

**Information and
Communications
Technology Industry
Software Products and
Software Services
Specification of Competency
Standards**

Version 2

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Review on Development of ICT Industry

Introduction

The Education Bureau (EDB) of the Hong Kong Special Administrative Region (HKSAR) Government assisted the Information and Communications Technology (ICT) industry to setup its Industry Training Advisory Committee (ITAC) with a view to promoting the Qualifications Framework (QF) to the industry. In 2019, the ITAC kicked start the work of production of progression pathways and revision of Specification of Competency Standards (SCS) for the industry. In consideration of the present conditions and future development of ICT as well as the new skills and knowledge required, the above SCS formulated would not only set out the competency standards at various levels required by the future development of the industry, but also act as a set of unified benchmarks for human resources management. This could provide a comprehensive training framework for the improvement of the service quality of the industry.

2. This Section presents a review of the development of ICT industry including review of the global and local ICT industry development, the development of emerging technologies, impact on competency requirements and identification of Specification of Competency Standards (SCS) for update and development.

A Recap of the Global Development Trends of ICT Industry

3. The global ICT industry is under rapid development. Both business operations and personal lives are becoming more digital, more connected and increasingly more automated. According to the CompTIA research¹, the global ICT industry business is estimated to reach US\$5.2 trillion in 2020. The United States remains the largest technology market in the world representing 32% of the total business value (approximately US\$1.7 trillion). The Asia region accounts for the second largest market (21% of the total business value) with technology expenses mainly on the areas of infrastructure setup and research & development (R&D) activities. The Western Europe stays at the third position of the global technology business value with a sharing of 20%.

4. The advancement of the emerging technologies has led to the transformation of job nature and induced new skill requirements. From the Table 1.1, the top demanding new technology skills include big data analysis, app/web-enabled marketing, IoT applications, machining learning and cloud computing. According to the World Economic Forum², at least 133 million new ICT job roles will be generated globally by 2022 as a result of the new division of labour between humans, machines and algorithms. In addition to the strong demand of technology skills, management skills including creative thinking, problem-solving and negotiating are also highly required for the ICT workforce.

¹ Research Report, CompTIA (November 2019)

² www.weforum.org

Technology	Percentage of respondents that likely to adopt
User and entity big data analytics	85%
App- and web-enabled marketing	75%
Internet of things	75%
Machine learning	73%
Cloud computing	72%
Digital trade	59%
Augmented and virtual reality	58%
Encryption	54%

Table 1.1: Technologies by proportion of companies likely to adopt them by 2022 (projected)
(source: www.weforum.org)

5. Filling the knowledge and skill gaps for ICT workforce is a major challenge faced by business companies worldwide. Many companies started to develop their own training programmes to upskill their employees. The topic of ICT manpower training will further be discussed in the below paragraphs.

6. The US ICT industry has a market-oriented economy structure mainly including extensive provision of innovative technology services across different business sectors and exports of technology products and services to other countries. In 2018, the majority of the ICT workforce in US involves in the categories of Software, IT and Business Services, and Emerging Technologies development (Table 1.2).

Key Career Categories	ICT Workforce
Software	18%
Devices plus Infrastructure	17%
IT and Business Services	30%
Telecom Services	13%
Emerging Technologies (such as IoT, AI, Blockchain etc.)	22%

Table 1.2: ICT Key Career Categories of US market 2018 (Source: *CompTIA*)

7. A further breakdown of the key technology employment growth drivers of the US market from 2010-2018 is shown in Table 1.3. From the Table, the category Software Developers and Application accounts for the largest actual number of employment growth (+386,900) revealing the strong talent demand in supporting the technology service development in the past few years. For other conventional technology positions (such as System Analysts and Network Architect), the employment growth is relatively mild. On the other hand, it is observed that the categories Cybersecurity Analyst and Technology Occupation have high percentage increase of employment growth showing the rising needs of these new technology skills.

Key Technology Employment	Actual change	Percentage change
Software Developers and Applications	+386,900	+76%
IT Support Specialists	+190,200	+43%
Technology Occupation, Others*	+138,900	+69%
Systems Analysts	+90,000	+17%
CIOs / IT Managers	+82,900	+28%
Industrial Engineers	+69,800	+34%
Mechanical Engineers	+64,800	+27%
Web Developers	+58,800	+56%
Cybersecurity Analysts	+52,500	+91%
Network Architects	+50,800	+45%
Total	1,185,600	44%

Table 1.3: Key Technology Employment Growth Drivers in US (2010-2018) (Source: CompTIA)

**Note: include positions such as videogame developers, business intelligence analysts, IT project management etc.*

8. In global terms, Europe has no massive software industry³. However, Europe does innovate in ICT through technology applications in other industries. For example, BMW and Airbus are the major companies embracing the Internet of Things (IoT) to develop advanced transportation systems⁴. The telecom companies such as Vodafone, Telefonica, Nokia and Ericsson are the major multinationals with telecom operations spanning several continents. London, as one of the world's financial centers, hosts vigorous FinTech industry with keen talent demand in big data analysis and other technology-based financial services. Ireland is the second largest exporter of computer and IT services in the world that its ICT sector accounts for more than €50 billion of the nation exports per annum⁴.

9. In 2018, around 8.9 million professionals worked as ICT specialists across the 28 member states under the European Union (EU). In 2020, the European market is projected to be lacking more than 0.67 million ICT professionals due to the rapid growth of technology-driven business ecosystem⁵. Both small-medium enterprises (SMEs) and multinational companies are competing for ICT professionals for their business development. Among the spectrum of job vacancies, two segments are particularly in high demand including 1) ICT professionals with strong communication and project management skills; and 2) workforce with entry-level programming skills⁶.

³ Association for Computing Machinery (2019)

⁴ www.enterprise-ireland.com

⁵ www.eu-startups.com (2019)

10. To build the long-term strategic digital capacities and facilitate the wide deployment of digital technologies in EU, the European Commission has proposed the “Digital Europe Programme” with €9.2 billion of funding to support the EU ICT development for 2021-2027⁶. The Programme has identified several key areas for technology investment including supercomputing, artificial intelligence and cybersecurity. In addition, the Programme will provide funding to nurture advanced digital skill workforce through the following initiatives.

- Support the design and delivery of short-term trainings and courses for entrepreneurs, small business leaders and the workforce
- Support the design and delivery of long-term trainings and Master’s courses for students, IT professionals and the workforce
- Support on-the-job trainings and traineeships for students, young entrepreneurs and graduates.

11. Europe is a leading region in data privacy protection. Their General Data Protection Regulation (GDPR) provides a regulatory model that aims to protect consumers and increase control over their personal data via informed consent. For companies with business operations in Europe, the GDPR may lead to their increased compliance risks, growing costs to maintain the data storage systems and fulfill compliance requirements.

12. Israel is not a state member of EU but it has significant ICT development and achievement in recent years. Israel’s ICT industry was initially fueled by the defense-related research and development (R&D) needs. The Israel government has invested a lot to nurture the technology talents that it attracted many multinational companies, including Intel, IBM, Google, Cisco, Apple etc., to invest and setup research centres in Israel to take the advantage of the local talent. Nowadays, Israel has become the global leading ICT development hub in software, data communications, hardware design and cybersecurity. It has attracted 19% of global investment in cybersecurity, ranks number one globally in R&D expenditures per GDP, and attracts the highest rate of venture capital funding per capita in the world⁷.

Development of ICT Industry in Mainland China

13. The ICT industry is a major driving force of the Mainland China economy. It is estimated that the Mainland China ICT market reaches \$8.1 trillion in 2021 representing 55% of the national GDP⁸. The competitiveness of the Mainland China ICT companies keeps growing as the quality of domestic hardware, software, and services has continued to improve. In 2017, the Mainland China’s ICT imports totaled \$528 billion while exports totaled \$781 billion¹⁰.

⁶ www.ec.europa.eu/digital-single-market/

⁷ Start-up Nation Central (SNC) and PwC Israel (2018)

⁸ www.export.gov (2019)

14. Certain technology sectors (e.g. smart phone devices) are predicted to reach saturation that could not further boost national economy growth. It is believed that integrating ICT technologies into and transforming traditional industries will be the fuel of the future national economy growth. As announced in the China's Made in China 2025 initiative, the industrial big data and industrial internet are the two major areas to support the new development of Mainland China's technology market¹⁰. Alibaba has also listed several potential technology areas for economy growth including real-time urban simulation, development and applications of AI, 5G networks for new applications, smart vehicles and commercial applications of Blockchain. In addition, the Mainland China business companies are willing to apply and develop immersive technology (AR/VR) products for entertainment and business services markets.

15. On the other hand, technology talent supply is a critical challenge facing by the Mainland China ICT industry. The challenge is analyzed as below.

Gap between the talent supply and demand

According to statistics from China's National Bureau of Statistics and Ministry of Education⁹, the ICT industry showed demand for a total of 7.6 million educated talents in 2017, while the number of ICT graduates per year has not yet exceeded 1 million. There is a huge gap between the supply of talent and the demand for it, and the rapid development of the ICT industry will further widen this gap. The overall talent deficit is projected to rise to 12.4 million by 2020¹⁰.

Mismatch between talent quality and industry demand

As the ICT industry develops, the trend of supply chain segmentation continues to reshape the structural demand for talent. Instead of professionals who specialize in a single area, ICT talent with diverse skill sets are expected by business companies. Companies may look for talents who have a comprehensive knowledge of multiple areas such as technology, product, marketing, business, and communication.

16. To fill the gap of talent supply, some Mainland China giant technology companies (such as Alibaba and Huawei) have established their own ICT training and certification programmes with training contents focusing on their own product specifications and company standards. Beside to offering the training programmes on their own, these giant companies also seek collaboration with educational institutions to expand the supply of technology talent.

17. The Mainland China's technology policy presents another challenge on the ICT industry development. In addition to commercial concern, the Mainland China authority would also consider national security in setting up the ICT policy. For example:

⁹ <https://support.huawei.com/learning/news/>

Cybersecurity Law

On June 1, 2017, Mainland China established the first Cybersecurity law as a framework to regulate China's networks on national security grounds and for the supervision of the ICT sector more generally. The law details the security obligations of internet products and service providers, institutes rules for the transmission of data, and enhances the rules on personal data protection. Lack of clarity about how the law will be enforced remains a top concern for many ICT companies in Mainland China.

18. In view of the extensive cross-border business operations and the frequent travel between Mainland China and Hong Kong, there is a need for the Hong Kong ICT practitioners to understand the details and the compliance requirements of the relevant Mainland China's technology regulations in order to ensure smooth business operations in Mainland China.

The Greater Bay Area (GBA)

19. In 2018, the Chinese Government committed to developing an international innovation and technology hub in the Guangdong-Hong Kong-Macao Greater Bay Area (GBA) that serves as a leading force for national innovation development. To support the GBA development, the China Government has announced the following technology initiatives:

- strengthen the coordination of policies in areas such as intellectual property protection, market regulation, financial technologies, talent cultivation and the commercial application of technological achievements
- establish several major technological infrastructure facilities, cross-study platforms, as well as emerging innovative research in the GBA
- remove barriers that hinder the free flow of talent, technologies, capital, equipment, information and other innovative elements in the GBA

20. According to some study reports^{10&11}, the GBA has a high proportion of high level talent in the areas of manufacturing, consumer goods and ICT with over 25 percent having overseas learning experience and more than 30 percent holding a master's degree and above. Among the ICT relevant specialties, the majority of the talent possesses computer science qualification.

21. The reports pointed out that the demand for quality technology workforce in the GBA is particularly acute in four fast-growing industries including research and development within innovative technologies, financial services, trade and logistics, and the medical industry. R&D in technology lacks of professionals in areas of data scientists, cloud architects, user interface designers, solution engineers and artificial intelligence. There is a need to upgrade the gap of the current technology workforce in the GBA.

¹⁰ GBA talent study report by the Tsinghua University's School of Economics and Management and LinkedIn in 2019

¹¹ Decoding the Outline Development Plan for Guangdong-Hong Kong-Macao Greater Bay Area 2019

22. The reports examined that among the GBA eleven cities, Shenzhen, Guangzhou and Hong Kong are rated as the top cities where digital talent is concentrated. It is further analyzed that Guangzhou has the most balanced talent distribution among industries; Shenzhen highlights the talent in ICT relevant industries while Hong Kong mainly has talents in the financial and education industries.

23. According to the reports, the number of talent exchange between Hong Kong and other GBA cities lags far behind that of Shenzhen and Guangzhou. There is room for Hong Kong to further strengthen talent exchange with other GBA cities especially the necessity for favorable policies to incentivize the youth of Hong Kong.

24. In summary, the development of emerging technologies is changing the global business ecosystem. Different nations have been setting up policies to support and upgrade the ICT skill workforce training. The demand for ICT workforce with new skills/knowledge is keen especially in the areas of big data analysis, AI, cybersecurity, IoT applications and cloud computing etc. Business companies has also positioned ICT as an integral part of their strategy planning process that the ICT workforce is also expected to enhance their competence in business management. In addition to university academic path, industry professional training/certification could be considered as an alternative pathway to fill up the technology gap of ICT workforce. If university programmes and/or industry certifications are developed with reference to industry competence standard, it would facilitate the recognition of the outcomes of training by the industry.

Development of ICT Industry in Hong Kong

25. In 2017, the ICT industry generated US\$13.6 billion of value added, contributing to round 4% of the Hong Kong GDP.¹² The ICT infrastructure of Hong Kong plays an important role to maintain its leading business position in the Asia-Pacific region especially in the age of e-business and digital social media. According to the Global Innovation Index 2019, Hong Kong ranked fourth worldwide in technological infrastructure. The ranking indicates the readiness of the Hong Kong's infrastructure and market to support the development of digital economy.

26. In the following paragraphs, the Hong Kong ICT industry would be reviewed from the public policy, economic, social and technological aspects to explore the future development direction of the industry.

Public Policy Factor

27. Focusing on technology related public policies, the two major initiatives including the Hong Kong Smart City Blueprint and the Greater Bay Area would definitely impact on the coming Hong Kong ICT industry development and the technology talent requirements.

¹² "2018 Economic Background and 2019 Prospects", HKSAR Government

Smart City Blueprint

28. In 2017 the HKSAR Government published the Smart City Blueprint¹³ outlining the Government's vision to build Hong Kong into a world-class smart city. The Blueprint covers six areas including "Smart Mobility", "Smart Living", "Smart Environment", "Smart People", "Smart Government" and "Smart Economy". Three digital infrastructures will be developed to support the Smart City Blueprint including "eID", "Pilot Multi-functional Smart Lampposts Scheme" and "Next Generation GovCloud and Big Data Analytics Platform".

29. According to the study by Sharing Economy Alliance¹⁴ in 2018, Hong Kong came last in developing innovation and technology out of other Asian cities such as Taipei, Shenzhen, Seoul and Singapore. Lack of sufficient technology talent supply is considered as a major factor of holding back the Hong Kong smart city development. According to a study report¹⁵, over 70% of the Hong Kong CIOs commented that IT security, software/application development (including Java/Python developers and UI developers etc.) and database management are the most difficult functional areas to source skilled IT workforce.

30. To support the ICT industry development and talent development, the HKSAR Government has announced the following policies in recent years.

2017 Government Policy Address

- Earmarked HK\$500 million for the Innovation and Technology Bureau (ITB) to help the government in applying technology to improve the quality of public services
- Promoted establishment of a Common Spatial Data Infrastructure (CSDI) to enable sharing of geospatial data and support the Smart City Blueprint of Hong Kong
- Introduced the Technology Voucher Programme to facilitate the adoption of technology by small-and-medium enterprises (SMEs) for upgrading and improving productivity

2018 Government Policy Address

- Injected \$20 billion into the Research Endowment Fund of the Research Grants Council and launched a \$3 billion Research Matching Grant Scheme
- Expedited re-industrialization by establishing a \$2 billion re-industrialization funding scheme to subsidize manufacturers to set up smart production lines in Hong Kong and allocating \$2 billion for building manufacturing facilities required by the advanced manufacturing sector in industrial estates
- Promoted technology transfer by increasing the funding support to the Technology Transfer Offices of universities, the Technology Start-up Support Scheme for Universities, as well as the State Key Laboratories and Hong Kong branches of the Chinese National Engineering Research Centre

¹³ <https://www.smartcity.gov.hk/>

¹⁴ <https://sharingcitiesalliance.com/>

¹⁵ Robert Half Technology Salary Guide 2019

2019 Government Policy Address

- Extended the coverage of the Technology Talent Admission Scheme to companies outside the Hong Kong Science and Technology Parks Corporation and Cyberport and to cover new technology areas
- Extended the coverage of the Researcher Programme, Postdoctoral Hub and Public Sector Trial Scheme to all technology companies conducting research and development activities
- Injected \$500 million into the Social Innovation and Entrepreneurship Development Fund to further promote social innovation

2018-19 Government Budget

- The Government identified four areas for technology development including biotechnology, artificial intelligence, smart city and financial technologies (Fintech). Additional funding was allocated to promote the innovation and technology development that include:
 - HK\$10 billion additional injection to the Innovation Technology Fund (ITF)
 - HK\$10 billion to support the establishment of two research clusters on healthcare technologies, artificial intelligence and robotics technologies
 - HK\$200 million to Cyberport to enhance support for start-ups and promote development of a digital technology ecosystem
 - HK\$100 million to Cyberport to promote the development of eSports

Integration with the Greater Bay Area (GBA)

31. Shenzhen has a strong pool of ICT talent while Hong Kong mainly has talents in the financial and education industries. The Hong Kong Government has reviewed its role in the GBA development by changing from a connector to being a more proactive participant with the following technology related initiatives¹⁶.

32. The four fast-growing industries in the GBA includes research and development of innovative technology, financial services, trade and logistics, and the medical industry. The above initiatives by the HK Government could support the technology talent demand of R&D activities, FinTech and trade and logistics. On the other hand, Hong Kong has existing advantage of providing high standard medical service. Future development of digitalization of the industry operation should have great potential market in Hong Kong and the GBA.

33. The development of Hong Kong Smart City and the GBA would continuously drive substantial demand of technology talent. It is observed that the Hong Kong's R&D investment has kept improving. According to the WIPO (World Intellectual Property Company)¹⁷, Hong Kong ranked 13th worldwide under the Global Innovation Index (GII)¹⁸ in 2019 as compared to 16th in 2017. The ranking in 2019 is also the third position in Asia that just

¹⁶ Decoding the Outline Development Plan for Guangdong-Hong Kong-Macao Greater Bay Area 2019

¹⁷ Global Innovation Index (2019)

¹⁸ <https://www.globalinnovationindex.org/Home>

behind Singapore and South Korea. On the other hand, together with the Shenzhen innovation and technology sector, the Shenzhen-Hong Kong technology cluster ranked the world's second largest on the GII 2018. It is expected the continuous investment on R&D schemes could further support the R&D talent supply for the ICT industry growth.

Other Government Policies

34. In the 2017-18 Budget, the Financial Secretary highlighted eSports as a new potential sector to boost the local digital entertainment and ICT industries. The Hong Kong Government has injected a funding of HK\$100 million to Cyberport to promote the development of eSports. Although Hong Kong is not a major game development hub, the development of eSports industry could induce other demand of technology talent including digital content production, social media marketing, network infrastructure setup and online broadcasting etc.

35. The Hong Kong's start-up ecosystem keeps growing in recent years with the increasing funding supports. According to the survey by InvestHK¹⁹, in 2017, there is a record of steady growth of the number of start-ups (+16%) and the number of staff employed in these start-ups (+21%) as compared with the previous year. Major focus of the Hong Kong ICT start-ups includes software as a services (SaaS), Internet of Things (IoT), data analytics, biotech, Artificial Intelligence (AI), robotics, Virtual Reality (VR) and Augmented Reality (AR). In terms of application development, Fintech, Smart City and Smart Home, healthcare and big data applications are also popular. The growth of the local start-up ecosystem is benefited by the increasing investment on R&D activities from the Hong Kong Government, and the global and local trend of emerging technology applications in finance and e-business sectors.

Economic Factors

36. The high rent in Hong Kong has speeded up the companies' pace to develop e-business²⁰ in order to reduce the rental cost. It is estimated that the revenue in the Hong Kong e-business market amounts to US\$4,784 million in 2019 while the revenue is expected to show an annual growth rate of 7.9%, resulting in a market volume of US\$6,484 million by 2023²¹. To catch up the rapid growth of e-business market, business companies have to consider which technologies fit into their business the best. According to a study report (Table 1.5), building omni-channel business platforms and social media platform for consumer engagement are the most important concern by Hong Kong companies, followed by big data application development. The rapid development of e-business depends on the supply of technology talent including digital media production and marketing, big data applications and mobile apps development etc..

¹⁹ <https://www.investhk.gov.hk/en.html>

²⁰ Definition of e-business: "all business activities conducted through electronic means, including all business activities involved in various stages of the business cycle from marketing, advertising, ordering, delivery, payment to stock replenishment." (www.legco.gov.hk)

²¹ KPMG and GS1 Survey Analysis (2017)

Area		Percentage
1	Building omni-channel business platforms	31
2	Popular social media platform for consumer engagement	25
3	Adopting big data analytics	17
4	Building up mobile commerce	11
5	Adopting Internet of Things	9
6	Adopting cloud computing technologies	6
7	Others	1

Table 1.5: The most important digital innovation technology for business development
(Source: KPMG and GS1 Survey Analysis (2017))

37. Online cross-border trading is another growth area for the Hong Kong business companies especially for e-business in China. According to Agreement Ten of the Mainland and Hong Kong Closer Economic Partnership Arrangement (CEPA) Supplementary²², service providers in Hong Kong are allowed to set up joint ventures to provide online data processing and transaction processing business (operating e-business sites) in Guangdong province. Hong Kong business companies could make use of the support from CEPA to strengthen the development of the cross-border e-business in the Mainland.

38. More companies are entering the Hong Kong's FinTech sector to offer innovation solutions to the local and global markets in areas such as payment systems and data analytics. To support the development of Hong Kong FinTech market, the Hong Kong Monetary Authority (HKMA) has launched the upgraded version of the FinTech Career Accelerator Scheme to nurture the talent. In addition, in the 2017-18 Budget, the Hong Kong Government has provided HK\$2 billion for the technology start-ups to support the FinTech industry. It is expected that the talent demand in relevant FinTech areas would keep growing.

39. Hong Kong is developing data center business by taking its advantages including location as an international investment hub, free flow of information and proximity to the Mainland China. The development drives the talent demand of data scientists and cyber security specialists.

40. It is also observed that more Hong Kong technology and business companies are moving towards to a more Agile methodology of project-based work to replace the waterfall management approach. Companies hiring management staff are therefore, looking for candidates who are not only technically capable but also have the software skills (such as collaboration and adaptability etc.) to work in an Agile workplace.

²² "Overview of Internet in Hong Kong", HKTDC Research

41. On the other hand, the Mainland China recorded a slowdown of economy growth with the 2018 GDP at 6.5% only, which is the lowest in the past 28 years. However, the giant technology company Alibaba reported that their ebusiness sales volume was still under double-digit growth despite the overall slowdown of the nation economy. Alibaba commented that their business growth heavily depends on the rapid and diversified development of ebusiness marketing channels.

Social Factors

42. Social factors, including population statistical data such as the age of population and its distribution, their education, living attitude and consumption pattern, etc., will affect the preference of consumers, thus influencing their demands on different products and services.

43. Hong Kong's communications and Internet infrastructure is advantageous to the development of online shopping, especially for the younger generation. According to a survey²³, Hong Kong ranked tenth in the Asia Pacific region on the popularity of online shopping (with China ranked the first and India ranked the second). By considering the factors affecting online shopping behavior, secure payment facility remains to be a top factor, along with the reputation of the website or merchant and the items' prices or monetary value. As online shopping continues to develop as one of the most significant consumption activities in Hong Kong, it would further drive the demand of technology talent in areas of digital media production, digital marketing, cybersecurity and mobile apps development etc.

Technology Factors

44. The comprehensive and advanced ICT infrastructure in Hong Kong includes the 100% coverage of mobile network, the fastest Internet connection speed in the world, numerous free public Wi-Fi points and high mobile device penetration rate.

HK ICT Infrastructure	Figures
Mobile Services	
▪ Mobile network operators	4
▪ Mobile subscriber penetration rate	259.9%
▪ Mobile broadband customers (2.5G/3G/4G)	18,573,243
Internet Services	
▪ Registered customer accounts with broadband access	2,699,029
▪ Household broadband penetration rate	93.2%

Table 1.6: Key statistics of ICT infrastructure in Hong Kong
(Source: Office of the Communications Authority)

²³ "Hongkongers Continue to Embrace Online Shopping", Mastercard Survey (2018)

45. The ICT infrastructure could well support local and overseas business companies to carry out frequent e-business activities and foster the development of technology-based business applications. With the growing demand on obtaining faster and reliable consumer service, business companies are driven to further develop business and technology applications. In addition, Hong Kong's advancement of data centre and cloud computing service also supports business companies to develop innovation and technology initiatives to meet the local and global business opportunities brought by emerging technologies.

