of the organisation	Be able to test and evaluate the use of ICT applications that can increase, strength, and enhance the competitive advantage of the organisation e.g. improve operational efficiency	6.3 Deploy the ICT applications that can increase, strengthen, and enhance the competitive advantage of the organisation	Be able to deploy the ICT applications that can increase, strengthen, and enhance the competitive advantage of the organisation in accordance with the organisation's guidelines as well as any (local and international) laws and regulatory requirements, if applicable
	Performance Requirement								
6.1 Identify the available ICT applications to increase, strengthen, and enhance the competitive advantage of the organisation	Be able to identify the available ICT applications to increase, strengthen, and enhance the competitive advantage of the organisation								
6.2 Test and evaluate the use of ICT applications that can increase, strength, and enhance the competitive advantage of the organisation	Be able to test and evaluate the use of ICT applications that can increase, strength, and enhance the competitive advantage of the organisation e.g. improve operational efficiency								
6.3 Deploy the ICT applications that can increase, strengthen, and enhance the competitive advantage of the organisation	Be able to deploy the ICT applications that can increase, strengthen, and enhance the competitive advantage of the organisation in accordance with the organisation's guidelines as well as any (local and international) laws and regulatory requirements, if applicable								
7. Assessment Criteria	The integrated requirements of this UoCs are the abilities to identify opportunities to increase, strengthen, and enhance the competitive advantage of the organisation via deployment of ICT applications.								
Remark									

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

1. Title	Identify and assess the risk factors related to IT		
2. Code	ITSWG609A		
3. Range	Identify and assess the risk factors related to IT (e.g. software development, maintenance, and service provision) for an organisation in the context of risk management in achieving business objectives and goals [Generic Skills – Risk Management]		
4. Level	6		
5. Credit	4		
6. Competency	<table border="0" style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> <p>6.1 Understand the risk factors faced by the organisation</p> <p>6.2 Understand the processes of risk assessment</p> <p>6.3 Identify and assess the risk factors related to IT with a high degree of expertise and professionalism</p> </td> <td style="width: 50%; vertical-align: top;"> <p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ have industry specific knowledge on risks associated with IT ▪ understand the threats to organisation, personnel, and assets including information and intellectual property ▪ understand the threats to IT installations and operations <p>Be able to identify the activities involved in a risk assessment, with reference to standard methodologies and the organisation's guidelines if applicable</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ specify and analyse the risk factors related to IT faced by the organisation, according to the risk assessment processes of the organisation ▪ make appropriate use of methodologies and tools in the risk assessment processes ▪ document and consolidate the risk factors in a risk assessment report in a manner that is clear and easy to understand by all stakeholders ▪ obtain endorsement from stakeholders for the risk assessment report </td> </tr> </table>	<p>6.1 Understand the risk factors faced by the organisation</p> <p>6.2 Understand the processes of risk assessment</p> <p>6.3 Identify and assess the risk factors related to IT with a high degree of expertise and professionalism</p>	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ have industry specific knowledge on risks associated with IT ▪ understand the threats to organisation, personnel, and assets including information and intellectual property ▪ understand the threats to IT installations and operations <p>Be able to identify the activities involved in a risk assessment, with reference to standard methodologies and the organisation's guidelines if applicable</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ specify and analyse the risk factors related to IT faced by the organisation, according to the risk assessment processes of the organisation ▪ make appropriate use of methodologies and tools in the risk assessment processes ▪ document and consolidate the risk factors in a risk assessment report in a manner that is clear and easy to understand by all stakeholders ▪ obtain endorsement from stakeholders for the risk assessment report
<p>6.1 Understand the risk factors faced by the organisation</p> <p>6.2 Understand the processes of risk assessment</p> <p>6.3 Identify and assess the risk factors related to IT with a high degree of expertise and professionalism</p>	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ have industry specific knowledge on risks associated with IT ▪ understand the threats to organisation, personnel, and assets including information and intellectual property ▪ understand the threats to IT installations and operations <p>Be able to identify the activities involved in a risk assessment, with reference to standard methodologies and the organisation's guidelines if applicable</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ specify and analyse the risk factors related to IT faced by the organisation, according to the risk assessment processes of the organisation ▪ make appropriate use of methodologies and tools in the risk assessment processes ▪ document and consolidate the risk factors in a risk assessment report in a manner that is clear and easy to understand by all stakeholders ▪ obtain endorsement from stakeholders for the risk assessment report 		
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to (i) prepare a risk assessment report that reflects the risk factors related to IT for an organisation; and (ii) obtain endorsement of the report by relevant senior management.		
Remark			