Impact on Competency Requirements and Manpower Development in Hong Kong

46. The increasing adoption of internet stimulated the growth in all facets of economic interactions that achieving the global transferability of skill and knowledge. The ICT industry itself also breaks the geographical constraint especially through the flourishing global outsourcing services. An advantage of the Hong Kong ICT professionals is their language competency of Chinese and English communication that enable them to work with clients from Mainland China and other countries. The language competency is important in matters of collection and preparation of the system specifications, communication with clients and preparation of the user manual etc. In particular, the China Government's initiative to develop the Greater Bay Area (GBA) into an international innovation and technology hub would continuously drive substantial demand of technology talent.

47. ICT is a vast sector that is continuously splintering off into subsectors. There is an array of career paths for professional development. As the impact of digitalization is growing exponentially, the global technology manpower demand is keen. ICT professionals could develop themselves into different technology specialists to catch the new technology career opportunities. On the other hand, ICT is a team-based industry requiring professionals with transversal skills including communication, problem solving, collaboration, project management and team skills. The ICT professionals could also further develop their career into different managerial positions.

48. Major emerging technologies, including Blockchain (distributed ledger technology), Artificial Intelligence (AI), Virtual Reality (VR), Internet of Things (IoT), 5G network and Cloud computing etc., are rapidly redefining global business and society development. The new business ecosystem however, has brought several challenges to the business companies today including the demand of production efficiency, expansion into new markets and the competition on new products for a global consumer base. Business companies have to consider which technologies fit into their business the best. They have to place more priority on how technologies could support potential market penetration across different channels, how to apply the technologies to enhance customer services and how technologies could innovate their business. Large number of ICT professionals now are therefore, employed by companies from different industry sectors. For instance, the IDC Research (IDC FutureScape: WorldWide IT Industry 2019) indicated that 46% of the US ICT workforce is employed by technology companies while 56% of the ICT workforce is employed by companies from different industry sectors.

49. The increasing adoption of ICT in government and public utility organizations has brought advancement in public service standard in terms of improving efficiency and transparency. To deliver more robust and user-friendly digital services to citizens, many cities have been increasing the investment on technology hardware and manpower development. A stable source of ICT professionals is crucial to deploy and maintain these digital services as any failure of the systems, such as the electricity and telecommunication systems, would bring adverse impact to the society operation. Therefore, there is a need to have a well-established framework to develop and monitor the competency requirements for the ICT professionals, and to recognize their standard of competency, particularly in the new technology areas.

50. The advancement of the emerging technologies has led to the transformation of job nature and induced new skill requirements. From the Table 1.1, the top demanding new technology skills include big data analysis, app/web-enabled marketing, IoT applications, machining learning and cloud computing. According to the World Economic Forum²⁴, at least 133 million new ICT job roles will be generated globally by 2022 as a result of the new division of labour between humans, machines and algorithms. In addition to the strong demand of technology skills, management skills including creative thinking, problem-solving and negotiating are also highly required for the ICT workforce.

Technology	Percentage of respondents that likely to adopt
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(source: www.weforum.org)

Identification of Competency Standards for Updating and the Vocational Qualifications Pathways (VQP)

51. Having reviewed the development of ICT industry and the impact of development of emerging technologies, this section provides a suggested list of emerging areas and management skills for updating the competency standards in order to support the Hong Kong ICT industry development, and for the technology workforce catching up with the competence requirements in view of technology development. To make sure the competency requirements are relevant and applicable to that of principal job posts in the industry, the VQP under respective emerging area has been drawn up with reference to the Manpower Survey Reports and in consultation with relevant stakeholders to serve as a basis for working out the competency requirements. The emerging areas

²⁴ www.weforum.org

and management skills identified are listed below:

1	Emerging Area	AI/Machine Learning
	Proposed Functional Area(s)	Design, Development and Maintenance / Software Products & Software Services Application Support / Operation and Support
	Details of competency requirements	Architecture design of the software/system, requirement identification of software release, risk assessment, testing, online payment, payment security

2	Emerging Area	Cloud Computing
	Proposed Functional Area(s)	Architecture / Software Products & Software Services Network Support / Operation and Support
	Details of competency requirements	Cloud adoption – infrastructure concern, business workflow reconfiguration, risk management and resources optimization for cloud computing

3	Emerging Area	Information Security
	Proposed Functional Area(s)	Information Security / Software Products & Software Services Security Support / Operation and Support
	Details of competency requirements	Cybersecurity policy setup, evaluation and management of cybersecurity threats, development and implementation of security measures, plan for disaster recovery, stakeholder management in relation to cybersecurity issues

4	Emerging Area	Data Science
	Proposed Functional Area(s)	Design, Development and Maintenance / Software Products & Software Services Application Support / Operation and Support
	Details of competency requirements	Database administration, predictive analytics, data visualization, data management/policy

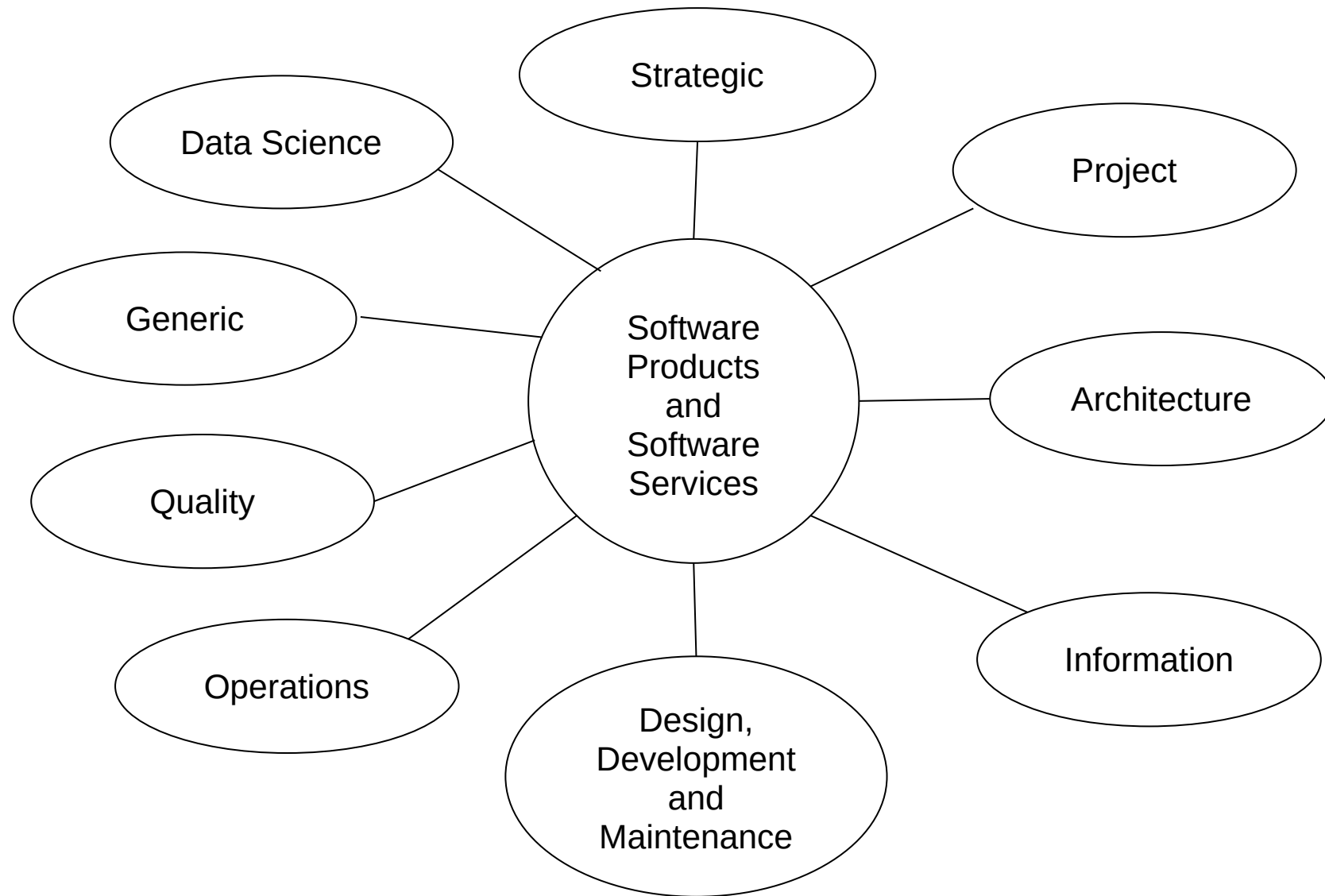
5	Emerging Area	eSports Technology
	Proposed Functional Area(s)	DMT architecture / Digital Media Technology
	Details of competency requirements	Network infrastructure setup, online broadcasting, cost optimization, troubleshooting,

6	Emerging Area	Internet of Things (IoT)
	Proposed Functional Area(s)	Architecture / Software Products & Software Services Systems & Hardware Support / Operation and Support
	Details of competency requirements	Business operation model with IoT, hardware/software requirements

7	Management Skills	
	Proposed Functional Area(s)	Strategic Management / Software Products & Software Services Project Management / Software Products & Software Services
	Details of competency requirements	Innovation management, the role of ICT in business strategy setup, regulatory compliance (including Mainland China and Europe Union ICT policies)

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Functional Map for Software Products and Software Services Branch



Chapter 3

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

UoCs in Strategic Management

1. Title	Monitor the IT governance process	
2. Code	ITWSM501A	
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	<u>Performance Requirement</u> 6.1 Understand the definition and establishment of IT governance Be able to know the definition and establishment of IT governance in compliance with the local and international regulatory requirements 6.2 Execute the IT governance processes Be able to execute the IT governance processes under the governance structures and best practices 6.3 Monitor and control the progress of the execution of IT governance processes Be able to monitor and control the progress of the execution of IT governance processes 6.4 Review and report the progress of executing the IT governance processes Be able to review and report the progress of executing the IT governance processes 6.5 Update the IT governance processes Be able to update and improve the IT governance processes so as to respond to changing events, if necessary 6.6 Execute, monitor and review the IT governance processes in a professional manner 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	
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	ITSWSM502A	
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	<u>Performance Requirement</u> 6.1 Have good knowledge of IT business models Be able to ▪ understand the importance of adopting business models in IT departments ▪ comprehend popular IT business models 6.2 Understand IT organisational needs Be able to ▪ 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 6.3 Formulate IT business models Be able to ▪ 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	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	<u>Performance Requirement</u> 6.1 Have good knowledge of IT budget planning Be able to ▪ understand the importance of documenting an IT budget plan ▪ understand the structure of an IT budget plan 6.2 Identify the elements and information for preparing for an IT budget Be able to ▪ 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 6.3 Formulate an IT budget plan Be able to formulate plans for ▪ 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	6.1 Have knowledge of contingency plans 6.2 Evaluate the plan through testing 6.3 Conduct training and exercise to involved personnel	<u>Performance Requirement</u> Be able to understand thoroughly about the contingency plan and its appropriate procedures in various scenarios 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 ▪ 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 Be able to arrange the following two different formats of exercises for the appropriate personnel ▪ 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 Be able to provide training, in complementary to the above exercises, at least annually to newly recruited staff with the following plan elements ▪ purpose of the plan ▪ cross-team coordination and communication ▪ reporting procedures ▪ security requirements ▪ team-specific process ▪ individual responsibilities

	6.4 Handle the notification of the contingency events 6.5 Make professional damage assessment 6.6 Activate the disaster recovery plan and provide professional support 6.7 Carry out reconstitution steps after recovery	Be able to ensure that notifications of contingency events to the specific personnel are effective ▪ 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 Be able to ensure that the Damage Assessment Team carry out the appropriate damage assessment procedures as defined in the contingency plan Be able to ▪ 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 ➤ an action is not completed within the expected time frame ➤ a key step has been completed ➤ items must be procured ➤ other system-specific concerns Be able to ensure the organisation returns to normal operation after the system is restored and tested
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (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	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	6.1 Understand the cyclic activities on data or information upon their processing 6.2 Recognize the shortfalls in traditional data management 6.3 Justify the needs and set applicable procedures to perform Information Life-cycle Management (ILM)	<u>Performance Requirement</u> Be able to ▪ 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 Be able to list the shortfalls in traditional data management such as ▪ 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 Be able to ▪ 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 ➢ redundancies and irrelevant data; ➢ version control problem; ➢ unnecessary data volume; ➢ hardware, software and supporting staff costs ▪ set up systematic procedures to ➢ 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 ▪ 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	Establish a business continuity planning strategy
2. Code	111209L5
3. Range	Determines the competencies for defining cloud computing application continuity and recovery policies
4. Level	5
5. Credit	3 (for reference only)
6. Competency	Performance Requirements 6.1 understand the value of BCP in business operation; including reducing financial and operational impacts and ensuring the survivability of the corporation under different scenarios 6.2 Obtain executive support in BCP ● articulate the importance of BCP to an organisation's business upon unexpected interruption ● appreciate how the development and application of emerging technologies support business continuity ■ provide regular backups and easy failover ■ reduces downtime ■ reduce impact from cyber attacks ■ reduce the cost of maintaining a costly physical mirror site ■ eliminate the software synchronization ● obtain senior management commitment and full support on the execution of BCP in the organisation 6.3 Build business continuity model ● 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 6.4 Define performance indicators ● 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

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	111210L5
3. Range	Formulate IT plans to illustrate the IT business model
4. Level	5
5. Credit	6 (for reference only)
6. Competency	Performance Requirements 6.1 Have good knowledge of IT business plans ● Be able to ■ understand the importance of documenting an IT business plan ■ understand the structure of an IT business plan 6.2 Develop the plans according to the objectives of the organisation ● Be able to ■ identify the IT business models of the organisation ■ identify the prioritised objectives for the whole organisation to achieve ■ develop the plan to fit the models and objectives above ■ account for new technologies and the potential adaption of them to enhance IT plans 6.3 Formulate IT business plans ● Be able to formulate IT plans, such as (but not limited to) the following: ■ hardware and software deployment and updates ■ software development and maintenance ■ procurement ■ IT outsourcing ■ IT services ■ IT infrastructure remodelling (e.g. replacing on-site network/storage with cloud services) ● Identify new technologies that are aligned to the organisation's goals and integrate them into IT plans for the benefit of the organisation 6.4 Exhibit professionalism ● Comply with the organisation's guidelines and procedures as well as any (local and international) laws and regulatory requirements, if applicable ● Stay up to date with the new developments related to the IT industry and the organisation's industry

7. Assessment Criteria	The integrated outcome requirements of this UoC are the abilities to : ● formulate detailed IT business plans for the benefit of the organisation. ● refine IT business plans to implement technological updates that align with the organisation's goals
8. Remark	This UoC replaced ITSWSM503A "Formulate IT plan"

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

1. Title	Project the potential costs, benefits and ROI of IT project
2. Code	111211L5
3. Range	This UoC involves preparing and assembling a preliminary cost model so that an IT project can be completed within an approved budget and achieve the target Return On Investment (ROI)
4. Level	5
5. Credit	3 (for reference only)
6. Competency	Performance Requirements 6.1 Understand the budget planning of IT project ● understand the structure of an IT budget plan ● identify the existing available resources of the company ● identify the resources requirements of the IT business plan ● compute the cost of extra resources to acquire for budgeting ● conduct amortization of the current resources and factor the cost into the budget 6.2 Review the existing business strategies and policies against the business trends and business performance of the organisation ● examine the business performance against the identified performance indicators of the organisation ● analyse the effectiveness of the existing business strategies and policies in achieving business performance and matching with the business trends ● perform a SWOT analysis for an organisation to develop business strategies and policies that bring reasonable and acceptable Return of Investment (ROI) 6.3 Formulate an IT budget plan ● analyse the resource requirement above according to the IT plans ● develop and present a coherent budget plan according to industry standards ● regularly review the budget plan in accordance with the organisation's business goals as well as compliance requirements, and make adjustment whenever appropriate
7. Assessment Criteria	The integrated outcome requirement of this UoC is the ability to prepare a coherent budget plan according to IT business models and IT plans of the organisation
8. Remark	

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

1. Title	Manage marketing and public relation plans
2. Code	111217L5
3. Range	Manage the marketing and public relation plans for an organisation to promote the organisation brand, market products, control damages and build goodwill with the organisation's customers.
4. Level	5
5. Credit	6 (For Reference Only)
6. Competency	Performance Requirements 6.1 Possess knowledge in the subject area ● Understand the organisation's mission and vision and its business strategies ● Familiar with the organisation's structure, business model and the brands and products under the organisation ● Possess strong communication skills and be able to articulate in written and spoken words ● Experienced with handling different categories of parties (media, consumers, colleagues, investors and public) and different levels of people ● Know marketing strategies and tactics for analysing and researching on market trend 6.2 Manage marketing and public relation plans ● Understand the marketing and public relation plans ● Ensure that the organisation have a unified image across all media as defined by the marketing and public relation plans ● Identify the target audience of a marketing campaign to ensure the key messages are communicated efficiently and effectively. Also, identify the public's current attitude to the situation to allow tailoring of key messages ● Formulate the key message of the campaign based on the known goals and objectives ● Ensure that the plan is carried out in accordance with the time frame ● Formulate and implement monitoring controls to measure the effectiveness of the campaign ● Launch the campaign with suitable media coverage. Take note of which journalists reported in the organisation's favour and which didn't. ● Analyse the overall amount of positive, negative or neutral coverage received and identify the effective marketing platforms.

	● Ensure all associated parties are notified and invitations are sent ● Formulate reports to record and report the effectiveness of the plan ● Respond to public relations crises in a timely manner 6.3 Exhibit professionalism ● Manage the marketing and public relation plans in accordance with the organisation's guidelines as well as any (local and international) laws and regulatory requirements, if applicable ● Always maintain a proper balance of interests between the company and all stakeholders (internal and external)
7. Assessment Criteria	The integrated outcome requirements of this UoC are the abilities to : ● Manage and market the brands and products/services provided by the organisation ● Communicate effectively at all levels with internal and external parties to understand the objectives of the PR plans ● Successfully implement the plans
8. Remark	This UoC replaced the following UoCs: 1. ITWSM508A "Manage product/services brand through the use of IT" 2. ITCSSG403A "Implement Public Relation Plans"

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

1. Title	Establish contingency and risk mitigation plans
2. Code	111218L5
3. Range	Establish contingency and risk mitigation plans for an organisation related to its IT operations. This UoC concerns competencies for identifying and assessing the risk factors related to the IT operations of the organisation with a high degree of expertise and professionalism.
4. Level	5
5. Credit	6 (for Reference only)
6. Competency	Performance Requirements 6.1 Possess knowledge in the subject area ● Possess extensive knowledge of different contingency and risk mitigation plans related to an organisation IT operations ● Fully in tune with the organisation's business objectives and goals ● Understand the different types of contingency related plans and how they are related to each other ● Proficient with project management and risk management methodologies ● Understand the organisation's IT needs and operations ● Critically understand the business impacts and preventive controls ● Aware of new technologies options and digital transformation opportunities that could provide a better contingency and enhance risk mitigation ● Work with colleagues and communicate plans and policies effectively 6.2 Establish contingency and risk mitigation plans ● Identify critical IT resources ● Identify potential IT related risks that the organisation could face ● Assess the risks to identify the degree of severity and the likelihood of the risks ● Understand the potential impact to the business if IT resources outage occurred ● Based on the result of the analysis, define a set of procedures to mitigate the risk ● Identify preventive controls and integrate them into the system architecture ● Develop contingency plan ● Ensure risk mitigation plans and contingency plans are well documented and well understood by the associated personnel ● Periodically review plans to ensure that new technologies are

	incorporated to enhance plans performance 6.3 Exhibit professionalism ● Ensure the plans developed are in accordance with the organisation's guidelines as well as any (local and international) laws and regulatory requirements, if applicable ● Always take into consideration and strike a proper balance among all related technological, political, social, environmental and legal factors
7. Assessment Criteria	The integrated outcome requirements of this UoC are the abilities to : ● Identify potential IT related risks that the organisation ● Establish contingency and risk mitigation plans for the organisation that aligned with the organisation's guidelines as well as any (local and international) laws and regulatory requirements ● Document the plans and ensure all associated personnel understand the plans
8. Remark	This UoC replaced the following UoCs: 1. ITSWG609A "Develop business continuity plans and disaster recovery plans related to IT" 2. ITCSSG501A "Formulate risk mitigation strategies and plans" 3. ITCSSG512A "Develop business continuity and disaster recovery plans"

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	<u>Performance Requirement</u> 6.1 Understand the business strategies and policies of an organisation Be able to know the business strategies and policies of an organisation with respect to business-IT alignment and enablement 6.2 Understand international standards and regulatory requirements Be able to understand international standards and regulatory requirements 6.3 Understand related issues in information security and related laws of intellectual property Be able to know related issues in information security (e.g. data security, authentication, integrity and privacy) and related laws including copyrights and IP rights etc 6.4 Formulate IT strategies and policies of an organisation 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	
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	6.1 Have knowledge about the functions of the tactical plans 6.2 Have knowledge about the mission statement and the goals on IT strategies of the corporation 6.3 Define relevant tactical plans according to the approved IT strategies in a professional manner 6.4 Identify the criteria for each individual tactical plan in a professional manner	Performance Requirement Be able to state the objectives of formulating tactical plans for supporting the pre-defined strategic plan. Be able to list the corporation's mission statement and their related goals accurately. Be able to formulate respective tactical plans according to each particular goal with distinct objectives Be able to convert each individual plan into project items and give clear project information such as ▪ 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	<u>Performance Requirement</u> 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 6.2 Coordinate the execution of approved IT strategies and plans Be able to ▪ 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 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 6.4 Monitor and review the progress of each tactical plan Be able to ▪ 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 6.5 Report the progress on the action plans Be able to ▪ 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	<u>Performance Requirement</u> 6.1 Have knowledge in various methods to measure the effectiveness of the execution 6.2 Evaluate the effectiveness of the executions of the strategies and plans in a professional manner 6.3 Provide professional suggestions to improve the effectiveness of the execution of the strategies and plans Be able to list out all the measure mechanisms in evaluating the effectiveness of the execution 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 ▪ Net profit ▪ Earning per share ▪ Market share ▪ Sales ▪ Dividend rate ▪ Return on capital ▪ Productivity ▪ Costs ▪ Staff turnover Be able to recommend goal target improvements related to the organisation's proposed evolution for meeting the organisation's mission
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	<u>Performance Requirement</u> 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 6.2 Define IT governance framework Be able to help collect, research and compile the definition of IT governance framework 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 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 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 ▪ 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	ITSWSM608A	
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	<u>Performance Requirement</u> 6.1 Understand various compliance and performance management techniques 6.2 Evaluate the effectiveness of the execution of the approved IT strategies and plans 6.3 Suggest ways to increase the effectiveness of the execution of the IT governance processes 6.4 Follow up the improvements made 6.5 Evaluate the effectiveness of the execution of the approved IT strategies and plans	
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	ITWSM609A	
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	Performance Requirement 6.1 Have knowledge of different types of contingency plans related to IT Be able to ▪ list the purpose and scope of different types of contingency-related plans ➢ 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 6.2 Integrate the contingency planning at all phases of the computer system life cycle 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 6.3 Prepare contingency planning policy Be able to develop contingency planning policy including ▪ identify statutory or regulatory requirements for contingency plans ▪ develop IT contingency planning policy statement ▪ obtain approval of policy ▪ publish policy 6.4 Understand the business impact and preventive controls Be able to conduct business impact analysis including the following steps ▪ identify critical IT resources ▪ identify outage impacts and allowable outage times ▪ develop recovery priorities 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	

	6.5 Develop contingency plan in a professional manner 6.6 Make estimate on the cost involved for a recovery process	Be able to prepare contingency plan for recovery strategies including ▪ 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 Be able to ▪ 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	ITWSM610A	
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	6.1 Understand how information was created 6.2 Transform information into business knowledge and value 6.3 Ensure integrity of information 6.4 Transform information into business knowledge and value in a professional manner	<u>Performance Requirement</u> Be able to ▪ 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 Be able to ▪ 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 Be able to verify the integrity of information and confirm that it meets business rules 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
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	Select appropriate information technologies for business purposes	
2. Code	ITSWSM613A	
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	6.1 Understand the business purposes for the particular projects 6.2 Select appropriate information technologies for the business purposes with a high degree of expertise and professionalism	<u>Performance Requirement</u> Be able to ▪ 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 Be able to ▪ 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		

**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	111201L6
3. Range	Formulate the business strategies and policies for an organisation in alignment with its approved vision and mission statements by considering the potential impacts and implications of both current and emerging technologies
4. Level	6
5. Credit	6 (for reference only)
6. Competency	Performance Requirements 6.1 Understand business objectives and envisioned future of an organisation ● Be able to ■ articulate the core values and purpose of an organisation ■ articulate the current trends of business and the envisioned future of an organisation 6.2 Understand issues related to both business and IT perspectives of the industry ● Be able to ■ understand the issues related to both business and IT perspectives of the industry ■ have insights of technology trends and viability of technology products under market forces ■ understand the potential impacts and implications of current and new technologies in the fields related to the organisation ■ think of possible ways to utilise new technologies in the organisation operation and marketing strategy. 6.3 Understand the current development trends of a business ● Be able to summarise the business trends related to the organisation ● Aware of the business profile and positioning of the organisation ● Understand and state up to date with the business field related to the organisation 6.4 Understand the ICT applications related to a business ● Be able to summarise the ICT applications related to the operational aspect of the organisation ● Consider and make suggestions on updating current or adopting new technologies to enhance the operation and governance aspect of the organisation

	6.5 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) 6.6 Formulate strategies and policies for the sustainability of the business ● Be able to ■ formulate the strategies and policies for the long-term sustainability of the business taking into consideration Business-IT alignment and enablement ■ formulate partnership/alliance strategies with external partners like vendors/suppliers, investors, distributors to win the market ■ carry out the above in accordance with the organisation's business goals, objectives, policies and guidelines as well as any (local and international) laws and regulatory requirements, where applicable 6.7 Formulate ideas where IT can help the growth of the business ● Be able to identify and think of ways to update and implement technologies that could strengthen the operational goal and governance of the organisation
7. Assessment Criteria	The integrated requirements of this UoC 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 ● suggest updates to current technologies and adaptation of new technologies that could assist the development and governance of the organisation
8. Remark	Some examples of emerging ICT technologies are: ● Artificial intelligence and machine learning ● Cloud computing ● Internet of things ● Security and automation [This UoC replaced ITWSM602A "Formulate business strategies and policies"]

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	111202L6
3. Range	This UoC involves applying analysis methods to identify and evaluate the information technologies that fit most to the organisation's business processes
4. Level	6
5. Credit	3 (for reference only)
6. Competency	Performance Requirements 6.1 Understand the organisation's objectives ● comprehend the organisation's vision, mission, objectives, goals and plans ● seek clarification on the above from relevant people, if necessary ● understand the implications of the organisation's objectives on the application of emerging technologies 6.2 Have broad knowledge of the information technologies applicable to the organisation's industry ● understand the emerging technologies landscape, including but not limited to: ■ Artificial intelligence and machine learning ■ Cloud computing ■ Internet of things ■ Security and automation ● understand the applicability, advantages and disadvantages, constraints and limitations of various information technologies available for the specific industry of the organization ● evaluate the opportunities and threats of the emerging technologies ● Understand the shared responsibility model with IT service providers, if applicable 6.3 Identify and evaluate information technologies that support the organisation's objectives with a high degree of expertise and professionalism ● identify and evaluate the appropriate information technologies for the organisation using standard guidelines and methodologies ● consider and evaluate the appropriateness of managed or outsourcing services. ● make appropriate references to industry sources, such as vendors

	and their customers, experts and consultants in the industry, etc.
7. Assessment Criteria	The integrated outcome requirement of this UoC is the ability to ensure that the information technologies identified and evaluated are the most appropriate to support the organisation's objectives.
8. Remark	This UoC replaced ITSWSM612A "Identify and evaluate information technologies that support the objectives of an organisation"

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

1. Title	Maintain the portfolio management with different stakeholders
2. Code	111203L6
3. Range	Maintain the portfolio management with different stakeholders in the context of relationship management in an organisation to achieve its business goals and objective.
4. Level	6
5. Credit	3 (for reference only)
6. Competency	Performance Requirements 6.1 Understand the interests of different stakeholders ● identify the roles of different stakeholders (internal/external, upstream/downstream etc.) (Remark) ● assess needs and interests of different stakeholders (such as customers, colleagues, vendors/suppliers, and industry peers) 6.2 Communicate effectively and efficiently with various types of stakeholders ● identify the difficulties faced by different stakeholders and their bottom lines ● know how to stimulate or motivate the stakeholders 6.3 Understand the emerging technologies associated with portfolio management ● know the value of emerging technologies ● aware the relevant regulations and risks related to the emerging technologies 6.4 Maintain a professional relationship with various stakeholders ● plan engagement strategy and communication plan with various stakeholders ● manage and maintain the portfolio and relationship with stakeholders in order to establish mutual respect and trust
7. Assessment Criteria	The integrated requirement of this UoC is the ability to manage and maintain the portfolio and relationship with stakeholders for an organisation so as to achieve the organisation's business goals and objectives while upholding mutual interests and establishing mutual respect and trust.
8. Remark	Stakeholders may include as customers, colleagues, vendors/suppliers, and industry peers etc. [This UoC replaced ITSWG618A "Manage and maintain the portfolio

	and relationship with business partners”]

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

1. Title	Manage IT service management strategy
2. Code	111204L6
3. Range	Coordinate the IT service management system documentations and monitor processes to adhere to standard
4. Level	6
5. Credit	3 (for reference only)
6. Competency	Performance Requirements 6.1 Possess knowledge of IT service management ● Understand the operations and processes involved in IT service ● Understand the importance of cybersecurity in IT service ● Understand the various factors, e.g. objectives and goals, success criteria, cost drivers, performance measurements, cybersecurity etc., affecting IT services for an organisation ● Understand the various needs of IT services in an organisation ● Understand IT tools and systems available in managing IT services 6.2 Apply the knowledge of IT service management in an organisation ● Monitor IT service activities involved in IT operations and IT processing ● Maintain documentation of IT services ● Make use of IT tools and systems in the management of IT services 6.3 Enhance the effectiveness and efficiency of IT services in an organisation ● Monitor IT service activities to ensure they are carried out in a timely manner ● Ensure IT services are delivered securely and up to standards ● Make appropriate changes to the systems or processes to enhance the effectiveness and efficiency of IT service management ● Manage the IT activities involved in the most effective and efficient manner for the organisation ● Demonstrate that the IT services of an organisation is achieving the set objectives and goals
7. Assessment Criteria	The integrated outcome requirements of this UoC is the abilities to demonstrate the IT services are well managed and under control in the organisation in order to meet its business goals and objectives
8. 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	Review and comply with organisational policies and procedures, relevant laws and regulatory requirements
2. Code	111205L6
3. Range	This UoC involves reviewing practices to ensure that the service delivered adhere to the organisational policies and procedures, relevant laws and regulatory requirements
4. Level	6
5. Credit	6 (for reference only)
6. Competency	Performance Requirements 6.1 Have knowledge of organisational practices, infrastructures, policies and procedures ● know the operational structure of the organisation ● aware of the different technologies, tools, equipment and online services that are related to the service or tasks delivered ● understand the organisation's policies, procedures and goals ● observe organisational practices and procedures 6.2 Have knowledge of relevant laws and regulatory requirements related to the industry of the organisation ● comprehend the latest regulatory requirements applicable to the organisation, including but not limited to: ■ Intellectual property right protection ■ Personal data (Privacy) ordinance ■ National security law ■ Telecommunications ordinance ● refer to the appropriate experts for guidance where necessary 6.3 Review and comply with organisational policies and procedures, relevant laws and regulatory requirements ● Identify the applicable laws and compliances ● observe and adhere to relevant policies and procedures, laws and regulations in an efficient and effective manner ● take the initiative to improve the organisation's policies and procedures where appropriate ● obtain the endorsement of relevant stakeholders ● obtain prior approvals for system resources and access, such as communication protocols and ports, data storage, online services,

	other system peripherals, computer time as well as data of another person ● review practices, identify and rectify any noncompliance procedures ● make use of tools, infrastructures, equipment and online services available to enhance the service delivered ● make suggestions to enhance existing or purchase of new tools, infrastructures, equipment and online services if it helps to improve on the compliance to related regulations or the effectiveness of the service delivered ● make effective and efficient use of external experts where necessary to meet its business goals and objectives ● report serious misconducts and noncompliance procedures to relevant management and suggest methods to avoid future occurrences (such as provide training programs or workshops to highlight issues to relevant personnel)
7. Assessment Criteria	The integrated requirements of this UoC are the abilities to : ● review of own practices; identify and rectify any noncompliance procedures ● comply to organisational policies and procedures, relevant laws and regulatory requirements ● obtain prior approval for system access and resources according to the aforementioned policies and requirements ● Utilise existing resources and make suggestions on updating or acquiring new resources to enhance the service delivered and adhesion to various related policies and regulations ● Report serious misconducts and noncompliance procedures to relevant management and suggest methods to avoid future occurrences (such as provide training programs or workshops to highlight issues to relevant personnel)
8. Remark	This UoC replaced the following UoCs: 1. ITSWG624A "Comply with relevant laws and regulatory requirements" 2. ITSWG602A "Comply with organisational policies and procedures, relevant laws and regulatory requirements"

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	111206L6
3. Range	Establish policy to control data security and privacy of an organisation
4. Level	6
5. Credit	6 (for reference only)
6. Competency	Performance Requirements 6.1 Understand legal requirements on data security and privacy ● locate and make reference to sources of legislation applicable to local business entities (Remark) ● seek professional advices on issues relating to security and privacy 6.2 Observe standards, guidelines and procedures published by professional bodies ● comprehend the standards, guidelines and procedures published by professional bodies in the trade and extract the sections relevant to organisational operation as reference 6.3 Set corporate policy to control data security and privacy ● formulate control policies to cover stages from data capture and processing, information flow and distribution, storage and access to retirement ● formulate control policies to ensure that information is relevant, accurate and timely and its management is an integral part of strategic management ● formulate control policies to maintain confidentiality, integrity, and reliability throughout the stages to comply with administrative, audit and legal requirements 6.4 Keep the policy up to date ● perform regular review on the local and international policies to ensure it meets the changing operational environment ● cross check the policy with current best practice as published by professional bodies in the trade to make optimum use of the information resources 6.5 Set policy to control data security and privacy in a professional manner ● establish the required policies in accordance with organisation's guidelines as well as any (local and international) laws and regulatory requirements, if applicable
7.	The integrated outcome requirements of this UoC is the ability to produce a

Assessment Criteria	policy document addressing the control of data security and privacy.
8. Remark	Some reference sources of legislation applicable to business entities are: ● Bilingual Laws Information System http://www.legislation.gov.hk/eng/index.htm ● Personal Data (Privacy) Ordinance http://www.pcpd.org.hk/english/ordinance/ordfull.html ● General Data Protection Regulation (GDPR) https://gdpr.eu/ ● The Personal Information Protection Law of the Mainland https://www.pcpd.org.hk/english/data_privacy_law/mainland_law/mainland_law.html ● The PRC Data Security Law http://www.hk-lawyer.org/content/new-prc-data-security-law-and-its-potential-impact-overseas-data-transfers [This UoC replaced ITWSM611A “Set policy to control data security and privacy”]

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

1. Title	Review the emerging technologies and cross-functional strategies
2. Code	111207L6
3. Range	Review cross-functional strategies to enable an organisation to identify suitable emerging technologies for supporting its business strategies
4. Level	6
5. Credit	3 (for reference only)
6. Competency	Performance Requirements 6.1 Understand issues associated with emerging technologies ● evaluate the values of the emerging technologies with respect to business-technology alignment and enablement of the organization ● understand the deployment procedures of the emerging technologies ● keep updated of the application development areas of various emerging technologies, including but not limited to: ■ Artificial intelligence and machine learning ■ Cloud computing ■ Internet of things ■ Security and automation ■ Streaming technologies ● aware of the data security and privacy concerns in the domains of various emerging technologies 6.2 Review cross-functional strategies for deploying and managing the emerging technologies ● review the organization business strategies, and conduct a mapping between the possible application areas of emerging technologies with the business strategies ● setup a clear digital strategy, if necessary, to ■ identify the appropriate technology applications for different operations of the organization ■ prioritize projects that require cross-functional collaboration ■ setup the project management team for cross-functional projects
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to ● conduct a mapping between the possible application areas of emerging technologies with the business strategies ● setup digital strategy to support the deployment and management

	of cross-functional projects
8. Remark	

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

1. Title	Review the ethical and social issues for IT applications
2. Code	111208L6
3. Range	This UoC involves reviewing/addressing the social, environmental, political and legal challenges related to the emergence and convergence of information and communication technologies from the point of view of morality and ethics.
4. Level	6
5. Credit	3 (for reference only)
6. Competency	Performance Requirements 6.1 Understand the moral and ethical dimensions for IT applications ● identify and understand the major moral and ethical dimensions that tie together ethical, social, and political issues in IT applications including ■ Information rights and obligations ■ Property rights and obligations ■ Accountability and control ■ Application/system quality ■ Culture and lifestyle: economic disparity, equality and ethnicity on rights ● understand the impacts from technology advancement on individual and society such as data collection and analysis, privacy invasion etc. 6.2 Review the ethical and social issues for an organisation ● review the IT applications and/or processes within the organization from the point of view of morality and ethics ● identify and properly record any shortfalls relevant to moral and ethical considerations 6.3 Exhibit Professionalism ● always look after the interest of the organisation as well as customers.
7. Assessment Criteria	The integrated outcome requirements of this UoC is the ability to review the social, environmental, political and legal challenges related to IT applications/systems to support organisation's business strategies from the point of view of morality and ethics
8. Remark	

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

1. Title	Formulate global and local business strategies
2. Code	111212L6
3. Range	Formulate the global and local business strategies for an organisation in alignment with its approved vision and mission. This UoC concerns competencies for identifying the business needs of the organisation for market expansion.
4. Level	6
5. Credit	6 (For Reference Only)
6. Competency	Performance Requirements 6.1 Possess the knowledge in the subject area ● Thoroughly understand the organisation's vision and mission statements ● Strong knowledge of the organisation products and services, its positioning, its strengths and competitive edge in both global and local market ● In tune with the current trends of global economic development and the market trends ● In depth business analytic skills and knowledge on use of business analytic tools ● In depth skills in business management and strategy formulation ● Good knowledge of global and local business environment, such as business law, tax, culture, market, etc. ● Aware of how digital transformation could enhance the business performance and market share 6.2 Formulate global and local business strategy ● Identify factors, such as market trends and needs, organisation's area of growth that could lead to business success ● Steer a business strategy formation team to: ■ analyse and formulate strategies and policies for the business's sustainability, accounting for the organisation's vision and mission, core ideology, CIS business trends, the business area's strength and weaknesses, business risks, area of growth etc. ■ manage the formulation of partnership/alliances strategies with external (local or international) partners including vendors, suppliers, investors, distributors, etc ● Ensure the strategy comply with local and global laws and regulations ● Review and evaluate the effectiveness of global and local teams

	such as the team structure, effectiveness of top down control or total autonomy of local marketing ● Make judgements on areas where the global and local business strategy can share implementation strategies in the absence of complete information ● Present strategies with financial projections to senior management/board to gain support ● On the lookout of new technologies and digital transformation opportunities and consider the incorporation of these technologies / transformation to improve the effectiveness of the strategies 6.3 Exhibit professionalism ● Always take into consideration and strike a proper balance among all related technological, political, social, environmental and legal factors when developing global and local business strategies ● Always strike a proper balance between all stakeholders
7. Assessment Criteria	The integrated outcome requirements of UoC are the abilities to: ● Formulate a global and local business strategy that has considered all possible business factors which lead to achieving the global and local business major goals ● Determine the effectiveness of the local and global structure of the organisation and recommend restructure to complement the new local and global business strategies
8. Remark	This UoC replaced the following UoCs: 1. 108015L7 "Formulate global and local business strategy" 2. ITCSSG503A "Formulate global and local marketing strategies" 3. ITCSSG602A "Define business strategies and policies"

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

1. Title	Formulate strategies on business relation management
2. Code	111213L6
3. Range	Formulate strategies to manage and maintain the portfolio and relationship with business partners in an organisation to achieve its business goals. Business partners include customers, vendors/suppliers, industry peers, internal staff and other external stakeholders. This UoC concerns competences for fortifying partnership with clarity of communication, understanding and trust.
4. Level	6
5. Credit	6 (For Reference Only)
6. Competency	Performance Requirements 6.1 Possess knowledge in the subject area ● Critically understand the organisation's business mission, vision, goals and business objectives and core values ● Know the needs and interests of business partners (such as stakeholders, customers, colleagues, vendors/suppliers, and industry peers) ● Possess excellent skills that help communicate effectively and efficiently with various types of business partners ● Possess in-depth experience with contract management and supplier evaluation management ● Proficient with commercial & management skills such as management of business finance, communication, people, change, negotiation and business operations ● Aware of digital transformation opportunities that could benefit and enhance business relationship management 6.2 Formulate the partner/supplier relationship strategies ● Steer a team to identify and classify partners in terms of importance to the organisation, such as long term, short term, project based, strategic partners, strategic customers, major suppliers, etc. ● Define procedures on maintaining professional relationship and mutual interest with partners by managing partners uniquely with appropriate person or departments. e.g. senior managers, sales departments, operations, HR, etc. ● Establishing and maintaining continuous communication channel with the partners to maintain and build mutual respect with partners ● Periodically review the effectiveness of partnership and its

	associated policies, make changes with necessary ● Take advantage of new technologies and digital transformation opportunities to enhance business relation management 6.3 Exhibit professionalism ● Always maintain a professional relationship with various business partners ● Always strike a proper balance among all stakeholders
7. Assessment Criteria	The integrated outcome requirements of UoC are the abilities to : ● Identify and classify different types of partners ● Manage and maintain the portfolio and relationship with business partners while upholding mutual interests and establish mutual respect and trust
8. Remark	This UoC replaced the following UoCs: 1. ITSWG5618A “Manage and maintain the portfolio and relationship with business partners” 2. ITCSSG508A “Formulate partner/supplier relationship strategies” 3. ITCSSG521A “Manage and maintain the portfolio and relationship with business partners”

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

1. Title	Formulate human resource strategy
2. Code	111214L6
3. Range	Formulate the human resource strategy of an organisation to enhance its economic performance, employee and organisational productivity, survival rate as an organisation entity, labour turnover, customer satisfaction, organisation image and its social and legal responsibilities, etc.
4. Level	6
5. Credit	6 (For Reference Only)
6. Competency	Performance Requirements 6.1 Possess knowledge in the subject area ● Understand the criticality and the importance of having an HR strategy and the role of strategic HR management ● Extensive experience in HR strategies formulation at the corporate level ● Possess in-depth knowledge of the organisation's mission, vision, business goals, and HR policies ● Exhibit extensive knowledge of strategic HR management and strategy formulation techniques ● Possess extensive knowledge of business strategy and business planning ● Critically understand the importance and business impact of effective people management ● Extensively knowledgeable of local/international labour and HR-related laws 6.2 Formulate Human Resource strategies ● Ascertain organisation's mission, vision and short to long term business objectives ● Steer the HR strategy development team to understand and develop the organisation's HR strategies which align with the organisation's mission, vision and objectives ● Conduct analyses of the organisation, focusing on the people side of the organisation to identify the strengths, weaknesses in areas such as current skills, capabilities ● Conduct research in identifying opportunities and threats that could change or impact the human resources of the organisation. ● Review and analyse the results of various findings; interpret and integrate under the context of local, regional and global challenges; translate into HR strategies that will deliver the

	maximised benefits to the organisation, people, business, customers and industry ● Periodically reassess policies and strategies to account for the digital transformation of the industry due to technological advancements ● Adoption of the HR strategy at the board/decision level; integrate as part of the organisation strategy and operation plans 6.3 Exhibit professionalism ● Be updated with current industry human resource requirements and local and regional industry growth, and develop the right strategy for the organisation to achieve its business goals ● Always strike a proper balance of interest among all stakeholders
7. Assessment Criteria	The integrated outcome requirements of this UoC are the abilities to : ● Analyse the current status of the organisation in terms of its human resources standing ● Formulate human resource strategy that aligned with the organisation's goals and needs that accounted for the digital transformation of the industry ● Evaluate analyses and research results to formulate effective strategies that can be used to derive HR management framework for implementation
8. Remark	This UoC replaced the following UoCs: 1. 108021L5 "Formulate human resource strategy" 2. ITCSSG606A "Formulate human resource strategies"

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	111215L6
3. Range	This UoC involves formulating the vision and mission statements for the entire organisation to support the long-term and strategic objectives.
4. Level	6
5. Credit	6 (For Reference Only)
6. Competency	Performance Requirements 6.1 Possess the knowledge in the subject area ● Experienced in discovering core ideology and envisioned future of the organisation ● Aware of the current trends, opportunities and global economic development of the organisation's sectors ● Understand the issues related to an organisation's business and the CIS industry ● Extensively experienced with articulating the envisioned future of the organisation by having insights of the industry as well as the long term and sustainable vision with well supported data, analysis, research and other references ● Extensively experienced with formulation of mission and vision statements 6.2 Formulate vision and mission statements ● Steer the business strategy formation team to understand the issues related to both business and organisation ● Define the future state of the organisation; taking in consideration of strategic direction and potential transformation opportunities ● Identify information required for analysis of business trends ● Formulate the vision and mission statements for the entire organisation to support its long term as well as strategic objectives using the relevant data, through analysis, market research and intelligence ● Ensure the formulation process follows proper standards and recognised methodologies in compliance with local and/or international regulatory laws ● Prepare and present the newly formed vision and mission statements to the board and other stakeholders for approval 6.3 Exhibit professionalism ● Ensure the formulation process abide to local and international laws

	● Always take into consideration and strike a proper balance among all related technological, political, social, environmental and legal factors ● Always strike a proper balance of interest among all stakeholders
7. Assessment Criteria	The integrated outcome requirements of this UoC are the abilities to : ● Formulate the vision and mission statements for the entire organisation, capturing the development trends of the global economy and ICT industry to support its long-term and strategic objectives. ● Present the vision and mission statements professionally to stakeholders to gain approval
8. Remark	This UoC replaced the following UoCs: 1. ITWSM601A “Formulate vision and mission statements” 2. ITCSSG601A “Formulate vision and mission statements”

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

1. Title	Establish and implement information management and control policy
2. Code	111216L6
3. Range	Establish and implement policy to manage and control information security and privacy of an organisation. This UoC concerns competencies for collecting, collating, assessing, distributing and disseminating information within the organisation.
4. Level	6
5. Credit	3
6. Competency	Performance Requirements 6.1 Possess knowledge in the subject area ● Understand the organisation obligations in data security to its related parties, such as employees, customers, partners, government etc. ● Aware of the vulnerability of the information storage systems and the storage media used by the organisation ● Aware of the latest development of the information management and security field ● Understand which information needs to be protected ● Aware and know the laws associated with information management and control 6.2 Establish information management and control policy ● Understand the needs of the organisation in using and sharing information ● 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 references ● Identify the storage systems and the storage media used by the organisation and their associated vulnerability ● Formulate information management and control policy ● Specified the handling of raw data and information ● Define ways to discard information safely ● Identify systems that is required to be implemented and adopted for the policy ● Ensure the policy could maintain confidentiality, integrity, and reliability throughout the stages to comply with administrative, audit and legal requirements ● Develop methods and procedures in auditing the handling of information in the organisation ● Ensure the policy are reviewed periodically

	● Establish systems to record any mishandling of information incident 6.3 Implement information management and control policy ● Purchase and implement the required system for information management and control policy adaptation ● Provide workshop to staff such that they understand: ■ the importance and needs of the information management and control policy ■ the procedure of how to handle information ■ the consequences of mishandling of information ● Conduct periodic audits to ensure the policy is followed ● Ensure all findings and incidents are recorded 6.4 Exhibit professionalism ● Be able to establish the required policy 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 : ● Establish and implement information management and control policy that is in accordance with the organisation's guidelines as well as any (local and international) laws and regulatory requirements ● Ensure associated parties understand the importance and the need of information management and control policy and the potential consequences of mishandling of information
8. Remark	This UoC replaced the following UoCs: 1. ITWSM611A "Set policy to control data security and privacy" 2. ITWSM506A "Collect and distribute disseminate information" 3. 108022L5 "Manage information strategy to facilitate product development and marketing"

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

1. Title	Develop marketing and public relation plans
2. Code	111219L6
3. Range	Develop the marketing and public relation plans for an organisation to promote the organisation brand, market products, control damages and build goodwill with the organisation's customers.
4. Level	6
5. Credit	6 (for Reference only)
6. Competency	Performance Requirements 6.1 Possess knowledge in the subject area ● Understand the organisation's mission and vision and its business strategies ● Familiar with the organisation's structure, business model and the brands and products under the organisation ● Possess strong communication skills and be able to articulate in written and spoken words ● Experienced with handling different categories of parties (media, consumers, colleagues, investors and public) and different levels of people ● Know marketing strategies and tactics for analysing and researching on market trend ● Aware of the potential competitors ● Aware of new technologies and social media platforms that could be beneficial for the organisation's marketing and public relation 6.2 Develop marketing and public relation plans ● Analyse, research, and develop the competitive strategy of the brands and product/services ● Identify the uniqueness and differentiation of the product/services offered by the organisation ● Develop and establish the corporate and product identity and document it properly in brand and logo guide books ● Perform situation analysis to understand the current situation regarding the marketing campaign, such as the organisation's current position with respect to the market, how customers and staff perceive it or how its products are compared with competitors, etc. ● Set a time frame for the plan and define the goals and objectives ● Develop guidelines and procedures for handling public relations crisis ● Periodically review plans to ensure that new technologies and new

	platforms are accounted for to enhance plans performance 6.3 Exhibit professionalism ● Develop the marketing and public relation plans in accordance with the organisation's guidelines as well as any (local and international) laws and regulatory requirements, if applicable ● Always take into consideration and strike a proper balance among all related technological, political, social, environmental and legal factors when developing the marketing and public relation plan
7. Assessment Criteria	The integrated outcome requirements of this UoC is the ability to develop marketing and public relations plans that align with the organisation's mission and vision as well as address the market needs
8. Remark	