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

1. Title	Develop risk mitigation strategies and plans related to IT	
2. Code	ITSWG610A	
3. Range	Develop risk mitigation strategies and plans related to IT (e.g. software development, maintenance, and service provision) in the context of risk management within an organisation in achieving business objectives and goals [Generic Skills – Risk Management]	
4. Level	6	
5. Credit	4	
6. Competency	<p>6.1 Have knowledge of current IT risk mitigation techniques</p> <p>6.2 Understand the requirements for a risk mitigation plan</p> <p>6.3 Develop risk mitigations strategies and plans related to IT with a high degree of expertise and professionalism</p>	<p><u>Performance Requirement</u></p> <p>Be able to understand current risk mitigation techniques and their strengths and weakness</p> <p>Be able to relate an organisation's risk management requirements with reference to standard methodologies and organisation's guidelines if applicable</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ develop a risk mitigation strategies related to IT that are most appropriate for the organisation; and according to the overall risk management strategies of the organisation ▪ develop the risk mitigation plans according to the risk mitigation strategies developed ▪ make appropriate use of methodologies and tools in the development of risk mitigation strategies and plans ▪ document the risk mitigation strategies and plans in a manner that is clear and easy to understand by all stakeholders ▪ obtain endorsement from stakeholders for the risk mitigation strategies and plans
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to develop a set of risk mitigation strategies and plans related to IT for an organisation which adequately mitigate the risks faced by the organisation; and are endorsed by relevant senior management and users of the organisation.	
Remark	Pre-requisite: ITSWG609A	

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

1. Title	Review risk factors related to IT, and execute and monitor risk mitigation plans
2. Code	ITSWG611A
3. Range	Review risk factors related to IT(e.g. software development, maintenance, and service provision), and execute and monitor risk mitigation plans in the context of risk management within an organisation in achieving business objectives and goals [Generic Skills - Risk Management]
4. Level	6
5. Credit	3
6. Competency	<p style="text-align: right;"><u>Performance Requirement</u></p> <p>6.1 Have knowledge about risk factors to be reviewed Be able to</p> <ul style="list-style-type: none"> ▪ understand the risk factors identified ▪ understand the risk assessment review processes <p>6.2 Execute and monitor risk mitigation plans Be able to</p> <ul style="list-style-type: none"> ▪ comprehend the activities specified in risk mitigation plans ▪ make appropriate use of methodologies and tools in the risk assessment review processes ▪ execute the risk assessment review processes ▪ monitor activities in the processes and seek clarification from relevant people if necessary <p>6.3 Review risk factors related to IT with a high degree of expertise and professionalism Be able to</p> <ul style="list-style-type: none"> ▪ identify, analyse and document the risk factors related to IT from the risk assessment review processes ▪ interpret the risk assessment report ▪ update the risk assessment report in a manner that is clear and easy to understand by all stakeholders ▪ obtain endorsement from stakeholders for the revised risk assessment report <p>6.4 Execute and monitor risk mitigation plans with a high degree of expertise and professionalism Be able to</p> <ul style="list-style-type: none"> ▪ manage and/or carry out the execution and monitoring of soft risk mitigation plans according to the standards and guidelines of the organisation ▪ ensure that proper risk control are in place ▪ make adjustment to the plan, where necessary, according to the change management procedures of the organisation ▪ obtain endorsement from stakeholders for the results of the risk mitigation plans
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) review and revise a pre-approved risk assessment report that adequately reflects the risk factors related to IT faced by the organisation for proper endorsement by the stakeholders; (ii) properly execute and monitor the risk mitigation plans; and (iii) ensure that the results of risk mitigation activities are endorsed by stakeholders.
Remark	Pre-requisite: ITSWG610A

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

1. Title	Manage changes								
2. Code	ITSWG613A								
3. Range	Manage changes within the organisation, which is related to the development and maintenance of software products and software services, for the achievement of the organisational business goals and objectives [Generic Skills - Change Management]								
4. Level	6								
5. Credit	5								
6. Competency	<table border="0" style="width: 100%;"> <tr> <td style="width: 30%;"></td> <td style="text-align: right;"><u>Performance Requirement</u></td> </tr> <tr> <td>6.1 Understand change</td> <td> Be able to <ul style="list-style-type: none"> ▪ understand the importance and need for changes ▪ understand the implications of changes </td> </tr> <tr> <td>6.2 Cope with changes positively</td> <td> Be able to <ul style="list-style-type: none"> ▪ identify if a change has occurred ▪ evaluate the impacts resulting from the change ▪ manage the change ▪ document the change </td> </tr> <tr> <td>6.3 Grasp opportunities for improvement</td> <td> Be able to <ul style="list-style-type: none"> ▪ minimize negative impacts resulting from the change ▪ leverage on the change to enjoy positive outcomes which would not have been obtained if the change had not existed </td> </tr> </table>		<u>Performance Requirement</u>	6.1 Understand change	Be able to <ul style="list-style-type: none"> ▪ understand the importance and need for changes ▪ understand the implications of changes 	6.2 Cope with changes positively	Be able to <ul style="list-style-type: none"> ▪ identify if a change has occurred ▪ evaluate the impacts resulting from the change ▪ manage the change ▪ document the change 	6.3 Grasp opportunities for improvement	Be able to <ul style="list-style-type: none"> ▪ minimize negative impacts resulting from the change ▪ leverage on the change to enjoy positive outcomes which would not have been obtained if the change had not existed
	<u>Performance Requirement</u>								
6.1 Understand change	Be able to <ul style="list-style-type: none"> ▪ understand the importance and need for changes ▪ understand the implications of changes 								
6.2 Cope with changes positively	Be able to <ul style="list-style-type: none"> ▪ identify if a change has occurred ▪ evaluate the impacts resulting from the change ▪ manage the change ▪ document the change 								
6.3 Grasp opportunities for improvement	Be able to <ul style="list-style-type: none"> ▪ minimize negative impacts resulting from the change ▪ leverage on the change to enjoy positive outcomes which would not have been obtained if the change had not existed 								
7. Assessment Criteria	The integrated requirements of this UoCs are the abilities to: (i) cope with changes positively; and (ii) grasp opportunities resulting from changes for improvement.								
Remark	This UoCs together with UoC on “Lead and motivate a team” (ITSWG604A) form a UoC cluster which allows the participants to be able to “lead and motivate teams to prepare for and enforce change positively”.								