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	<u>Performance Requirement</u> 6.1 Know the project requirements Be able to ▪ understand the activities in a project, the input and expected output requirements ▪ identify key project milestones 6.2 Estimate a reasonable timeframe from preliminary identified activities Be able to ▪ identify customer expectations with the timing of deliverables ▪ identify internal and external schedule constraints and influences ▪ identify key project milestones 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 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	
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		<u>Performance Requirement</u>
	6.1 Understand the developed project schedule	Be able to ▪ comprehend the details as documented in the developed project schedule ▪ list the possible allowance for delay of each activity
	6.2 Implement the project schedule	Be able to ▪ 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
	6.3 Catch up with delayed activities	Be able to adjust resource allocation to compensate for any delay in an activity so that the overall schedule could be fulfilled
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	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	6.1 Know the source of information 6.2 Establish and manage an information distribution system 6.3 Collect and distribute reliable information	<u>Performance Requirement</u> Be able to ▪ 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 Be able to ▪ 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 Be able to ▪ 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	6.1 Know the tools and techniques in time reporting <u>Performance Requirement</u> Be able to - 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 6.2 Implement project time reporting Be able to - 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. 6.3 Serve time reporting to clients Be able to deliver project time reporting punctually to clients
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	6.1 Locate stakeholders and relevant information 6.2 Establish and conduct formal communication at checkpoints 6.3 Regulate information flow	<u>Performance Requirement</u> Be able to ▪ locate stakeholders at project checkpoints ▪ comprehend the established project communication plan with special note on checkpoint activities Be able to ▪ 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 Be able to ▪ 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	Analyse the available solutions from IT service providers
2. Code	111199L4
3. Range	This UoC involves analysing solutions from external IT service providers that fit most to the organisation's business goals
4. Level	4
5. Credit	3 (for reference only)
6. Competency	Performance Requirements 6.1 Knowledge in evaluation criteria of external IT service providers ● Technical expertise ● Domain expertise ● Business maturity Evaluation criteria of external IT service providers can also be divided into various sub-criteria. (See Remark 1) 6.2 Rank the proposals according to the criteria as listed in the procurement management plan 6.3 Make preparation for drafting the service agreement with the successful bidder ● Apply appropriate methods to identify service agreement concerns: ■ project warranties ■ liabilities ■ indemnity ■ insurance clause-related activities ● Make negotiation with the external service providers according to the rank sequence ● clarify any unclear points in the received proposal from the external service providers and negotiate with them on the terms and conditions according to relevant local / international laws ● reach consensus on the structure and requirements of the service agreement with the successful bidder prior to the signing of the agreement (Remark 2)
7. Assessment Criteria	The integrated outcome requirements of this UoC are the abilities to: ● apply appropriate criteria to evaluate proposals from external IT service providers ● make a fair selection for a successfully bidder and reach consensus with the successful bidder on the important terms and conditions for drafting the service agreement.
8. Remark	1. The evaluation sub-criteria are: ● Service / Product Value Creation / Provision ■ Service / Product Portfolio: Service scope including the

	completeness of the portfolio or the skill set. ■ Service / Product Experience: Service availability and service experience from a customer perspective. Maturity of the offer. ■ Integration: Interoperability of Technologies with one another or the skills to integrate them. ■ Economic factors: Price transparency and the quality of the business model, not the prices themselves. For service providers, nearshore concepts or skills that deliver low-cost architectures have also been evaluated. ■ Disruption potential: Recognition of the availability of highly innovative approaches ● Vendor Performance ■ Strategy: Strategy and market understanding. Does technology fit the company strategy? ■ Footprint: Competitive strength and market presence in terms of customers, reach, visibility and go-to-market. ■ Ecosystem: For IT service providers, the number of development service providers who are familiar with their technologies is critical. On the other hand, we evaluate the number of technology suppliers that are listed by Development Service Providers under Partners and Skills. Active involvement in open source communities is also a plus. ■ Customer Experience: Availability of information and training for technology providers. Local availability of employees for service providers. ■ Agility: Speed and innovation strength of the providers, assessed in terms of their ability to grasp market trends quickly and, if necessary, develop them with an innovation budget. 2. Subjects covered generally include, but not limited to, responsibilities and authorities, applicable terms and law, technical and business management approaches, contract financing and price. [This UoC replaced ITSWPM523A "Conduct source selection and/or contract development"]

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

1. Title	Prepare system operation documentation
2. Code	111200L4
3. Range	Prepare technical and user documentation describing how the system works for third party management. Documentation should reflect maintenance and update processes to ensure integrity the deployment.
4. Level	4
5. Credit	3 (For Reference Only)
6. Competency	Performance Requirements 6.1 Understand system requirements ● Be able to: ■ identify system operation issues, i.e. system installation/update and deployment, day-to-day technical operations, server or software application failure and maintenance, etc. ■ comprehend the workflow as stated in the system operation plan according to technical and user requirements 6.2 Prepare the operation documentation containing information that will aid system administrators to understand the functions and capabilities of your information technology systems, applications, and components ● Be able to: ■ describe the user typical processes and operation procedures as required by the needs of the technical and user requirements ■ provide standards on document to help with consistency and avoid potential pitfalls 6.3 Check the consistence and completeness of the documentation ● Be able to: ■ comply with corporate policy in documentation standards ■ review developed templates and guidelines to ensure their consistence in format and their completeness meet with system requirements ■ issue the developed templates and guidelines to stakeholders for review and feedback ■ incorporate feedback from stakeholders and management to finalise the system documentation standards
7. Assessment Criteria	The integrated outcome requirements of this UoC are the abilities to: ● establish system report and documentation standard and ensure consistency and completeness in the operation documentation ● enhance efficiency of system operation, support, maintenance and system training, etc.

8. Remark	This UoC replaced ITSWPM403A "Establish project communications documentation requirements"

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 6.2 Have knowledge in the tools and techniques for scope planning and definition 6.3 Have knowledge in various outputs of scope planning and definition 6.4 Have knowledge in scope statement and a scope management plan 6.5 Have knowledge in different types of Work Breakdown Structure (WBS) 6.6 Develop a scope management plan 6.7 Develop a work breakdown structure	
		Be able to collect all related inputs of the IT project for planning and defining the project scope Be able to utilize tools and techniques for scope planning and definition Be able to prepare suitable documents for the outputs of scope planning and definition Be able to ▪ 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 Be able to select and develop an appropriate WBS for an IT project based on the characteristics and nature of the project Be able to ▪ 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 Be able to ▪ 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

	6.8 Manage the scope definition process 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	Be able to ▪ 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 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
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	6.1 Have knowledge in scope planning tools concept 6.2 Execute project scope 6.3 Analyse dependencies and review processes 6.4 Manage each phase of execution 6.5 Manage the delivery of items in a professional manner	<u>Performance Requirement</u> Be able to ▪ understand the structure of a Work Breakdown Structure (WBS) ▪ understand how to set a baseline for measurement Be able to ▪ utilize the WBS to manage project deliverables ▪ conduct work scope according to the scope management plan Be able to ▪ identify activities and dependencies as planned ▪ define and analyse products ▪ establish review/approval process for project deliverables Be able to ▪ deliver work packages ▪ obtain work package acceptance ▪ handle respective project issues appropriately with respect to the deliverable requirements Be able to ▪ 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 - 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 - 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	<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 ▪ 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	
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	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	<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	<u>Performance Requirement</u> 6.1 Have knowledge in various cost analysis methods Be able to ▪ 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 6.2 Execute cost baseline Be able to ▪ 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 6.3 Execute the project cost as part of designing a plan Be able to ▪ 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	<u>Performance Requirement</u> 6.1 Have knowledge in cost monitoring process 6.2 Measure cost deviation 6.3 Evaluate remedial action on cost change when necessary 6.4 Handle the cost changes Be able to design an effective cost monitoring system for checking against planned resources as well as setting up appropriate monitoring checkpoints Be able to ▪ 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 Be able to ▪ identify and evaluate the factors of cost changes ▪ revise cost estimates ▪ evaluate the impact on cost baseline Be able to ▪ 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	6.1 Understand the principles and techniques of project quality management and project quality assurance 6.2 Conduct quality assurance 6.3 Report quality and related issues together with documentation as needed 6.4 Exhibit professionalism	<u>Performance Requirement</u> Be able to execute a project quality management plan Be able to ▪ 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 Be able to ▪ 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 Be able to formulate an appropriate approach in conducting quality assurance based on practical requirements of an organisation's specific environment
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	<u>Performance Requirement</u> 6.1 Understand the principles and techniques of project quality management, quality assurance activities and quality standards Be able to perform various quality assurance activities and report the quality of the items under quality review 6.2 Conduct quality control Be able to ▪ 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 6.3 Exhibit professionalism Be able to formulate best practices to conduct quality monitoring and control in an organisation's specific environment	
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	6.1 Understand project requirements and prepare ground work for organisation definition 6.2 Identify the organisational structure 6.3 Identify responsibility assignment processes 6.4 Conduct project team definition in a professional manner	<u>Performance Requirement</u> Be able to ▪ 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 Be able to ▪ identify the organisational structure (See Remark) ▪ determine project effects according to the structure Be able to ▪ identify specific processes for organisation role assignment ▪ identify specific processes for organisation responsibility assignment Be able to define the roles of the project management team in accordance with professional standards ▪ 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	<u>Performance Requirement</u> 6.1 Comprehend organisation components for the project Be able to ▪ provide an overview of the organisation components ▪ explain the programme organisation of which the project is belonged to (see Remark) 6.2 Estimate and allocate project resources Be able to ▪ estimate resource requirements using standard tools and methodology ▪ assign sufficient team members with relevant skills and experience to complete the project on schedule 6.3 Complete overall organisational planning processes Be able to ▪ 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 6.4 Develop alternative structures Be able to ▪ define programme executives as project board members as needed ▪ list common programme support as needed ▪ identify project support staffing requirements 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	
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	<u>Performance Requirement</u> 6.1 Understand staff acquisition and team development Be able to ▪ comprehend the processes to acquire quality staff ▪ understand the importance and the processes of team development 6.2 Plan for staff acquisition Be able to ▪ 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 6.3 Execute staff acquisition Be able to ▪ 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 6.4 Plan for team development Be able to ▪ define project team policies and procedures ▪ develop rewards and recognition plan 6.5 Conduct team development Be able to ▪ 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	

	6.6 Establish and develop the project team in a professional manner Be able to ▪ 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	<u>Performance Requirement</u> 6.1 Comprehend the monitoring tools Be able to ▪ 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 Be able to ▪ 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 Be able to ▪ 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	<u>Performance Requirement</u> 6.1 Know the relationship between communication management with other aspects in project management Be able to ▪ 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 ➢ inputs to communication planning ➢ tools and techniques utilised for communication planning ➢ outputs of communication planning 6.2 Conduct preliminary communications planning Be able to ▪ 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 6.3 Observe criteria for effective communications Be able to match project communications policies within the working organisation to the communication activities in a given project
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	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	6.1 Understand performance requirements in a project 6.2 Conduct project performance reporting 6.3 Evaluate the effectiveness of the performance	<u>Performance Requirement</u> Be able to ▪ 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 Be able to ▪ 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 Be able to ▪ 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	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. 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.	

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	6.1 Identify the criteria of project closure 6.2 Conduct administrative closeout 6.3 Properly conclude the project	<u>Performance Requirement</u> Be able to ▪ 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 Be able to ▪ 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 Be able to ▪ 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	6.1 Understand the project risk management plan 6.2 Understand the project risk response plan 6.3 Execute risk response plan 6.4 Exhibit professionalism	Performance Requirement 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 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 Be able to ▪ 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 Be able to judge whether to initiate change requests as a response to risk events depending on practical circumstances
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	6.1 Understand project risk management plans 6.2 Understand project risk response plans 6.3 Conduct risk monitoring and control	Performance Requirement 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 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 Be able to ▪ 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
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	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	6.1 Have knowledge on contract/ procurement control 6.2 Follow the contract administration 6.3 Monitor and ensure the contractor's performance meets the contractual requirements 6.4 Manipulate change requests 6.5 Arrange payment to the contractor	<u>Performance Requirement</u> Be able to use the appropriate tools and techniques to control contracts/procurements Be able to carry out project management processes including ▪ 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 Be able to integrate and coordinate at multiple levels of the outputs from different processes and from different sellers Be able to ▪ 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 Be able to follow the payment terms as defined in the contract as well as trace the linkage between progress made and compensations paid
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) execute the contract administration processes to ensure the contractor's performance meets with the requirement stipulated in the contract; (ii) manage changes in the contracts; and (iii) when administrating the contract, be acutely aware of the legal implications of actions taken due to the changes.	
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	<u>Performance Requirement</u> 6.1 Have knowledge in the contract administration Be able to incorporate the administrative closeout into the contract closeout process 6.2 Complete contract documentation Be able to check all documentation are completed: ▪ 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 6.3 Stock take deliverables Be able to ▪ verify the completion of all deliverables related to the contract (see Remark) ▪ identify any outstanding items from, for example, an enhancement list 6.4 Provide formal acceptance and closure to the seller 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 6.5 Perform a “lessons learned” analysis in a professional manner Be able to ▪ 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	The integrated outcome requirements of this UoCs are the abilities to: (i) conduct a formal acceptance and contract closeout procedure as defined in the contract; and (ii) carry out a structured procurement audit review for transferring the experience to other projects.
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	Conduct solicitation process in project outsourcing
2. Code	111196L5
3. Range	This UoC involves preparing and initiating the tender procedure for outsourcing parts of or the whole project.
4. Level	5
5. Credit	6 (for reference only)
6. Competency	Performance Requirements 6.1 Understand the outsourcing requirements ● Understand the organisation policies on outsourcing work ● Understand the project requirements and goals ● Aware of the technological skills needed for the completion of the project ● Have a rough idea of the budget ● Define a set of selection criteria 6.2 Awareness of the market condition ● Identify appropriate prospective bidders who are capable of providing the services ● Identify and collect information on services available in the market ● Aware of the reputation of different potential bidders 6.3 Prepare procurement documents ● Prepare all internal and external documents that are related to the solicitation process, for example: ■ invitation for Bid (IFB) ■ request for Proposal (RFP) ■ request for Quotation (RFQ) ■ initiation for Negotiation ■ contractor Initial Response 6.4 Invite or notify potential bidders and conduct bidder's conference ● Send invitations to identified potential bidders ● Place advertisements to attract more potential bidders ● Establish key principles for conducting a bidder's conference and clarify bidder's concerns 6.5 Proposals collection and tender board formulation ● Receive tenders following guidelines ● Identify suitable members and invite them to be members of the tender board for the tender evaluation process

	6.6 Exhibit professionalism ● 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 UoC are the abilities to : ● develop effective procurement documents and procedures for the tender bidders to submit bids/quotations ● formulate a tender board with suitable members for the tender evaluation process ● carry out the solicitation process in accordance with organisation guidelines
8. Remark	

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	111197L5
3. Range	This UoC involves preparing and specifying tender details for an organisation to outsource a particular project (whole or some of its part)
4. Level	5
5. Credit	3
6. Competency	Performance Requirements 6.1 Have knowledge in the market condition ● Be able to collect information about the products and services available in the marketplace 6.2 Understand the procurement cycle for outsourcing a particular project (whole or some of its part) ● Be able to understand the outsourcing activities for a procurement cycle 6.3 Prepare complete procurement documents ● Be able to: ■ design structured procurement documents that are used to solicit proposals from prospective sellers such as ◆ 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 6.4 Be able to define evaluation criteria for rating or scoring proposals including the bidders' ● background ● financial capability ● past track record ● technical knowledge/skill ● resources availability 6.5 Form a tender board ● Be able to formulate the tender board with suitable members for

	the tender evaluation process
7. Assessment Criteria	The integrated outcome requirements of this UoC are the abilities to: ● develop effective procurement documents for the tender bidders submitting bid/quotation; and ● set up an accurate evaluation process for rating and scoring the submitted bids.
8. Remark	This UoC replaced ITSWPM521A "Conduct solicitation planning"

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	111198L5
3. Range	This UoC involves conducting project closure in the context of Project Time Management
4. Level	5
5. Credit	1 (For Reference Only)
6. Competency	Performance Requirements 6.1 Understand the boundary of project phases ● Be able to: ■ recognise the terminal activity of a project phase ■ know the outputs from the last activity ■ understand the post-closure follow-up for relationship management and next version/iteration improvement 6.2 Conduct project closure with regard to time ● Be able to: ■ 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 ● 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
7. Assessment Criteria	The integrated outcome requirements of this UoC are the abilities to: ● consolidate causes and solution to time variance project closure ● review actual time schedule against planned schedule to aid better time management in subsequent projects.
8. Remark	Co-Requisites: ITSWPM606A, ITSWPM608A, ITSWPM612A, ITSWPM615A, ITSWPM518A, ITSWPM620A [This UoC replaced ITSWPM505A "Conduct project closure with respect to time"]

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	6.1 Identify project needs 6.2 Develop project-related product or service descriptions in accordance with the project requirements 6.3 Perform an initial project feasibility study and analysis in a professional manner	Performance Requirement Be able to determine product/service characteristics using expert judgement as needed Be able to identify constraints and assumptions including boundaries Be able to ▪ 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	6.1 Understand the requirements of a project charter and project interfaces 6.2 Develop the project charter and kick-off package in accordance with the organisation's requirements 6.3 Identify project interfaces 6.4 Conduct kick-off meeting 6.5 Develop the project charter and project interfaces in a professional manner	<u>Performance Requirement</u> Be able to define the primary components of the project charter and project interfaces Be able to ▪ 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. Be able to ▪ identify organisational, processes and technical interfaces ▪ define the basic inputs and outputs Be able to organise and conduct the project kick-off meeting in accordance with the organisation's guidelines and practices Be able to ▪ 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	<u>Performance Requirement</u> 6.1 Comprehend the different methodologies for project plan development Be able to ▪ 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 6.2 Conduct project plan development Be able to ▪ 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 6.3 Establish the Project Management Team, programme/project organisation and the alternative structures as needed Be able to provide an overview of the organisation components and the team structure for the project 6.4 Define project governance and steering organisation Be able to ▪ appoint project board executive or steering committee ▪ create or identify the project governance body 6.5 Design controls for the project Be able to ▪ focus on design and development planning ▪ identify the organisational and technical interfaces, i.e. define and design input, output, review, verification, validation and changes	

	6.6 Develop an initial project plan in a professional manner Be able to ▪ 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	The integrated outcome requirements of this UoCs are the abilities to: (i) produce a project plan in accordance with the adopted project plan development methodology; and (ii) obtain approval from stakeholders.
Remark	The integrated project plan includes: 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	6.1 Understand the various skills and techniques required in project plan execution 6.2 Conduct project plan execution 6.3 Direct and manage project execution in a professional manner	<u>Performance Requirement</u> Be able to ▪ 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 Be able to ▪ 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 Be able to ▪ 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	<u>Performance Requirement</u> 6.1 Understand the requirements of integrated change control Be able to ▪ 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 6.2 Conduct integrated change control Be able to ▪ 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) 6.3 Direct a project with the focus on controlling project work Be able to ▪ 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	

	6.4 Conduct integrated change control in a professional manner Be able to ▪ perform the activities of integrated change control in an efficient and effective manner ▪ obtain approval from stakeholders
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (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	1. Integrity of change includes but not limited to: 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	<u>Performance Requirement</u> 6.1 Understand the requirements of integrated project closure Be able to identify the components of integrated project closure 6.2 Conduct project closure with regard to integration Be able to ▪ document lessons learned from project integration, including ➤ 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 6.3 Conduct integrated project closure in a professional manner Be able to ▪ 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	<u>Performance Requirement</u> 6.1 Have knowledge in concepts for scope monitoring and control Be able to ▪ master monitoring techniques including inspections, reviews, audits and walkthroughs ▪ understand mechanisms for scope change control 6.2 Execute scope verification Be able to ▪ participate in project inspections, reviews, audits and walkthroughs ▪ determine whether product/results complies with the scope ▪ document product acceptance by business users 6.3 Plan for scope change control Be able to ▪ evaluate the degree to which changes would affect the project scope ▪ evaluate alternative to scope modifications ▪ implement a scope change control system 6.4 Manage the actual scope changes Be able to ▪ 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 6.5 Manage and control project scope in a professional manner Be able to ▪ 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	<u>Performance Requirement</u> 6.1 Have knowledge in concepts for project closures Be able to ▪ understand schedule variance and cost variance ▪ interpret the variance and performance index for schedule and cost 6.2 Analyse scope variances and the chosen corrective actions Be able to ▪ 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 6.3 Archive lessons learnt Be able to ▪ determine the lessons learnt with regard to scope ▪ document the lessons learnt 6.4 Conduct reviews Be able to ▪ 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 6.5 Conduct project closure with regard to scope in a professional manner Be able to ▪ 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	<u>Performance Requirement</u> 6.1 Understand the sequence of activities Be able to ▪ identify inputs to activities and their arrival sequence ▪ know the characteristics of tools useful for scheduling 6.2 Conduct activity definition Be able to ▪ 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 6.3 Conduct activity sequencing Be able to ▪ 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 6.4 Conduct activity duration estimating Be able to ▪ 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	

		▪ document the basis for activity duration estimates ▪ develop activity duration estimates
	6.5 Conduct schedule development	Be able to ▪ 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	<u>Performance Requirement</u> 6.1 Have knowledge in principles and concepts of various cost models 6.2 Identify available budget resources 6.3 Develop a business case 6.4 Develop a cost model for the proposed project in a professional manner Be able to state the features of all different cost analysis models applicable to the software project management Be able to ▪ carry out a preliminary cost benefit analysis for project proposal substantiation ▪ identify any constraints for the proposed project Be able to develop a valuable business case from the identified constraints Be able to select a cost analysis model addressing the following items clearly ▪ project context ▪ preliminary cost breakdown in group items in the project ▪ project control milestones	
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (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	Performance Requirement 6.1 Have knowledge of resource planning Be able to ▪ 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 6.2 Collect the availability of the resources in the organisation for supporting the proposed project Be able to ▪ 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 6.3 Develop a resource management plan Be able to ▪ 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 6.4 Make appropriate levels of cost estimates Be able to ▪ 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	

	6.5 Conduct cost budgeting in a professional manner Be able to ▪ 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
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (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.
Remark	

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	<u>Performance Requirement</u> 6.1 Have knowledge and understanding of cost control Be able to understand ▪ input to cost control ▪ tools and techniques utilized for controlling changes to the cost baseline or budget ▪ outputs of cost control 6.2 Check completion of all related cost documentation Be able to ▪ prepare a checklist for a full set of cost documentation ▪ collect all the stipulated documents for review 6.3 Study the variance between the budget and the actual Be able to ▪ 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 6.4 Review whether the expenses in meeting the project goals is worthwhile Be able to review that the spending are worthwhile in terms of ▪ meeting the project context ▪ meeting the project timeline ▪ consumption of manpower ▪ smoothness of process 6.5 Document the cost review process Be able to record the cost review items in details for future reference
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) conduct an effective cost review process for the completed project and make an appropriate appraisal on the cost consumption; and (ii) maintain a good record of the cost review on the completed project for the reference of the forthcoming projects.
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	<u>Performance Requirement</u> 6.1 Understand principles and techniques of project quality management Be able to initiate a project quality management exercise for an organisation's project 6.2 Determine project quality requirements Be able to ▪ 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 6.3 Define quality for the project environment Be able to define quality management in covering product quality criteria and measures, quality review (checkpoints), and the application of industrial standards where applicable 6.4 Exhibit professionalism Be able to ▪ 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 6.2 Understand the business process analysis methodologies 6.3 Understand project quality tools and techniques 6.4 Establish the quality path (road map) for the project and the project environment 6.5 Define quality review techniques and the quality review procedure 6.6 Conduct project quality planning	
		Be able to plan a project quality management exercise for an organisation's project Be able to have practical knowledge of business environments and requirements Be able to master project quality tools and techniques for project quality planning Be able to articulate what and why is special about quality in the given project environment, and emulate activities to make project quality work Be able to ▪ 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 Be able to ▪ 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

	project, the project's product, and the related effects on other project planning processes to the project's stakeholders ▪ 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
	6.7 Exhibit professionalism Be able to consider an organisation's specific environment in developing a project quality plan to suit its requirements
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to produce a project quality management plan documenting: (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	<u>Performance Requirement</u> 6.1 Understand principles and techniques of project quality management 6.2 Conduct project closure with regard to quality Be able to ▪ 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	<u>Performance Requirement</u> 6.1 Have knowledge on project closure processes Be able to ▪ understand the processes of resource utilization review ▪ understand the activities for archiving information and transition 6.2 Review resource utilization Be able to ▪ review planned and actual project resources utilized at project closure ▪ track and report the differences 6.3 Document project data and lessons learnt Be able to ▪ document causes of events that leads to changes ▪ list types of changes introduced ▪ explain reasons for selecting specific corrective actions 6.4 Provide feedback to improve future organisational projects Be able to ▪ classify change causes for further analysis ▪ update resources estimation factors as feedback for future projects 6.5 Conduct transition activities in a professional manner Be able to ▪ 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	6.1 Understand principles and techniques of project risk management 6.2 Conduct preliminary risk planning 6.3 Establish risk management approach and process for the project 6.4 Exhibit professionalism	Performance Requirement Be able to establish a project risk management approach and process for an organisation's project Be able to ▪ identify and review organisation's risk management policies and procedures ▪ identify risk tolerance levels of stakeholders ▪ identify preliminary risk Be able to ▪ define types of risk (e.g. Business Risk and Project Risk) ▪ include guidelines and appropriate documentation Be able to establish an appropriate approach and process for project management which best suit an organisation's specific environment
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	<u>Performance Requirement</u> Be able to plan a project risk management exercise for an organisation's project 6.1 Understand principles and techniques of project risk management 6.2 Conduct risk management plan ▪ Be able to ▪ 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 ▪ Be able to ▪ 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 ▪ Be able to ▪ 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 ▪ Be able to ▪ 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	

	▪ communicate the limitations of risk quantification in order to avoid false impressions of risk assessment reliability - prepare a probabilistic risk analysis for the project 6.6 Exhibit professionalism 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
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	6.1 Understand principles and techniques of project risk management 6.2 Understand a project risk management plan 6.3 Conduct risk response planning 6.4 Exhibit professionalism	<u>Performance Requirement</u> Be able to plan a risk response exercise for an organisation's project 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 Be able to ▪ 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 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
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	6.1 Understand project risk management plans 6.2 Understand a project risk response plan 6.3 Conduct project closure with regard to risk management	<u>Performance Requirement</u> 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 Be able to comprehend a risk response plan in relation to ▪ 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 Be able to ▪ 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	<u>Performance Requirement</u> 6.1 Have knowledge in the corporate resource allocation scheme Be able to collect the corporate resources and their consumption details 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 ▪ level of resource requirement in monetary term ▪ level of technical difficulties and complexity ▪ amount of manpower required ▪ risk factor 6.3 Define the procurement requisition procedure Be able to develop detailed procedures for submitting applications for tender bidding or request for quotation 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 ▪ 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	6.1 Have knowledge in identifying which particular project needs can best be met by procuring services outside the organisation 6.2 Define the project scope statement 6.3 Produce a product description 6.4 Identify the procurement expertise 6.5 Conduct make-or-buy analysis 6.6 Develop a procurement management plan and a statement of work in a professional manner	<u>Performance Requirement</u> Be able to evaluate the following considerations on ▪ whether to procure ▪ how to procure ▪ what to procure ▪ how much to procure ▪ when to procure 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 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 Be able to identify the expertise in the organisation to support project procedure activities Be able to ▪ 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 Be able to work out a procurement management plan addressing ▪ 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	The integrated outcome requirements of this UoCs are the abilities to: (i) develop a procedure management plan describing how the remaining procurement processes (from solicitation planning through contract close-out) are to be managed; and (ii) write a clear, complete and concise statement of work as reference during the procurement process management.	
Remark		

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	6.1 Understand the basic building blocks of a network architecture design 6.2 Document the design of a network architecture in a professional manner	<u>Performance Requirement</u> 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. 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	1. Examples of building blocks are network layers, communication protocols, and circuit specifications. 2. The items in network technology architecture design document are 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 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	<u>Performance Requirement</u> 6.1 Understand the functions of each building block and the relationship between different building blocks under the adopted application software architecture Be able to ▪ 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 6.2 Maintain a common library of reusable application software components Be able to ▪ 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 6.3 Devise a mechanism to facilitate the update of the library of reusable application software components Be able to ▪ 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	

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

1. Title	Analyse the performance, latency and accessibility of systems
2. Code	111130L4
3. Range	This UoC involves analysing the performance, latency and accessibility of computer systems across multiple processing environment in accordance with the organisation's guidelines and/or requirements.
4. Level	4
5. Credit	3 (For Reference Only)
6. Competency	Performance Requirements 6.1 Understand the attributes to measure the performance of computer systems across multiple processing environment, including but not limited to: ● Availability ● Extensibility ● Interoperability ● Maintainability ● Reliability 6.2 Understand the effect of latency and accessibility of computer systems across multiple processing environment, including but not limited to: ● Virtualization ● Distributed computing ● Data center Location ● Sensor and actuator network ● Streaming media ● Esports and online multiplayer games 6.3 Know the enhancement of accessibility and analyse the performance of computer systems across multiple processing environment to provide suitable strategies for the benefits of the organisation
7. Assessment Criteria	The integrated outcome requirements of this UoC are the abilities to: ● analyse the performance, latency and accessibility of computer systems across multiple processing environment for an organisation in accordance with its guidelines and/or requirements. ● provide suitable recommendations for the benefits of the organisation.
8. Remark	

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

1. Title	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	<u>Performance Requirement</u> 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 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 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 ▪ architecture tools ▪ architecture repositories ▪ architecture repository management processes 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 ▪ 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	<u>Performance Requirement</u> 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 6.2 Determine and select a suitable framework Be able to ▪ 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 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 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	
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	6.1 Understand the relationship of the architecture framework and the business requirements of the organisation 6.2 Adopt a selected architecture framework 6.3 Adopt suitable methods to implement the architecture 6.4 Adopt an architecture framework in a professional manner	<u>Performance Requirement</u> 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 Be able to systematically and objectively evaluate and select an appropriate architecture framework to support the IT development of the organisation Be able to ▪ 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 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
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	Performance Requirement 6.1 Understand the basic components and viewpoints of a business architecture and viewpoints in a business architecture (See Remark 1 for the examples of business architecture components) 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 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) 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 ▪ 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	1. Examples of business architecture components and viewpoints are: 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. (source: http://www.opengroup.org/architecture/togaf8-doc/arch/toc.html) 2. Examples of potential sources of gaps are: a) people gaps; b) process gaps; c) tools gaps; d) information gaps; e) measurement gaps; f) financial gaps; and g) facilities gaps. (source: http://www.opengroup.org/architecture/togaf8-doc/arch/toc.html) 3. Pre-requisite: ITSWAR605A 4. Co-requisites: ITSWAR606A, ITSWAR505A

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	<u>Performance Requirement</u> 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. 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. 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. 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
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	1. Examples of metrics and methodologies are: a) Key Performance Indicators b) Return on investment analysis c) Internal rate of return d) Balanced scorecard 2. Examples of related methods are cost-benefit analysis and force field analysis. 3. Pre-requisite: ITSWAR605A 4. Co-requisites: ITSWAR504A, ITSWAR606A

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	Performance Requirement 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 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 ▪ 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 6.3 Educate stakeholders on new business architecture Be able to ▪ 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	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	<u>Performance Requirement</u> 6.1 Understand various network technology architecture principles ▪ Be able to ▪ 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 6.2 Develop a set of network technology architecture principles for the network resources in a professional manner ▪ Be able to ▪ 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 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	<u>Performance Requirement</u> 6.1 Understand various network technology architecture models 6.2 Develop a network technology architecture model in a professional manner 6.3 Validate the network technology architecture model	
	Be able to ▪ select the appropriate network technology architecture models for the business ▪ select the appropriate industry-based reference models for the business Be able to ▪ 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 Be able to ▪ 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 - perform final cross check to ensure the overall architecture model addresses the business requirements	

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	Performance Requirements 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 6.2 Identify the gaps between the baseline network architecture and the needs of new business requirements Be able to ▪ 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 6.3 Perform gap analysis of the current baseline against the target business architecture in a professional manner Be able to ▪ 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	<u>Performance Requirement</u> 6.1 Understand international, national, industry, de-facto, corporate standards of network architecture Be able to ▪ 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 6.2 Define standards for the design and construction of network architecture Be able to select relevant standards or adapt those in designing, deploying and implementing the network architecture for an organisation's specific environment 6.3 Evaluate standards for the design and construction of network architecture Be able to ▪ 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: ➤ Hardware View ➤ Communications View ➤ Processing View ➤ Standards View ➤ Cost View 6.4 Apply standards for the design and construction of network architecture Be able to employ defined standards in the design and construction of an organisation's target network architecture 6.5 Exhibit strong professionalism in performing this task Be able to define appropriate standards for an organisation's target network architecture to support its business functions in a highly professional manner	
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	6.1 Understand the tools and techniques for modelling and analysis of various views of the network architecture 6.2 Develop, evaluate and apply appropriate tools for the modelling and analysis of various views of the network architecture	<u>Performance Requirement</u> Be able to master modelling tools and techniques for the analysis of various views of the network architecture Be able to ▪ 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 See Remark for different views of a network architecture
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	<u>Performance Requirement</u> 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 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 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 ▪ Assessment ▪ Procurement ▪ Deployment ▪ Management ▪ Retirement 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	
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 ▪ 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 ▪ 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 ▪ 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	<u>Performance Requirement</u> 6.1 Understand the life cycle concept of application integration Be able to understand and document the life cycle of application integration including the relationships with other architecture models 6.2 Define a life cycle management policy Be able to define a life cycle management policy including maintenance and change procedures of the adopted application integration architecture 6.3 Identify the resource requirements to meet the life cycle management policy Be able to identify the resource requirements needed to review, maintain and change the life cycle of the application integration architecture 6.4 Maintain the life cycle management policy Be able to utilize available resources to perform life cycle management of the application integration architecture work to ensure that the adopted architecture is ▪ 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	Performance Requirement 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. 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 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	
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	Performance Requirement 6.1 Comprehend various application software architecture models and patterns, their variants and various technologies behind them 6.2 Select and recommend the most appropriate application software architecture model 6.3 Select and/or develop necessary application software architecture resources 6.4 Select, recommend and develop appropriate application software architecture model(s) in a professional manner	
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	<u>Performance Requirement</u> 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 6.2 Develop methodologies, processes, and best practices 6.3 Document the methodologies, processes, standards and best practices for the architecture model adopted 6.4 Create templates to facilitate the enforcement of the methodologies, processes, standards and best practices developed 6.5 Enforce the compliance of templates 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 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 Be able to clearly document the defined methodologies, processes, standards and best practices Be able to create templates on the architecture model adopted for enforcement of the developed methodologies, standards and best practices adopted by the organisation 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	
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	<u>Performance Requirement</u> 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 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 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 6.4 Apply the suitable principles in the design of design of embedded software system Be able to use the suitable design principles in the design of embedded software system 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	
7. Assessment Criteria	The integrated outcome requirement of this UoCs are the abilities to apply suitable principles professionally in designing embedded software systems.	

Remark	1. Some examples of the key characteristics of embedded software systems are 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); and f) 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: 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; and g) physical constraints and footprints.

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	111127L5
3. Range	Define metrics to evaluate and analyse technology architectures to ensure that it can support the business goals and objectives.
4. Level	5
5. Credit	3 (for reference only)
6. Competency	Performance Requirements 6.1 Understand the principles of quality assurance ● articulate the needs for quality assurance to ensure that the resulting technology architecture really meets the required quality standards ● understand the quality assurance standards and measures provided by IT service providers 6.2 Understand the purposes of relevant metrics for quality assurance standards ● understand appropriate and measurable metrics to evaluate the ability of a technology architecture to meet the business goals and objectives (See Remark) 6.3 Define metrics for quality assurance standards ● keep updated of the business and technology changes ● observe the code of practices in trade ● update the developed software deployment or migration plan and contingency plan whenever necessary 6.4 Exhibit professional skills ● 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	The integrated outcome requirements of this UoC is the ability to: ● validate that the business goals and other objectives of implementing the technology architecture are met. 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.
8. Remark	An example of the metrics can be a key question list which is used to pose questions against the architecture model and service description

	portfolio to test its merit and completeness {This UoC replaced ITSWAR508A “Define metrics to ensure that a technology architecture meets the business goals”

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

1. Title	Develop the microservices architecture
2. Code	111128L5
3. Range	Develop a microservices architecture reference model from various viewpoints to align with the business requirements as well as requirements from higher level architecture
4. Level	5
5. Credit	3 (for reference only)
6. Competency	Performance Requirements 6.1 Review the benefits and challenges of a microservices architecture ● Be able to ■ understand the benefit of decomposing an application into microservices, such as modularity, scalability, integration, etc ■ understand the protocols that microservices communicate with each other ◆ Synchronous ◆ Asynchronous ◆ UI integration ■ address the challenges of embarking on a microservices architecture ◆ Complexity ◆ Lack of governance ◆ Latency ◆ Data integrity ◆ Versioning 6.2 Understand various microservices architecture reference models ● Be able to ■ understand the development processes for building a microservices architecture ■ identify the boundaries of the microservices ■ understand the strategy of decomposing and decoupling a monolithic application into a series of microservices 6.3 Develop the microservices architecture by evaluating business capabilities, and the software and hardware environment. ● Be able to ■ choose suitable hosting model for the computing resources ■ depict the microservices that enable reasoning about critical requirements and constrains all subsequent refinements. ■ conduct the evaluation and perform the analysis of the

	microservices
7. Assessment Criteria	The integrated outcome requirements of this UoC is the ability to develop a microservice architecture in alignment with the business capabilities, and software and hardware environment as well as the business requirements from higher level architecture
8. Remark	

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	111129L5
3. Range	This UoC involves modelling technology architecture using architecture building blocks and by considering appropriate architecture viewpoints for the particular problem domain or industry
4. Level	5
5. Credit	6 (for reference only)
6. Competency	Performance Requirements 6.1 Understand technology architecture viewpoints ● Be able to ■ identify relevant stakeholders of the technology architecture ■ select technology architecture viewpoints to address stakeholders' concerns (Remark) 6.2 Identify, evaluate, apply, and develop technology architecture tools and techniques ● 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 6.3 Use a building block approach to model the architecture ● Be able to abstract the technology architecture based on the relevant viewpoints into architecture building blocks 6.4 Understand the inter- relationships of the various viewpoints ● Be able to integrate the various viewpoints in the architecture model in order to ■ facilitate the building blocks decomposition ■ enhance the understanding of the audience 6.5 Develop an initial technology architecture using building block approach ● Be able to develop and document the initial technology architecture through the use of appropriate architecture building blocks 6.6 Conduct reviews with stakeholders ● Be able to seek feedbacks from stakeholders ■ confirm with stakeholders that the architecture addresses all stakeholders' initial concerns

	■ re-work the architecture if necessary
7. Assessment Criteria	The integrated outcome requirement of this UoC is to develop and document a technology architecture model using a building block approach that integrates the various viewpoints with the use of appropriate tools and techniques
8. Remark	Examples of technology architecture viewpoints include hardware, communication, processing, standards, cost, and integration. [This UoC replaced ITSWAR507A “Model technology architecture”]

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	<u>Performance Requirement</u> 6.1 Understand different IT architecture vision and principles Be able to ▪ 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 6.2 Know various potential stakeholders and understand their needs and concerns Be able to ▪ identify stakeholders and their needs ▪ analyse and understand their concerns for the formulation of suitable architecture vision and principles to optimize business opportunities 6.3 Define and prioritise the architecture vision and principles 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 ▪ define the architecture vision and principles that ➢ 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 ➢ the definition of benefits to be derived from the architecture ➢ the mapping of these benefits to business objectives 6.4 Document the architecture vision and principles in a professional manner 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
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.

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	<u>Performance Requirement</u> 6.1 Have expert level understanding of the adopted IT architecture vision and principles of the organisation ▪ Be able to 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 6.2 Have in-depth understanding of the stakeholders' needs and their concerns ▪ Be able to 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 6.3 Advocate and explain the adopted architecture design methodology, their underlying principles and expected benefits ▪ Be able to 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	<u>Performance Requirement</u> 6.1 Understand the adopted architecture framework in the context of the business domain and other related constraints 6.2 Set up processes to ensure that the adopted architecture framework is fit for the purpose 6.3 Ensure that the adopted architecture framework is fit for the purpose 6.4 Set up and execute the required monitoring and confirmation processes in a professional manner	
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	Performance Requirement 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 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 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 ▪ 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	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)	
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	1. Examples of tools and techniques are: a) Resource-Event-Agent business models; b) Zachman framework; c) Open Applications Group; and d) Universal Business Language. 2. Examples of business architecture components and viewpoints are: 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. (source: http://www.opengroup.org/architecture/togaf8-doc/arch/toc.html)	

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	6.1 Understand different business modelling tools and techniques 6.2 Evaluate and select modelling tools 6.3 Develop modelling tools 6.4 Apply modelling tools 6.5 Model and document business architecture to meet business principles, business goals and strategic drivers	Performance Requirement 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) Be able to evaluate and select appropriate tools for capture, model, and analyse stakeholders' viewpoints based on selected viewpoints and the degree of sophistication 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 Be able to apply appropriate tools to capture, model and analyse the business architecture building blocks 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	1. Examples of tools and techniques for business modelling are: 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) 2. Pre-requisite: ITSWAR605A 3. Co-requisites: ITSWAR504A, ITSWAR505A	

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	Performance Requirement Be able to identify different tools used for ▪ capturing data structures in existing data assets ▪ analysing existing data structures and data models ▪ developing data models from different viewpoints (See Remark 1 for examples of required tools) 6.1 Understand various tools for data modelling and specification 6.2 Evaluate and select appropriate tools to capture and model data assets into data architecture artefacts 6.3 Apply and develop selected tools to capture and model data assets into data architecture artefacts 6.4 Understand the life cycle of data architecture artefacts 6.5 Evaluate and select appropriate tools to build a registry of data architecture artefacts to perform lifecycle management of the artefacts Be able to ▪ 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 Be able to ▪ 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 Be able to ▪ 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 Be able to ▪ 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	

	6.6 Apply and develop required tools to build a registry of data architecture artefacts for its lifecycle management Be able to ▪ 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	The integrated outcome requirements of this UoCs are the abilities to: (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	1. Examples of required tools for developing data architecture artefacts are 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	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	<u>Performance Requirement</u> 6.1 Understand different artefacts in data architecture. Be able to understand the different artefacts in a data architecture (see Remark 1) 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 ▪ business drivers ▪ IT strategy ▪ regulatory requirements 6.3 Model data flows and structures Be able to ▪ 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 6.4 Document the required data architecture artefacts Be able to translate the process and data models into data architecture artefacts 6.5 Develop, publish, and maintain a registry of data architecture artefacts. Be able to ▪ 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	1. Examples of data architecture artefacts are 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. 2. Pre-requisites: ITSWAR608A, ITSWAR609A, ITSWAR610A

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	<u>Performance Requirement</u> 6.1 Understand different data application areas for standardisation Be able to ▪ understand the driving factors (e.g. business drivers, IT strategy) for setting data standards ▪ understand different data application areas (see Remark 1) 6.2 Identify suitable data application that require standardisation Be able to ▪ identify the data application that requires standardisation to address the driving factors ▪ document the rationales and guiding principles to formulate the data standards 6.3 Identify, evaluate and select suitable industry and international data standards to meet the data application requirements Be able to identify, evaluate and select suitable industry and international data standards to meet the data application requirements See Remark 2 for examples of industry and international data standards) 6.4 Derive an enterprise data standards from the suitable industry and international data standards or from the data architecture Be able to ▪ 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 6.5 Publish and maintain the enterprise data standards Be able to ▪ publish the enterprise data standards in the data registry ▪ maintain different versions of enterprise data standards	

	6.6 Enforce project teams to follow the enterprise data standards to implement the information systems Be able to ▪ establish policies, rules and guidelines for project teams to follow enterprise data standards ▪ establish an management structure to facilitate different business units to agree upon and promulgate enterprise data standards ▪ establish an management framework for managers and domain experts to review, update, and endorse enterprise data standards
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to (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	1. Examples of data applications where standardisation can be applied are 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 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		<u>Performance Requirement</u> 6.1 Understand standards, policy and procedure for the development of baseline technology architecture Be able to describe and identify the key baseline technology architecture components and the standards, policy, process and procedure required for its development 6.2 Define the baseline technology architecture Be able to ▪ 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 6.3 Review the baseline technology architecture Be able to ▪ 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 6.4 Document the baseline technology architecture Be able to ▪ 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 Be able to exercise professional judgment to ▪ 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	The integrated outcome requirements of this UoCs are the abilities to: (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 (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.
Remark	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 ▪ 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 ▪ 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 ▪ 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	

	supports the principles, objectives and constraints of the business ▪ 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 6.5 Exhibit professional behaviour Be able to ▪ produce a technology architecture reference model up to a professional standard ▪ perform trade-off analysis to resolve conflicts among different views
7. Assessment Criteria	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.
Remark	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	Performance Requirement Be able to ▪ 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 See Remark 1 for examples of new technology impacts. 6.3 Build and maintain a library of technology architecture building blocks Be able to ▪ 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 6.4 Perform trade-off analysis of newer technology / model against current technology in the architecture Be able to ▪ 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 (See Remark 2 for examples of technology architecture viewpoints)	

	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	The integrated outcome requirements of this UoCs are the abilities to: (i) perform life cycle management of the technology architecture for continuous improvement; and (ii) maintain the currency of the technology adopted. 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.
Remark	1. Examples of new technology impacts include, but are not limited to, 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 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	Performance Requirement 6.1 Comprehend different embedded software architecture models and the technologies behind them Be able to review and recommend a particular embedded software architecture model (including its design, patterns, variants, and various supporting technologies) See Remark 1 for examples of technologies of embedded software architecture models. 6.2 Select and recommend the most appropriate model(s) Be able to ▪ 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 6.3 Select and / or develop necessary embedded software architecture resources Be able to ▪ 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 6.4 Evaluate, choose and adopt appropriate embedded software architecture model(s) in a professional manner Be able to ▪ 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	

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	Performance Requirement 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 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. 6.3 Apply the appropriate modelling techniques and tools in the design and development of embedded software system Be able to ▪ 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 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	
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	1. Some examples of modelling techniques are a) finite state machines; b) data flow model; c) multi-threading; and d) concurrent multi-processing models. 2. Pre-requisite: ITSWAR619A 3. Co-requisite: ITSWAR620A	

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	<u>Performance Requirement</u> 6.1 Understand the needs and the methodologies for developing and maintaining a common library of re-usable building blocks for embedded software systems Be able to ▪ 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 6.2 Maintain a common library of reusable embedded software components Be able to ▪ 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 6.3 Maintain a common library of reusable embedded software components in a professional manner 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	
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	<u>Performance Requirement</u> 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 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 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 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 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	
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		

	model(s) for the classes of embedded software to be developed in an organisation; and (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.
Remark	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	Define data governance policies and architecture principles
2. Code	111123L6
3. Range	This UoC involves defining the data governance policies and scope of data assets for the establishment of data architecture to support the development of organisational data being accurate, accessible, consistent and protected.
4. Level	6
5. Credit	3
6. Competency	Performance Requirements 6.1 Understand the data governance policies and scope of data throughout the data lifecycle ● Be able to: ■ Have knowledge of data governance policies (see Remark 1) and scope of data (see Remark 2) 6.2 Define the data governance policy for the establishment of data architecture to support the development of organisational data being accurate, accessible, consistent and protected ● Be able to: ■ define the processes to be implemented in your data governance initiative ■ define roles and assign responsibilities ■ initialize the data governance framework ■ define the required deliverables and organization structure for data governance 6.3 Review the data governance policy ● review the data governance policy such that the data asset are consistent and confident for the business decisions based on trustworthy data aligned with all the various purposes within the enterprise
7. Assessment Criteria	● The integrated outcome requirement of this UoC is the abilities to define the governance policy to make consistent and confident business decisions based on trustworthy data aligned with all the various purposes for the use of the data assets within the enterprise
8. Remark	1. The data governance policy will deal with the internal policies and external policies for data quality, access, security, privacy and usage, as well as roles and responsibilities for implementing those policies and monitoring compliance with them against organisational culture, types of business, ethics, regulatory, compliances, standards, etc. 2. The appropriate protection and security levels for different classifications of data within the scopes of data include (but not limited

	to) data ownerships, data custodians, data retention, data sharing, data archive and data disposal [This UoC replaced ITSWAR608A "Define data management policies and architecture principles"]