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

1. Title	Allocate and prioritize IT and related resources	
2. Code	ITSWG614A	
3. Range	Allocate and prioritize IT and related resources for optimizing the return of investments usually under incomplete as well as inconsistent information in the context of managing resources for an organisation [Generic Skills – Resource Management]	
4. Level	6	
5. Credit	4	
6. Competency	<p>6.1 Understand IT related resources</p> <p>6.2 Find out the return of investment</p> <p>6.3 Allocate and prioritize IT and related resources</p>	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify all various types of resources including capital, labour and materials about IT industries and be able to link the relationship between these resources, usually under incomplete as well as inconsistent information ▪ quantify the related resources <p>Be able to</p> <ul style="list-style-type: none"> ▪ calculate the return of investment which seeks to identify the net profit (after tax) as a percentage of the total assets of the business ▪ calculate the return on stockholder/shareholder's equity which measures the total assets of the business less its liabilities as well as the return on total assets which is a measurement of whether or not a business is effectively using the assets <p>Be able to effectively assign the organisation's IT related resources including human resources and hardware resources to each action plan according to its priority in achieving the company's strategic plan in terms of optimizing the return of investment</p>
7. Assessment Criteria	<p>The integrated requirements of this UoCs are the abilities to:</p> <p>(i) get the full picture of IT resources and their volume usually under incomplete as well as inconsistent information for resources allocation and prioritization; and</p> <p>(ii) distribute the resources properly to each individual action plan for maximizing the return of investment under incomplete as well as inconsistent information.</p>	
Remark		

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

1. Title	Develop and maintain succession plans for human resources related to IT	
2. Code	ITSWG615A	
3. Range	Develop and maintain IT staff succession plans for the sustainability and development of the organisation to meet future needs of ICT industry related to software products and software services [Generic Skills – Human Resources and Staff Management]	
4. Level	6	
5. Credit	8	
6. Competency	<p>6.1 Have good knowledge of staff succession</p> <p>6.2 Develop IT staff succession plans</p> <p>6.3 Maintain IT staff succession plans</p> <p>6.4 Maintain sufficient workforce in organisation</p>	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ understand the importance of staff management ▪ understand the phenomenon and implications of staff turnover ▪ understand the matching of skill set requirements to established post <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify the IT organisational structure and the human resources requirements ▪ estimate changes in staffing according to historical records which may not be complete nor accurate ▪ devise strategies (external recruitment or internal rotation / redeployment) for coping with changes in staffing level ▪ document the strategies in a succession plan <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify when staff turnover has occurred ▪ identify when project has come to a phase that needs a different mix / level of staffing ▪ conduct necessary activities to cope with the changes ▪ update the succession plan with lessons learnt <p>Be able to keep human resources at optimal level for best customer services</p>
7. Assessment Criteria	The integrated requirements of this UoCs are the abilities to: (i) develop IT staff succession plan; and (ii) manage IT staff succession plan for the sustainability of the organisation. for the sustainability and development of the organisation to meet future needs of ICT industry related to software products and software services.	
Remark		

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

1. Title	Establish a business case for an IT investment	
2. Code	ITWGS617A	
3. Range	Establish a business case (as well as the assessment criteria) for an IT investment related to the development and maintenance of software products and software services for the organisation to meet its business goals and objectives [Generic Skills – Financial Management]	
4. Level	6	
5. Credit	11	
6. Competency	<p>6.1 Have good mastery on basic investment concepts</p> <p>6.2 Establish business cases</p> <p>6.3 Develop assessment criteria</p>	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ comprehend qualitative finance and investment concepts ▪ master basic quantitative finance techniques and ratios <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify the development as either an infrastructure groundwork or application development ▪ understand the importance / benefits of IT development toward organisational objectives ▪ develop the storyline for the business case <p>Be able to</p> <ul style="list-style-type: none"> ▪ list the qualitative benefits to the organisation ▪ quantify the benefits wherever possible ▪ establish baseline ratios for assessment
7. Assessment Criteria	The integrated requirements of this UoCs are the abilities to: (i) establish a business case for the software/system development; and (ii) develop assessment criteria and their baselines.	
Remark		

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

1. Title	Manage and maintain the portfolio and relationship with business partners	
2. Code	ITSWG618A	
3. Range	Manage and maintain the portfolio and relationship with business partners in the context of relationship management in an organisation to achieve its business goals and objective [Generic Skills – Relationship Management]	
4. Level	6	
5. Credit	4	
6. Competency	<p>6.1 Understand the interests of business partners</p> <p>6.2 Communicate effectively and efficiently with various types of stakeholders such as customers, colleagues, vendors/suppliers, industry peers, and business partners</p> <p>6.3 Maintain a professional relationship with various business partners</p>	<p>Performance Requirement Be able to know the needs and interests of business partners (such as stakeholders, customers, colleagues, vendors/suppliers, and industry peers)</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ communicate effectively and efficiently with various types of business partner such as customers, colleagues, vendors/suppliers, industry peers, and business partners ▪ sense, feel and identify the difficulties faced by the business partners and their bottom lines ▪ know how to stimulate or motivate the business partner <p>Be able to</p> <ul style="list-style-type: none"> ▪ maintain a professional relationship with various business partners with mutual interests ▪ manage and maintain the portfolio and relationship with stakeholders, customers, colleagues, vendors/suppliers, and industry peers in order to establish mutual respect and trust
7. Assessment Criteria	The integrated requirement of this UoCs are the abilities to manage and maintain the portfolio and relationship with business partners for an organisation so as to achieve the organisation's business goals and objectives while upholding mutual interests and establishing mutual respect and trust.	
Remark		

**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 to meet its business goals and objectives [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 for 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 for 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 of the activities and progress of software development
7. Assessment Criteria	The integrated requirements of this UoCs are the abilities to demonstrate that software development in the organisation is well managed and under control through the use of SDLC and appropriate software development process so as to help the organisation to achieve its business goals and objectives.	
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	Understand IT operations and IT processing	
2. Code	ITWGS620A	
3. Range	Understand IT operations and IT processing in order to perform IT consulting within an organisation or for an external client to meet its business goals and objectives [Generic Skills - IT Consulting / Champion]	
4. Level	6	
5. Credit	4	
6. Competency	<p>6.1 Have knowledge of IT operations and IT processing</p> <p>6.2 Apply the knowledge of IT operations and IT processing in the management of an organisation</p> <p>6.3 Enhance the effectiveness and efficiency of IT operations and IT processing in an organisation</p>	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ understand the activities involved in IT operations and IT processing ▪ understand the various factors, e.g. objectives and goals, success criteria, cost drivers, performance measurements etc., affecting IT operations and IT processing for an organisation ▪ understand IT tools, if any, available in managing IT operations and IT processing <p>Be able to</p> <ul style="list-style-type: none"> ▪ manage the activities involved in IT operations and IT processing ▪ make use of IT tools, if any, in the management of these activities <p>Be able to</p> <ul style="list-style-type: none"> ▪ manage the activities involved in IT operations and IT processing in the most effective and efficient manner for the organisation; ▪ apply appropriate IT tools, if any, in the most effective and efficient manner for managing IT operations and IT processing of the organisation ▪ demonstrate that the IT operations and IT processing of an organisation is achieving the set objectives and goals
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to demonstrate that IT operations and IT processing are well managed and under control in the organisation so as to meet its business goals and objectives..	
Remark	This UoCs is related to and may overlap with UoCs defined in the Operations & Support functional area.	

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

1. Title	Understand IT project management	
2. Code	ITSWG621A	
3. Range	Understand IT project management in order to perform IT consulting within an organisation or for an external client so as to meet its business goals and objectives [Generic Skills - IT Consulting / Champion]	
4. Level	6	
5. Credit	4	
6. Competency	<p>6.1 Have knowledge of IT project management</p> <p>6.2 Apply the knowledge of IT project management in managing IT projects for an organisation</p> <p>6.3 Enhance the effectiveness and efficiency of IT project management in an organisation to meet its business goals and objectives</p>	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ understand the activities involved in IT project management ▪ understand the various methodologies for IT project management, e.g. PMI, PRINCE2 etc ▪ understand IT project management tools, e.g. MS-Project <p>Be able to</p> <ul style="list-style-type: none"> ▪ plan the activities involved in IT projects ▪ manage the execution of these activities ▪ make use of IT project management tools in the management of these activities <p>Be able to</p> <ul style="list-style-type: none"> ▪ manage the activities involved in IT projects in the most effective and efficient manner for the organisation ▪ apply appropriate IT tools, if any, in the most effective and efficient manner for managing IT projects of the organisation <p>to meet its business goals and objectives</p>
7. Assessment Criteria	The integrated requirements of this UoCs are the abilities to demonstrate that IT projects are well managed in the organisation to meet its business goals and objectives.	
Remark	This UoCs is related to and may overlap with UoCs defined in Project Management functional area.	