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

1. Title	Develop application integration architecture
2. Code	111124L6
3. Range	Evaluate, develop and apply appropriate resources and model to support application integration architecture, based on business drivers, requirement of specific problem and existing IT infrastructure of the organisation with aid of emerging technologies such as AI and ML.
4. Level	6
5. Credit	3 (for reference only)
6. Competency	Performance Requirements 6.1 Understand new technology and development trend of proprietary and open technology products ● Be able to ■ understand new technologies and products provided by specific vendor for supporting the end stage of application integration ■ understand open source and open technology products ■ leverage emerging technologies to come up with metrics that better evaluate the appropriateness of these products to be used as application integration architecture resources (Remark) 6.2 Understand the latency and accessibility of computer systems across multiple processing environment ● Be able to ■ 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 6.3 Implement application integration architecture resources ● Be able to ■ develop and implement (i.e. buy, build, and apply any combinations of them) application integration architecture resources 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 the compliance to defined principles, policies and standards
7. Assessment Criteria	The integrated outcome requirements of this UoC are the abilities to : ● select relevant application integration architecture resources based

	on the proposed application integration architecture; and ● develop application integration architecture resources to support the application integration architecture as well as to become part of IT architecture of an organisation.
8. Remark	Examples of application integration resources are software products, platforms, and headcount with strength in emerging technologies [This UoC replaced the following UoCs: 1. ITSWAR617A "Recommend application integration architecture models" 2. ITSWAR618A "Develop application integration architecture resources"]

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	111125L6
3. Range	Promote and explain the adopted business processes to stakeholders in an organisation to obtain their buy-in and support in a general business environment
4. Level	6
5. Credit	6 (for reference only)
6. Competency	Performance Requirements 6.1 Define business performance indicators to meet with business goals in consistent to stakeholders' expectation ● Be able to ■ identify the stakeholders from different categories: ◆ Internal stakeholders ◆ External stakeholders ◆ Primary stakeholders ◆ Secondary stakeholders ■ understand the different stakeholders' expectation from different stakeholders' categories ■ define business performance indicators to meet with strategic drivers, and stakeholders' concerns (Remark) 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 6.3 Continuously measure and monitor the business performance of using the existing technologies ● Be able to ■ 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 6.4 Establish management structure to continuously improve business performance with new technologies

	● Be able to design and establish management structure ■ review current business performance in relation to existing technology capability ■ review new technologies with respect to improving business performance ■ conduct cost-benefit analysis on adopting new technologies and check for any improvement in business performance ■ formulate a new business architecture
7. Assessment Criteria	The integrated outcome requirements of this UoC are the abilities to : ● identify, design, and re-engineer business processes of an organisation with new technologies to improve business performance ● continuously monitor the business performance of using the existing technologies ● design and establish management structure and guidelines to continuously improve business performance with new technologies
8. Remark	Examples of metrics and methodologies are: ● Key Performance Indicators (KPIs); ● Objective and key results (OKRs); ● Return on investment (ROI) analysis; ● Internal rate of return (IRR); ● Balanced scorecard [This UoC replaced ITSWAR607A “Review, design and re-engineer business processes to form a new business architecture”]

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	111126L6
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
4. Level	6
5. Credit	3
6. Competency	Performance Requirements 6.1 Comprehend different embedded software architecture models and the technologies (See Remark 1) behind them ● Be able to: ■ 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 6.2 Select and recommend the most appropriate technology mix for the adopted embedded software architecture model ● Be able to: ■ 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 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 ● 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
7. Assessment Criteria	The integrated outcome requirement of this UoC is the ability 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.
8. Remark	1. Examples of various technologies of embedded software framework and platforms are Embedded Linux, WebOS, Android, Desktop Linux/Windows, QNX. Integrity, VxWorks, Ubuntu and Debian, Windows for IoT, Embedded Configurable Operating System (eCos), etc. 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 [This UoC replaced ITSWAR620A “Determine technology mix for the design and development of embedded software systems”]

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

1. Title	Monitor and perform the system security access checking
2. Code	111194L3
3. Range	Follow the organization's policy to monitor and protect the security elements associated with information of an organization.
4. Level	3
5. Credit	3 (for reference only)
6. Competency	Performance Requirements 6.1 Knowledge for monitoring the system security access ● understand the importance of access security checking to the organization operations and thus, the demand for proper handling ● understand the scope and areas for the access security checking within the organization's overall security infrastructure ● consider the critical factors of the access security control such as password control and related administrative arrangements ● review the available techniques and methodologies for access security checking with their own advantages and shortcomings 6.2 Carry out the system security access check ● apply appropriate tools to carry out the access checking ● closely monitor the effectiveness of the checking process ● follow the organization's guidelines to handle any malfunctions of system security access and report to the organization's management 6.3 Exhibit professionalism ● communicate with different stakeholders effectively and skillfully such that they know the organization's policies regarding access security checking ● strike a proper balance of interests between customers and the organization as a whole
7. Assessment Criteria	The integrated outcome requirements of this UoC are the abilities to : ● ensure all access security checking tasks will be executed effectively and correctly ● follow the organization's guidelines to handle any malfunctions of system security access
8. Remark	

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

1. Title	Understand general security and network security features on various types of platforms to carry out network security assessment
2. Code	111195L3
3. Range	This UoC involves a good understanding the latest security challenges and opportunities presented by various platforms in order to identify the associated risks preliminarily in network security assessment.
4. Level	3
5. Credit	3 (for reference only)
6. Competency	Performance Requirements 6.1 Know the general security and network security features ● Understand different types of network security devices and tools (including but not limited to) ■ Access control ■ Antivirus ■ Application security ■ Data loss prevention ■ Email security ■ Firewalls ■ Mobile device security ■ Network segmentation ■ Security information and event management ■ Web security ● Understand the general concepts of network security ■ Confidentiality ■ Integrity ■ availability 6.2 Follow instructions/guidelines to ● carry out trouble shooting of security and network problems ● respond to all system and/or network security breaches ● carry out testing and identifying network and system vulnerabilities 6.3 Keep updated of the development of network security ● changes of local and international industry trends and requirements ● availability of new security devices and tools
7. Assessment Criteria	The integrated outcome requirements of this UoC are the abilities to : ● understand different types of principles and devices of network security ● follow instructions/guidelines to perform network security assessment tasks

8. 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	6.1 Understand risk analysis methods and techniques 6.2 Manage and report status of identified risks	Performance Requirement Be able to apply risk analysis methods and techniques to assess changes in risks 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
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	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	<u>Performance Requirement</u> 6.1 Understand information security policies Be able to ▪ 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 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 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 6.4 Review and revise procedures and guidelines Be able to ▪ 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 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	
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	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 border="0"> <tr> <td style="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 ▪ 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 ▪ 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 ▪ 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	6.1 Understand the organisation's information security policies 6.2 Implement the practices, procedures and guidelines	<u>Performance Requirement</u> Be able to understand the organisation's information security policies Be able to ▪ 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	<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 6.2 Implement information security awareness programme to maintain an information security culture 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 6.3 Ensure the delivery of the activities that can influence the culture and behaviour of the staff, including information security education and awareness 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	
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	Apply suitable network development tools in the deployment of secure network system
2. Code	111190L4
3. Range	This UoC involves application of suitable network development tools based on the organisation's requirements and limitations for the deployment of a secure network system
4. Level	4
5. Credit	3 (for reference only)
6. Competency	Performance Requirements 6.1 Possess knowledge in the field ● Know the industry standards on secure network system deployment ● Aware of the different network development tools available ● Know the strengths and weaknesses of different network development tools 6.2 Understand the requirements for deployment of a secure network system ● Understand the organisation's requirements, limitations and constraints on the deployment of a secure network system 6.3 Apply suitable network development tools for secure network system deployment ● Select the network development tools that are most suitable for the organisation based on the strengths and weaknesses of the different tools and the requirements and limitations of the organisation ● Use the selected tools for deploying the secure network system 6.4 Perform the tasks in a professional manner ● Minimise disturbance to the organisation's operation ● 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 UoC are the abilities to : ● apply the network development tools that are most suitable for the organisation to deploy a secure network system ● Perform the tasks in a professional manner
8. Remark	

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

1. Title	Perform application security assessment for the organisation
2. Code	111191L4
3. Range	Conduct application security assessment for the organisation and suggest recommendations and follow-up action to enhance application security
4. Level	4
5. Credit	3 (for reference only)
6. Competency	Performance Requirements 6.1 Possess the knowledge in the subject area ● Understand the target of the assessment and the tasks that needed to be performed for the assessment ● Understand the importance of allocating the appropriate level of resources for performing the assessment ● Understand that the assessment should be conducted by qualified personnel with relevant experience and expertise ● Understand the needs of application security assessment ● Be aware of the different available approaches and methodologies to carry out the assessment, with their advantages and shortcomings 6.2 Carry out the application security assessment ● Be able to: ■ Define in advance the scope and coverage of the assessment, and consolidate all details into a testing plan ■ Communicate and inform associated units to notify them of the assessment to minimise potential interruption to the organisation's operation ■ Fully consider critical factors while preparing and planning for the assessment ■ Carry out the tasks planned for the application security assessment ■ Document results and findings of the assessment ■ Identify recommendations and follow up actions from the assessment result if necessary 6.3 Exhibit professionalism ● Ensure all related staff members contribute their greatest effort and honesty in activities related to the assessment

	● Always strike a balance of interests between customers, employees and the company as a whole ● Minimise disturbance to the organisation's operation ● 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 UoC are the abilities to : ● successfully perform the application security assessment for the organisation ● communicate with associated personnel to minimise disturbance to the organisation's normal operation ● correctly interpret findings from the assessment and propose appropriate recommendations and follow up actions
8. Remark	

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

1. Title	Carry out the first line of communication for triggering client response and alert internal security teams
2. Code	111192L4
3. Range	Ensure the first line of communication is developed for client response and alert internal security teams in a timely manner
4. Level	4
5. Credit	3 (for reference only)
6. Competency	Performance Requirements 6.1 Understanding of the cybersecurity system of the organisation ● Understand the triggers of the system ● Understand the cybersecurity policy of the organisation ● Understand the needs and functions of client response ● Know the functions and work departments of the internal security teams 6.2 Carry out the first line of communication ● Aware of when the first line of communication needs to be developed ● Ensure that the communications are carried out in a timely manner ● Make sure that all associated personnel are kept informed and stay up to date with the incident ● All communications should be recorded and filed for record 6.3 Exhibit professionalism ● 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 UoC are the abilities to : ● Ensure that the communications are carried out in a timely manner and are recorded for future reference ● Make sure that all associated personnel are kept informed and stay up to date with the incident
8. Remark	

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

1. Title	Maintain security files by receiving, processing and filing the system data
2. Code	111193L4
3. Range	Ensure the security files received are processed according to the organisation's standard procedures and filled for future reference.
4. Level	4
5. Credit	3 (for reference only)
6. Competency	Performance Requirements 6.1 Understand the data system ● Know the importance of maintaining the system data ● Aware of the filing structurer 6.2 Maintain security files ● Assign unique file numbers for security files ● Ensure the files can be sorted or find easily by the nature of the case for future references, such as by assigning descriptive tags or searchable keywords to the files ● Ensure the filing of the data are done following the organisation's standard procedure ● Process the file in a timely manner ● Grouping all associated data together or linking them for trackability 6.3 Summarising and follow up on security files ● Provide a periodic summary report (monthly, quarterly or half-yearly, depends on the organisation's needs) to show the number of different cases received to assess cybersecurity system effectiveness and for future performance improvement ● Follow up on missing information/data ● Ensure that associated personnel are informed of any required follow up action or the completion of the filing of a case 6.4 Exhibit professionalism ● 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 UoC are the abilities to : ● Ensure the filing of the data are done following the standard procedure and that they can be searched easily ● Follow up on missing information and inform the associated personnel of the status of the filed case or follow-up action

	required. ● Create a summary report for management to show the number of incidence within a period to assess the effectiveness of the cybersecurity system and future improvements.
8. 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	<u>Performance Requirement</u> 6.1 Understand various best practices of ISG activities Be able to identify suitable staff responsible for information security, their expertise and the best industry practices 6.2 Comprehend centralized and decentralized approaches to coordinating information security Be able to establish ISG practices for the management of reporting and communication channels in the organisation 6.3 Understand various information security management (or governance) roles, responsibilities and organisational structure Be able to assign suitable roles and responsibilities for management reporting and communication that support ISG activities 6.4 Establish reporting and communication channels for ISG activities in a professional manner 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	
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	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	Performance Requirement 6.1 Know the life-cycle-based risk management principles and practices Be able to ▪ 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 6.2 Ensure that risk management related activities are integrated into business life cycle processes 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	
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	6.1 Comprehend risk mitigation strategies 6.2 Understand cost benefit analysis 6.3 Define risk mitigation strategies 6.4 Prioritize risk mitigation strategies 6.5 Define and prioritize risk mitigation strategies in a professional manner	<u>Performance Requirement</u> Be able to define risk mitigation strategies related to security requirements of information resources that support business applications Be able to perform cost benefit analysis techniques in assessing options for mitigating risks threats and exposures to acceptable levels Be able to define and recommend strategies to mitigate risk to levels acceptable to the organisation based on its business impacts Be able to ▪ 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 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
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	<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	
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	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	<u>Performance Requirement</u> 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 6.2 Understand different technique for vulnerability assessment Be able to ▪ 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 6.3 Monitor, measure and report on the effectiveness of information security controls Be able to ▪ 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 6.4 Ensure the non-compliance issue and other variance are resolved in a timely manner Be able to ▪ 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	6.1 Know how to protect the integrity and confidentiality of information systems / data in the organisation 6.2 Understand the process of change management 6.3 Implement security measures for protecting the integrity and confidentiality of information systems / data in the change management process 6.4 Ensure the organisation's information security is not compromised throughout the change management process	<u>Performance Requirement</u> Be able to understand how to keep information accurate and from being disclosed to unauthorized parties Be able to ensure the proposed changes are merited and will not adversely affect other elements of the organisation's planning 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 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
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	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	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	6.1 Understand local and relevant international laws related to ICT, in particular data privacy and computer crime 6.2 Provide advice on legal matters related to computer forensic evidence collection and investigation 6.3 Make appropriate reference to professional standards and ethics	<u>Performance Requirement</u> Be able to provide advice on legal matters related to computer forensic such as ▪ whether an act constitutes a computer crime ▪ the proactive ways to investigate a computer crime and collect relevant evidence Be able to provide advice on handling computer incidents properly and in compliance with related laws and regulations 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	<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 ▪ 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	
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	<u>Performance Requirement</u> 6.1 Understand forensics concepts and investigation techniques Be able to ▪ 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 6.2 Identify a case for investigation Be able to ▪ 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 6.3 Develop an investigation plan Be able to ▪ 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 6.4 Examine the collected data Be able to ▪ 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 6.5 Investigate a security case in a professional manner 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	
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	<u>Performance Requirement</u>	
	6.1 Understand the important traits of a forensics report	Be able to ▪ understand the contents required in a forensics investigation report ▪ understand evidence presentation
	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
	6.3 Develop guidelines in drafting a forensic investigation report	Be able to ▪ 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
	6.4 Define guidelines in presenting a case	Be able to ▪ define the steps in presentation ▪ define the required supporting evidence ▪ define the appropriate methods to present evidence to the audience with different technical backgrounds
	6.5 Present the investigation report	Be able to clearly and unambiguously communicate the investigation report in court or to management
	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.
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	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	6.1 Understand BCP documentation requirements 6.2 Develop BCP documents 6.3 Archive and maintain the documents	<u>Performance Requirement</u> Be able to ▪ identify the critical information that must be included in BCP documentation ▪ master all key components of BCP documentation Be able to ▪ 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 Be able to ▪ 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	<u>Performance Requirement</u> 6.1 Understand the objectives of the BCP drill Be able to ▪ understand the different natures of drills ▪ understand the importance of drill tests which play a vital role in the BCP 6.2 Develop drill strategy Be able to ▪ 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 6.3 Conduct drill test Be able to ▪ 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 6.4 Review performance of drill tests Be able to conduct critical review on the processes and outcomes of drill tests for possible improvements in subsequent drill tests	
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	<u>Performance Requirement</u> 6.1 Prepare for a BCP awareness training programme Be able to ▪ 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 6.2 Develop an awareness training programme Be able to ▪ 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. 6.3 Deliver the awareness training programme Be able to ▪ 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 6.4 Evaluate the effectiveness of the training programme Be able to ▪ 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	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="1"> <thead> <tr> <th></th><th><u>Performance Requirement</u></th></tr> </thead> <tbody> <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> </tbody> </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
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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	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	Performance Requirement 6.1 Understand information system security audit report and security baseline Be able to ▪ 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 Be able to ▪ 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 Be able to ▪ 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 Be able to prioritize the resources for the timely implementation of the information security recommendations bought up in the audit report 6.5 Evaluate and follow up on the information security audit report in a professional manner 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	
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	Conduct investigation of Information Security Incidents
2. Code	111169L5
3. Range	This UoC involves Investigating information security issues for the organisation, collecting evidences and documenting the activities conducted
4. Level	5
5. Credit	3 (for reference only)
6. Competency	Performance Requirements 6.1 Understand forensics concepts and investigation techniques for the IT systems involved ● Be able to: ■ Evaluate different issues in IT security in order to develop the framework of investigation plan ■ Evaluate different investigation approaches in order to develop the procedures in conducting an investigation of security cases ■ Demonstrate professional knowledge in the various techniques in evidence gathering ■ Understand the functions and operations of the systems involved in the incident 6.2 Investigate security case in a professional manner ● Be able to: ■ Identify the case for investigation, define guidelines and ensure that steps taken during investigation are in accordance with the company's policies and any laws and regulatory requirements ■ Develop investigation plan that define the procedures and techniques used in information collection and documentation of forensic activities ■ Examine the collected data and recognize essential elements of possible forensic activities
7. Assessment Criteria	The integral outcome requirements of this UoC are the abilities to : ● Investigation of the information security case in a professional manner ● Documentation of conducted activities ● Preservation of evidence for later internal analysis and/ or police investigation
8. Remark	

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

1. Title	Develop procedures to implement incident response plan
2. Code	111170L5
3. Range	This UoC involves designing the process to implement the incident response plan while minimising the impact on the organisation's operation
4. Level	5
5. Credit	3 (for reference only)
6. Competency	Performance Requirements 6.1 Understand incident response plans ● Understand the processes and operations of the incident response unit ● Aware of the potential scale of incidents and personnel that could potentially be involved ● Understand the tasks that are needed to carry out to have the plan implemented ● Understand the organisation's cyber security policies and assets/infrastructures that could be involved (e.g. Internet of Things, Cloud storage, networks etc....) 6.2 Develop procedures and guidelines to implement incident response plan ● Determine the responsibility of all associated personnel ● Determine the scale of the tasks that needed to carry out ● Decide the order of the tasks needed to carry out to minimise any interruption to the organisation's operation ● Communicate with relevant departments to understand their needs such that the execution could be planned accordingly to minimise the impact on the organisation's operation ● Ensure that tools and equipment needed for the implementation are all identified and have a plan to make them available for the tasks ● If downtime of essential services are unavoidable, potential backup services should be considered 6.3 Exhibit professionalism ● 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 requirements of this UoC is the ability to design the procedure to implement incident response plan such that impact on the organisation's operation could be minimised
8. Remark	This UoC replaced ITSWIS614A "Develop response and recovery plans"

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

1. Title	Develop procedures to maintain and comply with the information security standard and policies of the organization
2. Code	111171L5
3. Range	Develop information security practices and procedures for using information systems to comply with the organisation's information security policies
4. Level	5
5. Credit	3 (for reference only)
6. Competency	Performance Requirements 6.1 Understand the organisation's information security policies and operation ● Be able to ■ understand the organisation's information security policies ■ understand the needs and usage of the organisation's information system 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
7. Assessment Criteria	The integrated requirements of this UoC is the ability to develop the practices, procedures and guidelines that comply with the information security standards and policies.
8. Remark	This UoC replaced ITSWIS506A "Develop information security practices and procedures"

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

1. Title	Develop secure computer networking applications
2. Code	111172L5
3. Range	Develop secure computer networking applications by considering appropriate viewpoints for the security domain
4. Level	5
5. Credit	3 (for reference only)
6. Competency	Performance Requirements 6.1 Understand the technological needs of the organization ● Be able to ■ identify relevant stakeholders associated the computer network applications ■ understand the needs and usages of the computer network applications within the organisation ■ select appropriate security domain viewpoints to address stakeholders' concerns 6.2 Develop secure computer networking applications ● identify and evaluate different networking tools and techniques ● apply appropriate tools and techniques to develop applications that fulfil the needs of different stakeholders ● ensure that the applications are complied with the cybersecurity policies of the organisation
7. Assessment Criteria	The integrated outcome requirements of this UoC is the ability to develop secure computer networking applications that fulfil the needs and abide to the organisation's cybersecurity policies.
8. Remark	

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

1. Title	Evaluate the results of application security assessment for improvement recommendation
2. Code	111173L5
3. Range	Evaluate the results of application security assessment and propose possible directions for security improvement.
4. Level	5
5. Credit	3 (for reference only)
6. Competency	Performance Requirements 6.1 Knowledge of the requirements of application security assessment ● understand the basic principles, methodologies and tools in the application security assessment process (e.g. RASP, MAST) ● appreciate the objectives of the security assessment ● understand the requirements and goals of the security assessment of the organization 6.2 Evaluate the results of application security assessment ● any security weaknesses and vulnerabilities in source code ● any security weaknesses in architecture, design, open source and third-party components ● consolidate the impacts from possible application security risks in qualitative and quantitative terms ● properly document the evaluation results 6.3 Propose possible directions for improvement ● develop a structured plan to coordinate security improvements in according to the organization's guidelines and requirements ● propose best practices for security assessment ● develop training programmes for internal staff to upgrade their competency
7. Assessment Criteria	The integrated outcome requirements of this UoC are the abilities to : ● critically evaluate the results of application security assessment ● propose possible directions for security improvement in according to the organization's guidelines and requirements
8. Remark	

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

1. Title	Evaluate the potential security threats to the organisation
2. Code	111174L5
3. Range	This UoC involves evaluating threats that could severely impact an organisation's business processes.
4. Level	5
5. Credit	6 (for reference only)
6. Competency	Performance Requirements 6.1 Understand information resources of an organisation ● understand how information resources of an organisation are handled and can be used to support its normal business processes (including its employees, business assets, business operations and business functions) ● understand the process of how information is acquired and stored within the organisation ● articulate the critical information resources for an organisation's business operation ● explain why certain information resources in an organisation are critical to its business processes 6.2 Determine potential risk factors related to information resources ● 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, information systems and information acquisition process of an organisation, which may have adverse effects on its business processes 6.3 Apply quantitative and qualitative methods to determine sensitivity and criticality of information resources and systems, and the impact of potential adverse events 6.4 Evaluate the potential security threats to the organisation in a professional manner ● apply risk identification and analysis methods to identify physical and logical threats that could severely impact an organisation's employees, business assets, operations and business functions ● evaluate the potential impacts that may arise from those identified threats ● comply 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 UoC are the abilities to : ● identify threats that could severely impact the organisation ● evaluate the potential impacts that may arise from those identified risks in accordance with the organisation's policies and guidelines, as well as any (local and international) laws and regulatory requirements, if applicable
8. Remark	This UoC replaced ITSWIS605A "Identify the potential security threats to the company"

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	111175L5
3. Range	This UoC involves managing the execution of the response and recovery plans when a tragic event arises
4. Level	5
5. Credit	3 (For Reference Only)
6. Competency	Performance Requirements 6.1 Understand response and recovery plans ● Be able to: ■ 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 6.2 Manage the execution of the response and recovery plans ● Be able to: ■ 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 6.3 Feedback to and integrate the response and recovery plans into the organisation's security programme ● Be able to: ■ archive the current tragic event's data and experience into the organisation's knowledge base. ■ 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 UoC is the ability to execute the response and recovery plans by: ● determining the occurrence of a tragic event; ● following the plans to rectify disruptions in business functions in a reasonably short time; and ● maintaining the alignment of plans into the organisation's security programme.
8. Remark	This UoC replaced ITSWIS511A "Manage the execution of response and recovery plans"

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

1. Title	Perform network security assessment for the organization
2. Code	111176L5
3. Range	Conduct network security assessment by abiding to the organization's security policy and assessing whether it could protect the organization's interest.
4. Level	5
5. Credit	6 (for reference only)
6. Competency	Performance Requirements 6.1 Possess the knowledge in the subject area ● Understand the organisation's security policy ● Understand the organisation's business needs ● Be familiar with network infrastructure and all the services that it supports ● Possess extensive knowledge in security principles, implementation of controls and best practices ● Possess extensive knowledge of various security risks, such as possible methods of attacks on signalling layer, database of subscribers, network elements, gateways, frauds, service interruptions, etc. ● Knowledgeable in network security standards and benchmarks ● Knowledgeable with network access requirements of products and services 6.2 Assess network security risks and appropriateness ● Be able to: ■ Work with appropriate departments to determine network access requirements for internal and external users or products and services ■ Assess whether personnel have the appropriate access right ■ Assess whether the network setting could fully impose the organisation's cyber security policy ■ Assess whether the network security is sufficient in minimising risks and protect the core operations and interest of the organisation ■ Document the assessment for record ■ Inform the associate personnel of the result for further processing 6.3 Exhibit professionalism ● Always look after the interest of the organisation as well as customers.