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

1. Title	Understand organisational and project quality assurance	
2. Code	ITWGS622A	
3. Range	Understand organisational and project quality assurance in order to perform IT consulting within an organisation or for an external client to meet its business goals and objectives [Generic Skills - IT Consulting / Champion]	
4. Level	6	
5. Credit	3	
6. Competency	<p>6.1 Have knowledge of organisational and project level quality assurance</p> <p>6.2 Apply the knowledge of organisational and project level quality assurance for an organisation</p> <p>6.3 Enhance the effectiveness and efficiency of management in an organisation through organisational and project level quality assurance to meet its business goals and objectives</p>	<p><u>Performance Requirement</u></p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ understand the activities involved in organisational and project level quality assurance ▪ understand the various methodologies for quality assurance at organisational and project level ▪ understand IT tools, if any, for quality assurance at organisational and project level <p>Be able to</p> <ul style="list-style-type: none"> ▪ plan the activities involved in organisational and project quality assurance ▪ manage the execution of these activities ▪ make use of IT tools in the management of these activities <p>Be able to</p> <ul style="list-style-type: none"> ▪ manage the activities involved in organisational and project level quality assurance in the most effective and efficient manner for the organisation ▪ apply appropriate IT tools, if any, in the most effective and efficient manner for organisational and project level quality assurance of the organisation so as to meet the organisation's business goals and objectives
7. Assessment Criteria	The integrated requirements of this UoCs are the abilities to demonstrate that organisational and project level quality assurance is well managed in the organisation to meet its business goals and objectives.	
Remark	This UoCs is related to and may overlap with UoCs defined in the Quality Assurance functional area.	

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

1. Title	Adopt and adapt international standards concerning information security as appropriate	
2. Code	ITWGS623A	
3. Range	Adopt and adapt international standards concerning information security in order to perform IT consulting within an organisation or for an external client so as to meet its business goals and objectives [Generic Skills - IT Consulting / Champion]	
4. Level	6	
5. Credit	3	
6. Competency	<p>6.1 Have knowledge of international standards in information security</p> <p>6.2 Apply international standards in managing information security for an organisation</p> <p>6.3 Enhance the effectiveness and efficiency of information security management in an organisation through application of international standards so as to meet the organisation's business goals and objective</p>	<p><u>Performance Requirement</u> Be able to</p> <ul style="list-style-type: none"> ▪ understand the existing international standards for information security, e.g. data security and privacy ▪ understand related laws in copyrights and IP rights ▪ understand the applicability of these standards and laws to the organisation ▪ understand IT tools, if any, available for governing information security ▪ consult legal professionals and relevant experts for clarification if necessary <p>Be able to</p> <ul style="list-style-type: none"> ▪ analyse the information security needs of an organisation ▪ plan the activities required in managing information security for an organisation in accordance with applicable international standards and laws ▪ manage the execution of these activities ▪ make use of appropriate IT tools, if applicable, in the management of these activities <p>Be able to</p> <ul style="list-style-type: none"> ▪ manage the activities involved in information security management in the most effective and efficient manner for the organisation ▪ apply appropriate IT tools, if any, in the most effective and efficient manner for information security management of the organisation <p>so as to meet the organisation's business goals and objectives</p>
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to demonstrate that information security is well managed and complies with applicable international standards and laws in the organisation so as to meet the organisation's business goals and objectives	
Remark	This UoCs is related to and may overlap with UoCs defined in Security Management functional area.	

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

1. Title	Comply with relevant laws and regulatory requirements
2. Code	ITSWG624A
3. Range	Comply with relevant laws and regulatory requirements related to the industry concerned in the course of providing IT consultancy to an organisation so as to meet its business goals and objectives [Generic Skills - IT Consulting / Champion]
4. Level	6
5. Credit	1
6. Competency	<p><u>Performance Requirement</u></p> <p>6.1 Have knowledge of relevant laws and regulatory requirements related to the industry of the organisation</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ understand the existing laws and regulations that are relevant to the industry of the organisation ▪ understand the applicability of these laws and regulations to the organisation ▪ consult legal professionals and relevant experts for clarification if necessary <p>6.2 Apply the knowledge of relevant laws and regulatory requirements in providing IT consultancy to an organisation</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ analyse the legal implications related to IT projects and operations of an organisation ▪ recommend appropriate actions to comply with the relevant laws and regulations for an organisation ▪ obtain endorsement from stakeholders for these actions ▪ manage the execution of these actions <p>6.3 Enhance the effectiveness and efficiency of IT consultancy through compliance with relevant laws and regulatory requirements faced by the organisation so as to meet the organisation's business goals and objectives</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ manage and monitor the execution of actions involved in complying with relevant laws and regulations in the most effective and efficient manner for the organisation ▪ make effective and efficient use of external experts where necessary to meet its business goals and objectives
7. Assessment Criteria	The integrated requirements of this UoCs are the abilities to demonstrate that relevant laws and regulatory requirements are properly taken into consideration in the course of providing IT consultancy to an organisation so as to meet the organisation's business goals and objectives.
Remark	This UoCs is related to and may overlap with the UoCs defined in General Soft Skills functional area.

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

1. Title	Capture market and competitor intelligence	
2. Code	ITSWG625A	
3. Range	Capture market and competitor intelligence for the sustainability and development of an organisation related to the development and maintenance of software products and software services [Generic Skills – Business Acumen]	
4. Level	6	
5. Credit	4	
6. Competency	<p>6.1 Understand the existing market ecological landscape and its competitive and regulatory forces</p> <p>6.2 Identify new market and new customers</p> <p>6.3 Capture market and competitor intelligence</p> <p>6.4 Analyse and confirm collected intelligence with scientific proofs</p>	<p><u>Performance Requirement</u> Be able to comprehend the local/international market ecology and its competitive and regulatory forces behind so as to identify various existing and potential business partners and competitors</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ identify agent of changes such as technology advancement and customer needs in the various market and customer segments ▪ identify new market and new customers with market research tool <p>Be able to establish connection to and network with relevant sources of market and competitor intelligence</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ analyse and confirm that the captured market and competitor intelligence captured are genuine with scientific proofs ▪ collect market and competitor intelligence in accordance with organisation's guidelines as well as any (local and international) laws and regulatory requirements, if applicable
7. Assessment Criteria	The integrated requirements of this UoCs are the abilities to develop effective business strategy based on the captured market and competitor intelligence for the sustainability of the organisation.	
Remark		

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

1. Title	Lead and motivate a team to attain extraordinary goals and accomplish incredible task
2. Code	ITWGS701A
3. Range	Lead and motivate a team in the context of managing and leading an organisation in accomplishing unprecedented and extraordinary goals and incredible task [Generic Skills – Management and Leadership – Personal Attribute]
4. Level	7
5. Credit	12
6. Competency	<p>Performance Requirement</p> <p>6.1 Apply appropriate knowledge and skills in leading and motivating team members to exercise their fullest capabilities and capacities</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ analyse and diagnose the specific and unique needs of every team member, referencing appropriate theories and/or methodologies ▪ steer and activate team efforts to achieve extraordinary challenging organisational objectives ▪ motivate team members to exercise their fullest capabilities and capacities <p>6.2 Lead and motivate a team with a high degree of expertise and professionalism to attain extraordinary goals and accomplish incredible task</p> <p>Be able to</p> <ul style="list-style-type: none"> ▪ gain absolute respect and trust of the team members ▪ adjust leadership and motivational skills to cater to different situations ▪ activate full participation of all team members in achieving the highest performance from each of them ▪ lead the team to achieve the highest potentials and synergy to attain extraordinary goals and accomplish incredible task
7. Assessment Criteria	The integrated requirements of this UoCs are the abilities to: (i) motivate all team members to exercise their highest capabilities and capacities in achieving challenging objectives; and (ii) lead a team to achieve extraordinary goals and accomplish incredible task for an organisation.
Remark	Prerequisite: ITWGS604A

Appendix E Important Attributes of ICT Professionals

As mentioned in Paragraph 43, the Generic Skills functional area is introduced to cover the essential characteristics, attitudes, principles and values that ICT practitioners or professionals should possess. They include ethics, professionalism, business acumen, entrepreneurship skills, leadership skills, management skills, people and team skills, change management skills, communication skills, and the ability to learn.

Some of the Generic Skills are tangible. They are specified in terms of Unit of Competencies in the same way as those competencies under the other seven functional areas. As for the intangible ones, they are written in the narrative below. In spite of their intangible nature, they contribute no less to what should be expected from ICT practitioners or professionals.

Ethics and social responsibilities

Information confidentiality: ICT practitioners and professionals should respect the confidentiality of the information related to any individual because they have plenty opportunities to manage and access confidential information. They should protect the interests of the information owners and other stakeholders by not disclosing the information to any party under the Personal Data (Privacy) Ordinance in Hong Kong or relevant local laws except with appropriate permission or at the discretion of a court of law. For example, they should maintain the privacy and integrity of individuals' data. They should proactively take proper precautions to ensure the accuracy of data and to protect the data from unauthorized access or accidental disclosure to inappropriate individuals. Only the necessary amount of personal information should be collected for a specific purpose, and the information should not be used for other purposes without the consent of the individual(s). Furthermore, they shall NOT make use of any information for any personal gains or personal interest.