	● Always respect the privacy of the employee when conducting the network security assessment ● Follow the policy and guidelines of the network security assessment
7. Assessment Criteria	The integrated outcome requirements of this UoC are the abilities to : ● conduct the network security assessment abiding to the policy and guidelines ● assess the network security on whether it could protect the interest of the organisation ● document the assessment and inform associate personnel for follow up
8. Remark	This UoC replaced ITCSNO530A “Define network infrastructure access policies”

**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	111177L5
3. Range	Report findings after information system security audit work to management via full documentation and management summary in an industry standard format. Make suggestions when necessary to enhance the information system security
4. Level	5
5. Credit	6 (for reference only)
6. Competency	Performance Requirements 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 that complies with information security policy and standards ● Understand the needs and the considerations involved for the different activities conducted through the information system security audit exercise 6.2 Prepare an information system security audit report ● Be able to provide a report that ■ 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 ■ When possible, benchmark the findings with industry standards ■ supports the reported results with sufficient and appropriate audit evidence 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 6.4 Provide the information system security audit report identifying major security exceptions and ensure appropriate management follow up actions taken ● Be able to ■ 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 UoC 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. ● make suggestions on changes to the system to address the issues and to further enhance the information system security
8. Remark	This UoC replaced ITSWIS514A "Prepare and deliver information system security audit report"

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

1. Title	Prepare documentation to report the security testing and findings
2. Code	111178L5
3. Range	Follow procedures for documenting for security testing and findings and identify potential follow up actions
4. Level	5
5. Credit	3 (for reference only)
6. Competency	Performance Requirements 6.1 Understand the basis of documenting an event as a basis for subsequent action ● Be able to ■ determine the scope for documentation ■ understand the procedures to document a security test and findings 6.2 Preparing the documentation to report a test or finding ● Be able to ■ ensure that all associated information and results are included ■ state the findings and results and their potential implications ■ identify any potential follow up actions ■ identify the person-in-charge to coordinate all documentation ■ follow organization's standard procedure and templates in preparing the documentation
7. Assessment Criteria	The integrated outcome requirements of this UoC are the abilities to : ● document the testing and findings in a standard manner ● ensure potential implications are highlighted for possible follow-up actions
8. Remark	This UoC replaced ITSWIS512A "Establish procedures documenting security incident"

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

1. Title	Propose appropriate countermeasures to prevent security attacks
2. Code	111179L5
3. Range	Ensure that internal and external information technology resources are secured by complying with the organization's cyber security policy and protect the organization's interests
4. Level	5
5. Credit	3 (for reference only)
6. Competency	Performance Requirements 6.1 Understand the needs for internal and external resources for information security ● Be able to identify and recognise the internal and external resources that could be compromised and posed as a risk to the organizations interests. 6.2 Identify the strengths and weaknesses of the internal and external resources for cyber security ● Be able to analyse and evaluate the characteristics, nature, limitations, strengths and weaknesses of the internal and external resources ● Be aware and up to date with new security attack methods and new cybersecurity technologies 6.3 Designing and proposing appropriate countermeasures to enhance cyber security ● Address the weaknesses and deficiencies of the system by designing appropriate countermeasures to protect the resources ● Propose update on the systems against new threats and enhance cyber security effectiveness with new technologies
7. Assessment Criteria	The integrated outcome requirements of this UoC are the abilities to : ● identify and optimise both internal and external resources and their weaknesses ● stay up-to-date with new threads and new cybersecurity technologies ● propose new countermeasures by adopting new technologies and techniques to enhance and enforce the cybersecurity
8. Remark	This UoC replaced ITSWIS525A "Minimize information security risks"

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

1. Title	Review the possible causes of the threats for remedial actions recommendation
2. Code	111180L5
3. Range	Propose remedial actions that address the possible causes of the threats and minimise interruptions to the organisation's normal business operations
4. Level	5
5. Credit	6 (for reference only)
6. Competency	Performance Requirements 6.1 Understand the system's operation, the reporting/recommendation procedures and the organisation's structure 6.2 Understand the possible causes of the threads ● Be able to ■ judge the validity of the proposed possible causes ■ understand the potential implications of the possible causes ■ evaluate the seriousness of potential causes 6.3 Know the information security emergency management practices (See Remark) ● Be able to understand remedial actions that include processes to organise, train and equip the teams and brief any associated personnel involved in the threats 6.4 Design and propose remedial actions ● Be able to ■ design and propose remedial actions that minimise interruptions of the normal business operations of the organisation ■ design and propose remedial actions that eliminate the possible causes of the threats ■ design and propose remedial actions that include processes to organise, train and equip the teams and any associated personnel involved in the threats to avoid similar causes in the future ■ identify potential equipment or information system infrastructure needed that could minimise the occurrence of similar future cases 6.5 Develop remedial actions in a professional way ● Be able to ensure that the proposed remedial actions comply 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 UoC are the abilities to : ● design and propose remedial actions that minimise interruptions of the normal business operations of the organisation; ● design and propose remedial actions that eliminate the possible causes of the threats; and ● ensure that the proposed remedial actions comply with the organisation's policies and guidelines as well as any applicable local and international laws and regulatory requirements.
8. 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	Appraise Open-source intelligence (OSINT) methodology in the security process
2. Code	111181L5
3. Range	Assess the suitability, advantages and disadvantages of OSINT methodology in the application of the security process of an organization
4. Level	5
5. Credit	3 (for reference only)
6. Competency	Performance Requirements 6.1 Understand the application of OSINT methodology in the security process ● Understand what OSINT methodology is ● Recognise the needs of OSINT in the security process ● Understand the advantages of OSINT methodology in the security process ● Be aware of the industry standards in the related field ● Know of alternative methods in the security process ● Aware of the tools and techniques in applying OSINT methodology in the security process 6.2 Determine the suitability of OSINT methodology in the security process of an organization ● Understand how OSINT could change the organization's security process ● Determine the needs and requirements of the organization's security process ● Assess the advantages and disadvantages of OSINT methodology in relation to the organization's operation 6.3 Set up benchmark and evaluation criteria to assess the OSINT methodology ● Be able to ■ rank the different OSINT sources in relation to the organization's business setting and standards ■ evaluate and benchmark the OSINT methodology in security processes in relation to other alternatives
7. Assessment Criteria	The integrated outcome requirements of this UoC are the abilities to : ● determine the impact of the application of OSINT methodology on the organization's security process ● evaluate and benchmark the OSINT methodology in security processes

8. Remark	

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

1. Title	Appraise the security threats in emerging technologies
2. Code	111182L5
3. Range	This UoC involves appraising the potential security threats associated with a range of emerging technologies
4. Level	5
5. Credit	3 (for reference only)
6. Competency	Performance Requirements 6.1 Understand the security threats associated with emerging technologies ● Be able to differentiate the threats associated with emerging technologies with traditional threats ● Be able to scope out various potential security threats by a range of emerging technologies, including but not limited to: ■ Data Breaches ■ Insider Threats ■ Insure Interfaces ■ Hijacking of Accounts ■ Misconfiguration and inadequate change control ■ Security Architecture and strategy ■ Access and Key Management ■ Fake Base Stations ■ IoT Device Hijacking 6.2 Appraise the security threats of the execution of emerging technologies ● Be able to appraise the security threats of the execution or emerging technologies in compliance with industry best practices and standard, including but not limited to: ■ Shared Responsibility Model ■ Data Governance Framework ■ Sensitive Data Protection ■ Audits and Penetration Testing
7. Assessment Criteria	The integrated outcome requirement of this UoC is the ability to appraise the security threats in the execution of emerging technologies in compliance with industry best practices and standards.
8. Remark	

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

1. Title	Compare the strengths and weaknesses of different cryptographic algorithms and determine the suitable algorithm for the organization operation
2. Code	111183L5
3. Range	Identify the cryptographic algorithms that best suit the needs of the organization's operation
4. Level	5
5. Credit	6 (for reference only)
6. Competency	Performance Requirements 6.1 Understand the needs and operation of the organization ● Identify the needs and use cases of cryptographic algorithm within the organization's structure ● Identify the types, sizes and amount of information that need to be encrypted ● Identify the level of security needed for the organization's use case 6.2 Aware of the different cryptographic algorithms and their strength and weakness ● Understand the different cryptographic algorithms available ● Aware of the potential cost of adopting a particular algorithm (such as capital cost, training cost, staff training cost, etc...) ● Understand the industry standards in cryptographic algorithms and how each of the cryptographic algorithms identified performed under these standards ● Understand the complexity of each cryptographic algorithms under consideration ● Aware of the difficulties that each cryptographic algorithms may inflict on the management and user-friendliness of the information ● Identify the strength and weaknesses of different cryptographic algorithms 6.3 Suitability to the organization ● Assess each cryptographic algorithms in consideration against the requirements/needs of the organization ● Consider the total cost incurred on the organization in the adaptation of an algorithm ● Consider the management of the data, the difficulties and effectiveness of implementing each cryptographic algorithms into the organization's operation systems ● Propose to the organization's management the cryptographic algorithm best suited the needs of the organization's operation

7. Assessment Criteria	The integrated outcome requirements of this UoC are the abilities to : ● summarize the strengths and weaknesses of each cryptographic algorithms under consideration with respect to the organization's operational needs ● propose the cryptographic algorithm that most suited the operational needs of the organization
8. Remark	

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

1. Title	Design and conduct a cyberattack simulation to evaluate the effectiveness of cyber defences across different technology layers
2. Code	111184L5
3. Range	Create and carry out a cyberattack simulation on the organization's assets and network to assess the effectiveness of the cyber security
4. Level	5
5. Credit	6 (for reference only)
6. Competency	Performance Requirements 6.1 Understand the range of assets that are prone to cyberattack ● Identify assets and infrastructures that are prone to cyberattack ● Understand the uses and needs of the identified assets and infrastructures in terms of the organization's operation ● Identify the range of personnel that have access to the data stored on the assets or infrastructures and understands the way that they access these materials 6.2 Stay updated with the latest trend ● Stay updated on the new ways and methods cyberattack could be conducted ● Understand and stay up to date with the industry standards ● Aware of the popular and common ways of cyberattack 6.3 Identify weaknesses in the system ● Understand the cybersecurity policy and procedures of the organization ● Identify potential weaknesses and vulnerabilities in the system and operational procedures 6.4 Design and conduct the cyberattack simulation ● Design the simulation by targeting especially the identified weaknesses and vulnerabilities ● Simulation should account for the use of the latest technologies and techniques ● Simulation exercise should minimise the impact on the normal operation of the organization 6.5 Evaluation of the effectiveness of the cyber defences ● Analyse the simulation result to highlight any deficiencies ● Assess the performance of the cyber defences by benchmarking to industry standards ● Make suggestions for enhancement of the cyber defence system

	6.6 Design and conduct the cyberattack simulation professionally ● Ensure the assessment conducted is abided to professional standards
7. Assessment Criteria	The integrated outcome requirements of this UoC are the abilities to : ● design and conduct a cyberattack simulation ● assess the performance of the cyber defence system by benchmarking to industry standards ● summarize any deficiencies in the cyber defence system and suggest system enhancements
8. Remark	

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

1. Title	Develop risk management process for emerging technologies
2. Code	111185L5
3. Range	Design a procedure to handle the potential risk from new technologies that could threaten the cybersecurity of the organization
4. Level	5
5. Credit	3 (for reference only)
6. Competency	Performance Requirements 6.1 Understand the risk response process and the cybersecurity policy of the organization ● Explain the steps that are carried out when an incident occurred ● Understand the role of the different personnel that need to respond to the incident ● Understand the cybersecurity policy of the organization 6.2 Develop a process to manage the risks from emerging technologies ● Be able to develop and implement processes for identifying and analysing potential risks from emerging technologies ● Be able to implement new procedures to protect the organization from the risks of emerging technologies 6.3 Regularly review risk management process ● Review and update the process if aspects of new emerging technologies are not covered to ensure the interests of the organization are protected
7. Assessment Criteria	The integrated outcome requirements of this UoC are the abilities to : ● develop and implement processes for identifying and analysing potential risks from emerging technologies ● implement new procedures to protect the organization from the risks of emerging technologies ● periodically review (and if necessary, update) the procedures to ensure it protects the interest of the organization
8. Remark	

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

1. Title	Formulate data security and consent policy for emerging technologies
2. Code	111186L5
3. Range	This UoC involves formulating data security and consenting policy for an organisation to adopt emerging technologies for supporting its business strategies
4. Level	5
5. Credit	3 (for reference only)
6. Competency	Performance Requirements 6.1 Know of the data security principles for emerging technologies (including but not limited to) ■ Accountability ■ Accuracy ■ Integrity and confidentiality ■ Purpose limitation 6.2 Know of regulations associated with data security and consent policy ● Knowledge of relevant security regulations (including but not limited to) ■ Personal Data (Privacy) Ordinance ■ European Union's General Protection Regulation (GDPR) ● Knowledge of roles of regulations in the digital society ● Knowledge of legal and economic perspectives underpinning data protection regulations 6.3 Formulate data security and consent policy ● Clearly define the data ownership and authority within the organization ● Identify the potential risks from improper use of data ● Select and adopt appropriate tools for the policy execution ● Ensure the policy to confirm to the relevant security and consent regulations ● Setup staff training direction to ensure that the staff could comply with the policy
7. Assessment Criteria	The integrated outcome requirements of this UoC is the ability to formulate data security and consent policy for an organisation to adopt emerging technologies with profound considerations of data security, and relevant consent regulations
8. Remark	

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

1. Title	Implement changes to procedures and controls designed to enhance the security standard
2. Code	111187L5
3. Range	Update the procedures and controls to improve the organisation's security standard
4. Level	5
5. Credit	3 (for reference only)
6. Competency	Performance Requirements 6.1 Understand the current procedures and controls of organisation's security standard and policy ● Identify all procedures and controls that are cybersecurity related ● Explain all cybersecurity related procedures and controls 6.2 Implement changes to procedures and controls ● Understand the needs of the changes and what they intended to address ● Identify and update procedures and controls that required to be changed ● Ensure associated personnel are notified and aware of the changes 6.3 Implement changes to the procedures and controls in a professional manner ● Ensure the changes does not compromise the organisation's interest and security policy ● Comply with the organisation's guidelines and any (local and international) laws and regulatory requirements, if applicable
7. Assessment Criteria	The integrated outcome requirements of this UoC are the abilities to : ● Identify and update procedures and controls that required to be changed ● Ensure associated personnel are notified and aware of the changes ● Ensure the changes does not compromise the organisation' s interest and security policy
8. Remark	

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

1. Title	Manage execution of action plans to ensure safety and security of IT assets
2. Code	111188L5
3. Range	Coordinate the execution of safety and cybersecurity enhancement with minimal interruption to organisation operation
4. Level	5
5. Credit	3 (for reference only)
6. Competency	Performance Requirements 6.1 Understand the organisation structure and the tasks involved in the action plans ● understand what is required to be performed by the action plans ● understand the scale of the tasks involved ● be able to explain the potential impacts on the organisation's operation during the execution of the action plan 6.2 Managing the execution of action plans ● Minimise disturbances to the organisation's operation during the execution ● Ensure that security and safety are not compromised if existing security or safety measures need to be offline during the update ● Estimate downtime (if any) and notify all associate personnel that could potentially be affected in advance ● Ensure that tasks are completed reliability and within the estimated time frame ● Update all associated personnel if service update exceeded the estimated time frame 6.3 Exhibit professionalism ● Comply with the organisation's guidelines and any (local and international) laws and regulatory requirements, if applicable
7. Assessment Criteria	The integrated outcome requirements of this UoC are the abilities to : ● minimise disturbances to the organisation's operation ● ensure that security and safety are not compromised during the execution of action plans ● Notify and update all associated personnel for potential interruptions in advance
8. Remark	

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

1. Title	Perform data loss prevention assessment
2. Code	111189L5
3. Range	Conduct periodic data loss prevention assessment, identify system deficiencies, suggest and implement recommendations and follow-up actions to enhance data loss prevention of the organisation.
4. Level	5
5. Credit	6 (for reference only)
6. Competency	Performance Requirements 6.1 Understand organisation data loss prevention processes and possess the knowledge in the subject area ● Understand the data storage system of the organisation ● Comprehend the data loss prevention measures of the organisation ● Understand industry standards in data loss prevention arrangement 6.2 Plan for data loss prevention assessment ● Observe schedule requirements on data loss prevention assessment ● Communicate with operating units to agree on the schedule 6.3 Perform data loss prevention assessment ● Identify data loss preventive measures ● Identify deficiencies of the data loss prevention system ● Perform regular data loss prevention assessment 6.4 Identify and implement recommendations to enhance data loss prevention ● Identify recommendations and follow up actions to enhance data loss prevention ● Seek endorsement from management on the recommendations ● Implement the recommendations 6.5 Perform the data loss prevention assessment in a professional manner ● Minimise disturbance to the organisation's operation ● 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 : ● Perform regular data loss prevention assessment

	● Identify and implementing recommendations and follow up actions to enhance data loss prevention after seeking endorsement from management
8. 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	<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	
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	<u>Performance Requirement</u> 6.1 Know the methodologies for business case development Be able to understand and select an appropriate methodology to develop the business case that supports information security programme investments 6.2 Know the different ways to perform enterprise value analysis 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 6.3 Develop a business case that supports information security programme investments Be able to develop a structured proposal for business improvement that supports information security programme investments (See Remark 1) 6.4 Perform an enterprise value analysis that supports information security programme investments Be able to ▪ 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 6.5 Develop a business case and perform an enterprise value analysis in a professional manner 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	
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 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	<u>Performance Requirement</u> 6.1 Understand information resources Be able to ▪ articulate the critical information resources for an organization's business operation ▪ explain how information resources are used to support an organisation's business processes 6.2 Understand the principles of developing baselines Be able to ▪ 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 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 6.4 Develop a risk management process / framework in a professional manner Be able to ▪ 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	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	<u>Performance Requirement</u> 6.1 Understand the importance of information security governance in support of business strategy and direction Be able to evaluate and prioritize information security plans to address the long-term business strategy and direction 6.2 Create plans to implement the information security governance framework Be able to ▪ 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 6.3 Promote accountability by business process owners and other stakeholders in managing information security risks Be able to ▪ 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 6.4 Establish metrics to manage the information security governance framework Be able to ▪ 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	6.1 Understand various life cycle activities of an enterprise 6.2 Integrate information security programme requirements into the enterprise's life cycle activities in a professional manner	<u>Performance Requirement</u> Be able to assess information security risks in an enterprise's life cycle activities 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
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	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	<u>Performance Requirement</u> 6.1 Understand the principles of information security policies Be able to ▪ 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 6.2 Understand the stakeholders and their concerns Be able to identify the stakeholders and understand their concerns on information security 6.3 Develop and propose information security policies Be able to ▪ 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 6.4 Promulgate the information security policies Be able to ▪ 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	<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 • 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 ▪ 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	
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	<u>Performance Requirement</u> 6.1 Understand help desk processes Be able to ▪ 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 6.2 Know information security incident detection and reporting policies and processes Be able to develop processes for detecting and identifying information security incidents 6.3 Develop processes to deal with security incidents Be able to develop and implement processes for detecting, identifying and analysing security related events of an organisation 6.4 Develop processes to deal with security incidents in a professional manner 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	
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	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	<u>Performance Requirement</u> 6.1 Understand the process of post-event review Be able to ▪ understand the purpose of post-event review ▪ understand the steps required to complete post-event review 6.2 Conduct post-event analysis Be able to ▪ 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 6.3 Devise corrective actions Be able to ▪ 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	<u>Performance Requirement</u> 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 6.2 Perform cross functional team facilitation Be able to ▪ 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 6.3 Perform cross functional team facilitation in a professional manner Be able to ▪ 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	<u>Performance Requirement</u> 6.1 Have the knowledge of developing a comprehensive crisis management plan Be able to ▪ explain the requirements of a comprehensive crisis management plan ▪ adopt suitable standards and guidelines for creating a crisis management plan 6.2 Understand the requirements of lifecycle management of crisis management plans Be able to explain the lifecycle management activities of crisis management plans 6.3 Prepare the comprehensive crisis management plan Be able to ▪ 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 6.4 Perform lifecycle management of the comprehensive crisis management plan Be able to ▪ 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 6.5 Prepare the crisis management plan in a professional manner Be able to demonstrate a high degree of competence and professionalism in the preparation of the crisis management plan 6.6 Perform lifecycle management of the comprehensive crisis management plan in a professional manner Be able to ▪ 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 ▪ 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	<u>Performance Requirement</u> 6.1 Understand the stipulated BCP strategy Be able to ▪ 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 ▪ 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 ▪ 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		

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 ▪ 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 ▪ 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 information security standard, policies and guidelines for the organization
2. Code	111164L6
3. Range	This UoC applies to the arrangements and procedures relating to the establishment of information security policies for the organization. This step is to ensure that all staff members have standards to follow and protect the organization from cyber attack, unauthorized access, alteration, unauthorized disclosure, etc.
4. Level	6
5. Credit	6 (for reference only)
6. Competency	Performance Requirements 6.1 Possess the knowledge in the information security area ● Realise the necessity in the establishment of a set of information security policies to be embedded into the organization ● Recognise the changes in cyber technology in the organization's related industries, and apply the knowledge to analyse future trends and developments in information security threats and measures based on incomplete information collected from different sources ● Understand the compliance requirements and based on that to determine regulatory requirements and obligation under different jurisdictions ● Understand the business requirements of key stakeholders and analyse views collected from different business and operation units accurately to discern their needs in IT control or security 6.2 Develop relevant standard, policies and guidelines ● Establish strategic objectives and compliance position for information security of the organization to provide protection with an outlook of future perspective ● Establish IT control or security (e.g. network) policies with respect to the organizations business strategies and security needs ● Ensure the information security policies and guidelines are established correctly, positioned at the appropriate level, and comprehensive enough for employee to follow 6.3 Develop professional behaviour and attitude

	● Direct communication and training programs on information security measures; ensure all levels of staff are aware of their importance and participate in the protection of information security ● Ensure all information security policies established comply to all existing legal and regulatory requirements as well as social concerns ● Design monitoring measures to ensure compliance with established security policies
7. Assessment Criteria	The integral outcome requirements of this UoC are: ● Formulation of security policies. The policies should be based on critical analysis of a broad range of data and incomplete information with the aim to provide enough protection to organizations' IT systems and meet the regulatory requirements without hampering operational efficiency ● Production of supporting measures on enforcing security policies. Comparison of different types of security measures should be provided to support the design.
8. Remark	This UoC replaced ITC SPL606A "Establish security policy for the products / services"

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	111165L6
3. Range	Develop organisational response and recovery plans including organizing, training and equipping the teams to restore the organisation's normal business operations
4. Level	6
5. Credit	6 (For Reference Only)
6. Competency	Performance Requirements 6.1 Know the components of an incident response capability and understand the disaster recovery planning and business recovery processes ● Be able to: ■ know the components of an incident response capability including training, communication, technology, and disaster recovery ■ understand response and recovery plans for an organisation to minimize any interruptions, caused by security incidents, of its normal business operations 6.2 Know the information security emergency management practices (See Remark) ● Be able to: ■ Be able to understand response and recovery plans that include processes to organize, train and equip the teams 6.3 Develop response and recovery plans ● Be able to: ■ 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 6.4 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 UoC are the abilities to: ● develop response and recovery plans for an organisation to

	minimize interruptions, caused by security incidents, of its normal business operations; ● develop response and recovery plans including organizing, training and equipping the teams; and ● 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.
8. Remark	Examples of information security management practices are production of change control activities and development of computer emergency response team. [This UoC replaced ITSWIS614A "Develop response and recovery plans"]

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

1. Title	Review key controls metrics regularly to fulfil the security standard
2. Code	111166L6
3. Range	This UoC involves reviewing key controls metrics to ensure the cybersecurity governance framework stay up to date with current industry practice
4. Level	6
5. Credit	3 (for reference only)
6. Competency	Performance Requirements 6.1 Understand the organisation's security standard, the best practices and industry standards of information security ● understand the security standard ● identify benchmark for assessing the key controls metrics ● be aware of the right cybersecurity practice and industry standards for the organisation 6.2 Review key controls metrics to maintain security standards ● review key control metrics against industry benchmarks ● criticise and identify deficiency of current key controls metrics ● suggest changes to key controls metrics or adaptation of industry best practice to ensure security standards are withheld. ● ensure that the review is done at least periodically and also on need basis 6.3 Exhibit professionalism ● 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 UoC are the abilities to : ● review key controls metrics against industry benchmarks and criticise or identify deficiency of current key controls metrics ● make suggestions to ensure the key controls metrics could withhold security standards and stay updated with industry development.
8. Remark	This UoC replaced ITSWIS609A "Establish metrics to manage information security governance framework"