They should observe and enforce any policies and procedures for information retention and disposal as well as for individuals to review their records as defined by the organisations and required by local and international laws and regulatory requirements.

Honest and trustworthy: ICT practitioners and professionals have a duty to be honest and trustworthy. They should provide full disclosure of all pertinent system limitations and problems to all stakeholders. They should protect the rights and interests of all stakeholders during their professional practices. They should respect human rights to avoid any action that adversely affects such rights. They should be honest about their own qualifications and circumstances that might lead to conflicts of interest. In fact, they should proactively seek ways to avoid any conflicts of interest. They should NOT misrepresent, withhold or hide information on the capabilities of products, systems or services. They should not take advantage of the lack of knowledge or inexperience of other people. They should not engage in or associate with dishonest and fraudulent practices.

Professional dignity and responsibility: ICT practitioners and professionals should strive to deliver the highest quality of products and services. They should only work in areas that are within their professional competence. They should not claim any level of competence that is beyond their capacity. They should provide objective and reliable professional opinions. They should take professional responsibility for the work of their own and their subordinates. They should not terminate any assignment except with good reason and on reasonable notice. They should uphold the reputation and standards of the profession. They should not perform any actions that are detrimental to the good standing of the profession. They should provide objective and credible reports and recommendations when evaluating ICT systems.

Avoiding conflict of interest: Conflicts of interest interfere with objective professional judgment and make it difficult to fulfil one's duties impartially. ICT practitioners and professionals must avoid any situation that may give rise to any conflict of interest and make full and immediate disclosure to the parties concerned if any conflict should arise.

Fairness: ICT practitioners and professionals have plenty of opportunities to deal with different stakeholders in a project. They should perform professionally in a manner that is fair and reasonable to clients, business partners (providers, principals and sub-contractors), employers and fellow colleagues. They should also proactively seek to avoid and/or disclose any conflict of interest that may occur during the provision of services or products. Fairness requires impartiality, honesty and disclosure of conflicts of interest. As essential in any profession, fairness means treating others in the same way that one would like to be treated.

Respecting other people: ICT practitioners and professionals should respect other people's nationalities, traditions, customs, cultural differences, ways of life, differing opinions, feelings, and interests. All individuals should have equal opportunity to participate in, or benefit from, the use of ICT resources regardless of their race and origin, religion, nationality, gender, age, physical and mentally disabilities, and other similar factors. They shall NOT, under any circumstances, use any ICT resource to discriminate against an individual person or discriminate against an individual person using ICT resources. They should also respect the confidentiality of the information related to any individual as discussed in "Information confidentiality" above.

Respect social responsibilities and environment: ICT practitioners and professionals should respect their own social responsibilities and environment. As ICT professionals, they should help non-ICT literate people to bridge the ICT gaps by the provision of general knowledge in ICT concepts, technologies, and applications. They should also respect their colleagues and proactively collaborate and co-operate with their colleagues for a better working environment so as to provide high quality services and products. Some examples have been discussed in "Honest and trustworthy", "Professional dignity and responsibility", "Avoiding conflict of interest", "Fairness", and "Respecting other people" above.

They should also proactively seek to avoid misuses and unauthorized uses of any ICT resources as observed by any organisation regulations, any relevant local and international laws as well as regulatory requirements.

Team leading and building: ICT practitioners and professionals need to be good leaders. They should show initiative and are capable of driving other members. They should be capable of identifying potentials of their staff and delegate work and responsibilities to optimize performance and efficiency.

Contribution to society and mankind: Noting the importance of ICT, ICT practitioners and professionals should ensure that their products and services will meet social needs, and will be used in socially responsible ways in protecting the welfare of the society and mankind. They should be alert to any potential damage to the users, colleagues, employers, community and environment.

They should promote public knowledge and understanding of ICT and its applications as well as counter false or misleading concepts and applications of ICT. They should avoid any action that adversely affects the rights of other people. They should co-operate and collaborate with professionals of their own as well as other disciplines in advancing the public's ICT knowledge and understanding by contributing to the integrated efforts which may be originated from professional societies, universities, colleges, and schools. They should share technical knowledge with the public by promoting public knowledge and understanding on the impacts, limitations and consequences of ICT technologies and applications.

Communication

Language proficiency: ICT practitioners and professionals in Hong Kong should be proficient in written English and Chinese and spoken English, Putonghua and Cantonese. While English is an international language, the development of ICT in Hong Kong inevitably links to the development of China.

Listening and presentation skills: ICT practitioners and professionals should be able to communicate effectively with all stakeholders. In particular, they should be able to solicit the needs from users and present findings and designs to various stakeholders such as users, senior management and team members.

Entrepreneurship and business acumen

Visionary and creativity: ICT practitioners and professionals should possess vision, creativity, lateral thinking, and strengths to overcome limitations as well as conventions in order to realize objectives. They should not be bounded by conventional approaches and practices. They should be innovative and perseverance in actualizing vision and objectives.

Global view and vision: ICT development is highly globalised. ICT is also highly accounted for the globalisation process. ICT practitioners and professionals should have a global vision and be capable of competing globally.

Business acumen: ICT practitioners and professionals can no longer focus on technology only. They should have a good business sense. They should be able to identify business opportunities and develop business plans to capitalize on such opportunities. They should be able to analyse business viability.

Risk calculation and risk taking: Outstanding ICT practitioners and professionals should also be good entrepreneurs. They should have good judgment on taking technology and business risks that contribute to growth and new development.

Self-learning and life-long learning

Continuous professional development: The ICT industry and ICT applications are very dynamic. ICT practitioners and professionals should be active learners. They should be proactive in learning new skills (both technical and soft) and technologies and their applications in different businesses. They should be life-long learners through participation in continuous professional development activities such as education and training courses, seminars, forums, workshops, and self learning.

Appendix F English-Chinese Reference Table of Technical Terms

A

Application Integration Architecture	應用系統綜合架構
Application Software Architecture	應用系統軟件架構
Architecture (See Software Architecture)	見 Software Architecture
Architecture Framework and Vision	軟件架構的框架及遠景
Availability Management Services	可用性管理服務

B

Business Acumen	營業本領
Business Architecture	(軟件)商業架構
Business Continuity Planning	商業延續計劃

C

Change Management	變更管理
Computer Forensics (or Forensics)	電腦鑑識
Configuration Management	配置管理
Contingency Management	意外事件處理
Continuous Professional Development	持續的專業發展
Crisis Management	危機管理

D

Data Architecture	(軟件)數據架構
Database Administration and Support	數據管理及支援
Design, Development and Maintenance	設計、開發和維修

E

Embedded Software Architecture	嵌入式軟件架構
Ethics and Professionalism	道德和專業素養

F

Field Support Services	外勤支援服務
Forensics (See Computer Forensics)	見 Computer Forensics

G

Generic Skills	通用技能
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H

Help Desk / Help Desk Services	支援服務
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I

Information and Communications Technology	資訊及通訊技術
Information and Communications Technology Industry	資訊科技及通訊業

Information Management	資訊管理
Information Security	資訊保安
Information Security Governance	資訊保安管治
Information Security Management	資訊保安管理
Information Security Programme Management	資訊保安程序管理
Information System Audit	資訊系統審計
Information Technology (IT)	資訊科技
IT Consulting / Champion	資訊科技諮詢 / 支持
IT Governance	資訊科技管治
IT Planning and Budgeting	資訊科技計劃及預算
IT Service Continuity Management	資訊科技服務延續管理

M

Management of Ethics and Professionalism	道德和專業素養管理
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N

Network Architecture	(軟件) 網路架構
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O

Operations and Support	營運與支援
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P

Performance and Capacity Management Services	系統性能及能力管理服務
Problem Management Service	系統疑難管理服務
Procurement Management	採購管理
Project Communication Management	項目通信管理
Project Cost Management	項目成本管理
Project Human Resources Management	項目人力資源管理
Project Integration Management	項目綜合管理
Project Management	項目管理 (計劃管理)
Project Procurement and Contract Management	項目採購及合約管理
Project Quality Management	項目質素管理
Project Risk Management	項目風險管理
Project Scope Management	項目範圍管理
Project Time Management	項目時間管理

Q

Quality Assurance Governance (QA Governance)	質素保證管治
Quality Assurance (QA)	質素保證
Quality Management	質素管理

R

Relationship Management	關係管理
Release Management Services	軟件發行管理服務
Resources Management	資源管理
Response Management	應變管理
Risk Management	風險管理

S

Security Management Services	保安全管理服務
Service Level Management	服務水平管理
Software	軟件 (軟體)
Software Architecture	軟件架構
Software Configuration Management	軟件配置管理
Software Decommissioning	軟件停用
Software Deployment and Migration	軟件部署及遷移
Software Development	軟件開發
Software Maintenance	軟件維修
Software Product	軟件產品
Software Quality Assurance	軟件質素保證
Software Releases & Control	軟件發行及控制
Software Services	軟件服務
Software Design	軟件設計
Specific Professional Responsibilities	具體專業責任
Strategic Execution and Review	策略執行及檢討
Strategic Formulation	策略擬定
Strategic Management	策略管理
System Design	系統設計
System Operations	系統操作
System Support Services	系統支援服務

T

Technology Architecture	(軟件) 技術架構
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U

V

W

X

Y

Z