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

1. Title	Design the digital forensic process in terms of technical and legal aspects
2. Code	111167L6
3. Range	Design the process to carry out digital forensic investigation of cyberattacks. The procedures should adhere to the organization's policies and oblige the associated jurisdictions
4. Level	6
5. Credit	3 (for reference only)
6. Competency	Performance Requirements 6.1 Possess the knowledge in the subject area ● Understand the needs, importance and the limitation of digital forensic ● Know of the tools needed for conducting digital forensic investigation ● Understand the processes and the latest technological development in data recovery ● Recognise the changes in IT technologies and how they could impact digital forensic ● Understand the laws that are associated with the organization's business operations and digital forensic 6.2 Design the process ● Establish the procedures to identify evidence and the location they are stored ● Create a set of guidelines in isolating, securing and preserving the data to prevent possible tampering ● Set up the protocol for data reconstruction/recovery and data analyses for drawing conclusion of the attack ● Formulate a system for documenting all the associated data, evidence and procedure ● Establish the procedure to summarise the data, such that non-IT personnel, for example, lawyer and the judge, could have a basic understanding of the impact and ramifications of the incident ● Ensure all procedures carried out adhered to organization's policies and obligated to the associated jurisdictions
7. Assessment Criteria	The integrated outcome requirements of this UoC are : ● Design the digital forensic process. The process should cover evidence identification, data preservation, data analysis and documentation. ● All procedures should adhere to the organization's policies and oblige to the associated jurisdictions

8. Remark	

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	6.1 Have the knowledge to report the results of different levels of testing 6.2 Report the discrepancies between the software and its related documents 6.3 Report the discrepancies between software and its related documents in a professional manner	<u>Performance Requirement</u> Be able to ▪ identify the requirements for reporting the results of various levels of testing ▪ understand the appropriate format required for the report 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) Be able to ▪ report the discrepancies between software and its related documents in an efficient and effective manner; ▪ advise which part of programme source should be modified 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) 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	<u>Performance Requirement</u> 6.1 Have the knowledge to select appropriate debugger Be able to ▪ understand the selection criteria for an appropriate debugger for debugging programmes ▪ understand the various debuggers available 6.2 Locate and fix the logical error Be able to ▪ 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 6.3 Perform debugging of programmes in a professional manner Be able to ▪ 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	<u>Performance Requirement</u> 6.1 Understand the process of performing software audit and how to select appropriate tools for software audit Be able to ▪ understand the requirements of software audit process ▪ understand the various tools available for software audit ▪ identify the selection criteria for software audit tools 6.2 Perform software audit, with the use of selected tools where applicable Be able to ▪ 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 6.3 Prepare software audit report Be able to ▪ list the software audit results ▪ list action plans for corrective action items ▪ recommend continuous improvement items 6.4 Perform software audit and record the audit findings for continuous improvement in a professional manner Be able to perform software audit and recommend for future improvements: ▪ 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		

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	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 decommission [Design, Development and Maintenance – Software Decommissioning]	
4. Level	4	
5. Credit	1	
6. Competency	6.1 Understand the software decommissioning policy 6.2 Identify components to be removed 6.3 Identify information to be removed 6.4 Classify and archive information with potential usage 6.5 Observe data protection requirements	<u>Performance Requirement</u> Be able to comprehend the defined software decommissioning policy in particular the scope, conditions, criteria and requirements Be able to point out software, hardware and storage media that need to be removed from operation Be able to locate account and credential information of software users that need to be removed from the operating environment Be able to ▪ 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 Be able to observe data protection requirements from within the operating organisation and regulatory bodies on confidentiality and privacy
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	Performance Requirement 6.1 Understand the functionalities of the decommissioned software Be able to ▪ 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 ▪ 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 ▪ 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	Verify and validate that the deployed / migrated software and the existing software are functioning properly
2. Code	111159L4
3. Range	Verify and validate that the deployed/migrated software and the existing software are functioning properly in the context of deploying and migrating software
4. Level	4
5. Credit	6 (for reference only)
6. Competency	Performance Requirements 6.1 Understand the relationship between the deployed or migrated software with other systems ● Be able to ■ state the features of the newly deployed software ■ state which functionalities from the retired software were replaced by that from the migrated software ■ identify the position of the deployed or migrated software in the integrated environment within an organization 6.2 Perform verification and validation on the deployed or migrated software ● Be able to ■ draw up a verification and validation plan on the deployed or migrated software for subsequent verification and validation process ■ trace the recorded results from deployment or migration process and any other traceable reports to determine whether the software was implemented correctly and completely according to defined requirements such as those in the area of ◆ Performance ◆ Data security and integrity ◆ Interoperability with other system components 6.3 Ensure independent operation in verification and validation process ● Be able to ■ conduct additional tests to verify and testify that the deployed / migrated software and any existing software are functioning properly ■ walkthrough all steps in verification and validation plan ■ review documentary evidence received and fully document audit works ■ ensure audit documentations are properly retained by

	following the organisation's / auditor's guidelines 6.4 Verify and validate the deployed / migrated software and the existing software are functioning properly professionally ● Be able to verify and validate the deployed / migrated software and the existing software are functioning properly in accordance with organization's guidelines as well as any (local and international) laws and regulatory requirements, if applicable
7. Assessment Criteria	The integrated outcome requirement of this UoC are the abilities to : ● confirm that the deployed or migrated software delivers its expected outcomes ● confirm that the deployed or migrated software and the existing software are functioning properly
8. Remark	This UoC replaced ITSWDM405A "Verify and validate that the deployed/migrated software and the existing software are functioning properly in the context of deploying and migrating software"

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

1. Title	Perform system testing against user, technical and hosting requirements
2. Code	111160L4
3. Range	Identify all elements of the system that need to be tested against user and system requirements, including data that should be used to fully test the system.
4. Level	4
5. Credit	3 (For Reference Only)
6. Competency	Performance Requirements 6.1 Have the knowledge to design and develop test plans and software/sensor simulator to facilitate different levels of testing ● Be able to: ■ identify the requirements of test plans ■ identify the requirements of software/sensor simulator, if applicable 6.2 Perform various levels of testing, which may involve the use of a software/sensor simulator ● Be able to: ■ design and develop software/sensor 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 ■ 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 UoC are the abilities to: ● develop appropriate software/sensor simulators, if necessary, for testing purposes; ● perform various levels of testing; and ● document all testing activities in test reports.
8. Remark	Various levels of testing include unit testing, integration testing, system testing – functional testing and performance testing, and user-acceptance testing. [This UoC replaced ITSWDM401A "Perform testing activities to facilitate different levels of testing"]

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	6.1 Understand the user requirement process 6.2 Formulate and analyse user requirements of the application 6.3 Develop user requirements with users of the software application 6.4 Prioritize functional requirements in a professional manner	<u>Performance Requirement</u> Be able to facilitate users to provide user requirements of the application Be able to ▪ formulate user requirements ▪ analyse user requirements ▪ synthesize and define user requirements ▪ prioritise user requirements Be able to ▪ 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: ➢ performance ➢ usability / re-usability ➢ reliability, availability and maintainability (RAM) ➢ Graphical User Interface (GUI) ➢ operating environment (both hardware and software) ➢ safety and security Be able to prioritize the functional requirements for development based on agreed criteria (see Remark for examples) within an organisation
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	6.1 Comprehend Software Requirements Specification (SRS) 6.2 Prepare the SRS 6.3 Validate user requirements in a professional manner	<u>Performance Requirement</u> Be able to comprehend the structure and content of a Software Requirements Specification (SRS) Be able to ▪ document functional requirements into the corresponding sections of SRS ▪ document non-functional requirements into the corresponding sections of SRS 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
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	Performance Requirement 6.1 Understand the requirements for verification and validation of design documentations Be able to ▪ 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 6.2 Verify and validate different levels of software/system design Be able to ▪ 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 6.3 Perform the verification and validation of design documentations in a professional manner Be able to ▪ 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	6.1 Comprehend design documentations 6.2 Decompose programme modules 6.3 Develop programme modules in a professional manner	<u>Performance Requirement</u> Be able to comprehend the structure and content of various design documents including: ▪ AD (Architecture design) ▪ HLD (High level design) ▪ DLD (Detailed level design) Be able to ▪ devise programme modules based on DLD, HLD and AD ▪ decompose different programme modules into software/system components according to their design documentations Be able to ▪ 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	6.1 Understand version control mechanism 6.2 Manage programme source 6.3 Maintain programme source 6.4 Act in line with software configuration management	<u>Performance Requirement</u> Be able to understand version control mechanism used by the organisation Be able to ▪ manage the consistency of programme source format ▪ manage the storage / backup of programme sources Be able to ▪ maintain programme source via proper version control mechanisms ▪ standardize the numbering systems for version control within the organisation Be able to ▪ 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	6.1 Have the knowledge to design checklists for inspecting programme source and software documents 6.2 Perform inspection of programme source and software documents 6.3 Revise and update the checklist after an inspection 6.4 Perform inspection of programme source and software documents in a professional manner	<u>Performance Requirement</u> Be able to identify the requirements of checklists (see Remark 3 & 4) for inspecting programme source and software documents Be able to ▪ 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 Be able to revise and update the items in an inspection checklist for future improvements Be able to perform an inspection of programme source and software documents according to ▪ the QA policies of the software project ▪ the organisation's guidelines ▪ 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) rigorously perform inspection of programme source and software documents according to the QA policies and procedures on the developed inspection checklist; and (ii) evaluate the correctness and quality of the programme source and software documents after inspection.	

Remark	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: a) Architecture Review; b) User Interface; c) Data Reference; d) Data Declaration; e) Computation; f) Comparison; g) Control Flow; h) Input/Output; and i) Interface. 4. The inspection checklist can be checked by another professional/third party.

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	6.1 Have the knowledge to design test plans according to the software requirements specification (SRS) and other software documents 6.2 Develop test plans for various levels of testing 6.3 Ensure the total cost for software testing is within budget 6.4 Develop test plans for various levels of testing in a professional manner	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 Based on software documentations such as the SRS, various software design documents and programme source, be able to ▪ 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 Be able to ▪ evaluate the total cost for software testing according to various level test plans ▪ review the test plans if the cost exceeds the budget Be able to ▪ develop test plans for various levels of testing ▪ ensure the total cost for testing is within the budget 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 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	<u>Performance Requirement</u> 6.1 Understand various tools and techniques in identifying functional requirements of an existing software 6.2 Identify extra functional requirements of an existing software 6.3 Revise the software documents accordingly 6.4 Identify extra functional requirements of an existing software in a professional manner	
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (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: 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	<u>Performance Requirement</u> 6.1 Understand various tools and techniques in identifying non-functional requirements of an existing software 6.2 Identify extra non-functional requirements of an existing software 6.3 Revise the software documents accordingly 6.4 Identify extra non-functional requirements of an existing software in a professional manner	
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (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: 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	<u>Performance Requirement</u> 6.1 Understand the defined goals to be achieved upon software deployment or migration Be able to understand the outcome specifications of the software for determination of success or failure of deployment or migration 6.2 Identify the business requirements for software deployment and migration Be able to state the business values to the organisation upon the successful deployment or migration of software 6.3 Identify the stakeholders in software deployment and migration Be able to ▪ 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 6.4 Identify the limitations, constraints and risks for the software to be deployed or migrated Be able to ▪ 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 6.5 Specify a standard operating environment 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 6.6 Identify the constraints, risks, and the Standard Operating Environment (SOE) for a software to be deployed/migrated in a professional manner 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	
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	<u>Performance Requirement</u> 6.1 Comprehend the details in software decommissioning policy and plan Be able to ▪ understand the detailed requirements in the software decommissioning operation ▪ locate the item to be decommissioned 6.2 Ensure decommissioning criteria are met Be able to confirm the functions performed by the outgoing system or component have been ▪ 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 6.3 Remove account and credential information Be able to ▪ archive information with potential usage together with their retrieval environments, processes, and procedures ▪ remove user account and credential information 6.4 Remove software and hardware components Be able to ▪ 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	Perform statistical analysis and refine the operational decision-making process
2. Code	111158L5
3. Range	This UoC involves performing statistical analysis and based on actionable insights, refining the organisation operations to make better-informed decisions
4. Level	5
5. Credit	3 (for reference only)
6. Competency	Performance Requirements 6.1 Understand operational problems and operations' key performance indicators (KPIs) and how they are related 6.2 Select statistical analysis viewpoints that best help dissect the operational problems 6.3 Communicate actionable insights to refine the organisation operations to make better-informed decisions ● explain operational problems through statistical analysis outcomes ● based on organisation actionable insights, refine the organization operations to make better-informed decisions
7. Assessment Criteria	The integrated outcome requirement of this UoC are the abilities to ● perform statistical analysis for the organisation operations based on the predefined KPIs ● refine the organisation operations based on organisation actionable insights
8. Remark	

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

1. Title	Develop data analysis programmes in enterprise intelligence systems
2. Code	111156L5
3. Range	This UoC involves developing programmes to assist data analysis in individual intelligence system. This covers all kinds of data analysis programmes.
4. Level	5
5. Credit	6 (for reference only)
6. Competency	Performance Requirements 6.1 Knowledge in Regulatory Requirements ● Be able to ■ have an in-depth understanding of the latest regulations (e.g. Basel), particularly concerning data governance and compliance; ■ assess the impact of any new regulations, identify the potential areas of concerns, and mitigate risks. 6.2 Knowledge in the Subject Area ● Be able to ■ have an in-depth understanding of the concepts and methodologies of collecting views from key stakeholders and liaise with product development and sales team to analyse types of data application required by different users; ■ possess comprehensive knowledge of the key components of an effective data analysis programmes (e.g. sources of data, data screening approaches, data clustering, data analysis methodologies, etc.) and based on that to develop the programmes. 6.3 Applications ● Be able to ■ Develop coding to automate calculation of necessary statistical analysis in intelligence system; ■ Cooperate with user to identify features to be included in the report so as to facilitate application of the results to different functions of the bank; ■ Design output format which can cater to the different needs and purposes of users. 6.4 Professional Behaviour and Attitude ● Be able to ■ Design data analysis programmes in consideration of artificial

	intelligence (AI) and machine learning element; ■ Cooperate with analysts to develop or identify suitable analysis models and maintain model reliability by periodic fine-tuning; ■ Cooperate with different users to review application of the system to ensure effectiveness and user-friendliness of the function.
7. Assessment Criteria	The integral outcome requirement of this UoC is the ability to develop data analysis programmes by identifying different features for data analysis and reporting them to facilitate the analysis and application of stored data. The measures should be based on analysis on users' requirements.
8. Remark	

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	Performance Requirement Be able to ▪ 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 6.1 Understand the requirements of an architecture design of software/system Be able to ▪ 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 6.2 Formulate an architecture design of the software/system Be able to ▪ 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 6.3 Analyse and evaluate the formulated architecture design of the software/system	

	▪ 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 6.4 Exhibit professional skills in the formulation of architecture design Be able to ▪ 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	The integrated outcome requirements of this UoCs are the abilities to formulate a software/system architecture design which can: (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	Performance Requirement 6.1 Understand the requirements of an high level design of software/system Be able to ▪ 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 6.2 Formulate a high level design of the software/system Be able to ▪ 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 6.3 Analyse and evaluate the formulated high level design of the software/system Be able to ▪ 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	

	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
	6.4 Exhibit professional skills in the formulation of high level design Be able to ▪ 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	The integrated outcome requirements of this UoCs are the abilities to formulate a high level software/system design which can: (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	Performance Requirement Be able to ▪ 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 6.1 Understand the requirements of a detailed level design of software/system Be able to ▪ 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 6.2 Formulate a detailed level design of the software/system	

	6.3 Analyse and evaluate the formulated detailed level design of the software/system Be able to ▪ 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 6.4 Exhibit professional skills in the formulation of detailed level design Be able to ▪ 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	The integrated outcome requirements of this UoCs are the abilities to formulate a detailed level software/system design which can: (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	<u>Performance Requirement</u> 6.1 Understand the principles and concepts of change control policy 6.2 Develop change control policy of system configuration management 6.3 Implement change control policy of system configuration management 6.4 Exhibit professional skills in the development and implementation of change control policy ▪ 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 Be able to ▪ 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 Be able to ▪ 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 Be able to ▪ 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	6.1 Understand the principles and concepts of system configuration management 6.2 Develop software configuration management plan 6.3 Implement software configuration management plan	<u>Performance Requirement</u> Be able to ▪ appreciate the importance of configuration management to a software system to ensure software quality ▪ understand the requirements of software configuration management plan Be able to ▪ 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 Be able to ▪ 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

	6.4 Exhibit professional skills in the development and implementation of software configuration management plan Be able to ▪ 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
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to produce a software configuration management plan documenting the following: (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.
Remark	

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	Performance Requirement Be able to identify ▪ 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 for software releases and control within the organisation 6.1 Understand the various requirements involved in software releases and control 6.2 Obtain approval for the requirements identified in a software release Be able to ▪ specify and integrate the requirements identified into a coherent document ▪ obtain agreement among the stakeholders for the software release 6.3 Demonstrate a high degree of expertise and professionalism in identification and development of requirements for software releases and control Be able to ▪ 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 in accordance with organisation's guidelines as well as any (local and international) laws and regulatory requirements, if applicable	
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	6.1 Understand the processes for risk assessment on software releases and control 6.2 Perform the risk assessment activities on software releases and control with a high degree of expertise and professionalism	<u>Performance Requirement</u> 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 Be able to ▪ 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	6.1 Understand the requirements for software releases and control plan 6.2 Define the software releases and control plan with a high degree of expertise and professionalism	<u>Performance Requirement</u> Be able to ▪ 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 Be able to ▪ 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 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) 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	<u>Performance Requirement</u> 6.1 Have the knowledge to execute and monitor the software releases and control plan 6.2 Have the knowledge to verify and validate the outcomes of released software and existing software 6.3 Execute and monitor the software releases and control plan 6.4 Verify and validate the outcomes of released software and existing software 6.5 Perform the software releases and control plan and verification and validation activities with a high degree of expertise and professionalism	
		Be able to ▪ comprehend the activities specified in a software releases and control plan; ▪ seek clarification on any activities from stakeholders if necessary Be able to ▪ 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 Be able to ▪ 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 Be able to ▪ 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 Be able to ▪ 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 ➤ the results of the software release

	and control plan ➤ the outcomes of the verification and validation of released software and existing software 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) 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	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	<u>Performance Requirement</u> 6.1 Understand the defined standard operating environment ▪ Be able to demonstrate knowledge on ▪ 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 6.2 Coordinate the work of software deployment and/or migration ▪ Be able to ▪ 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 6.3 Monitor and track the deployment and migration processes ▪ Be able to ▪ 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 6.4 Maintain proper communications Be able to communicate effectively, both verbal and written, with the affected stakeholders at all organisational levels 6.5 Monitor the deployment / migration process in a professional manner 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	
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	Performance Requirement 6.1 Understand the rationale to perform software decommissioning Be able to find out ▪ the implications in decommissioning a particular software ▪ the relationship between the outgoing software and the integrated operating environment 6.2 Identify the responsible person or team in a decommission project Be able to identify the person or team responsible for the preparation and management of the software decommissioning procedures 6.3 Define the scope and conditions where a software decommissioning policy applies Be able to ▪ 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 6.4 Formulate and document a decommissioning policy and plan Be able to ▪ 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 6.5 Ensure organisational policy or guideline and regulatory requirements, if any, are observed Be able to comply with any organisational policy or guideline and regulatory requirements during the development of the decommissioning policy and plan (See Remark for some examples in these aspects)	
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	Examples that organisational policy and regulatory requirements may affect the decommissioning policy and plan are as follows: ▪ 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

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

1. Title	Define a system migration plan
2. Code	111155L6
3. Range	Define a system migration plan taking into account the business operations (including contingency plan) in the context of migrating systems
4. Level	6
5. Credit	3 (for reference only)
6. Competency	Performance Requirements 6.1 Understand the requirements in system migration ● Be able to ■ comprehend the organisational requirements, limitations and constraints on the system migration ■ identify all components of the system that need to be migrated ■ know the regulatory requirement such as audit trails or other compliance requirements ■ know the share responsibility model with IT service providers 6.2 Develop and define a system migration plan and a contingency plan ● Be able to ■ perform reviews of software requirements, hardware infrastructure, software architecture, components, interfaces and performance model ■ identify components that need to be updated ■ make suggestions on how to upgrade the system, for example, with the use of the latest technological developments ■ future-proofing the system by accounting for the adaptation of potential future technologies ■ list out the required deliverables upon migration ■ identify the critical success milestone and criteria in migration ■ formulate a system migration plan by integrating the known factors and also taking into account the available migration timeline ■ suggest an alternative contingency plan as a backup to cope with adverse cases ■ alert of associated personnel for potential downtime to minimise impact to the operation of the organisation 6.3 Update the migration plan ● Be able to

	■ stay on top to keep abreast of the pace of business and technology changes ■ observe the code of practices in trade ■ update the developed system migration plan and contingency plan whenever necessary 6.4 Define system migration plan in a professional manner ● Be able to ■ define a system migration plan ■ define the contingency plan of the migration exercise ■ minimise impact to the organisation's operation ■ 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 UoC are the abilities to : ● devise and update a system migration plan and the related contingency plan for the migration exercise ● minimise impact to the organisation's operation
8. Remark	This UoC replaced ITSWDM611A "Define a software deployment / migration plan"

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

1. Title	Perform risk assessment on system migration
2. Code	111157L6
3. Range	This UoC involves analysing the cloud deployment/migration plan by taking into account the in-house system confirmation and business operations
4. Level	6
5. Credit	6 (for reference only)
6. Competency	Performance Requirements 6.1 Understand the risk factors in software deployment or migration ● Be able to list out the general risk factors in software deployment or migration such as ■ 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 ■ incompatible of the existing architecture ■ unwanted latency after migration ■ lack of visibility and control ■ data loss/corruption during the migration process ■ security risk including but not limited to: ◆ compliance violations ◆ security breaches ◆ insecure APIs ◆ misconfiguration ◆ hijacking of accounts services ◆ insider threats 6.2 Perform risk assessment on software deployment and migration ● audit the legacy architecture/system and minimize the inconsistencies and interoperability problems on software deployment or migration exercise ● 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 6.3 Report the risk assessment to stakeholders ● rank the identified risk factors according to the severity to the

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

1. Title	Design the evaluation criteria security test plans
2. Code	111168L6
3. Range	Design evaluation criteria for security test plans that are tailor to an organization's needs and risks in relation to industry standards
4. Level	6
5. Credit	3 (for reference only)
6. Competency	Performance Requirements 6.1 Understand the organization's cyber security standards and practices ● Be able to associate the organization's business operations and its cyber security standards and practices 6.2 Understand the organization's cyber security requirements and the likelihood of attack for different vulnerabilities of the organization's industry ● Be able to ■ identify the important areas for protection ■ identify different kinds of vulnerabilities ■ assess the likelihood of different types and forms of cyberattack 6.3 Set up a benchmark for acceptable cybersecurity level ● Be able to ■ rank the importance of different vulnerabilities and preventative measures in associate to the organization's IT systems ■ understand associated industry standards 6.4 Set up the evaluation criteria to assess security test plans ● Be able to evaluate and benchmark different preventative measures against industry standards by accounting for the importance of different vulnerabilities in relation to the organization
7. Assessment Criteria	The integrated outcome requirements of this UoC are the abilities to : ● identify the needs and risk of an organization under cyberattacks ● identify the industry standards for the associated vulnerabilities and preventative measures ● establish the set of evaluation criteria, which if satisfied, could greatly minimise the cybersecurity risk of the enterprise
8. Remark	

	business entity, such as ■ key benefits and security risks of Cloud Computing ■ obligations of Cloud service provider under the share responsibility model ● report the findings to stakeholders in good faith 6.4 Perform risk assessment on software deployment and migration in a professional manner ● formulate and execute a recovery/restore plan ● 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
7. Assessment Criteria	The integrated outcome requirements of this UoC are the abilities to: ● analyse the cloud deployment / migration plan ● perform a risk assessment on cloud deployment / migration exercise.
8. Remark	This UoC replaced ITSWDM610A "Perform risk assessment on software deployment and migration"

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	<u>Performance Requirement</u> 6.1 Comprehend the stock-take issues Be able to ▪ understand the stock-take procedure ▪ understand the structure of the asset database 6.2 Conduct stock-take of IT asset Be able to ▪ 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 6.3 Resolve all discrepancies between physical assets and the asset database Be able to ▪ identify any discrepancies ▪ conduct the first level investigation and diagnostic activities to determine the correct information 6.4 Update the asset database Be able to ▪ 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	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	Performance Requirement 6.1 Have basic knowledge in IT Be able to ▪ communicate with users in users' language (usually in laymen terms) ▪ communicate with technical personnel in technical language (usually in IT jargons) about the incident and service call related to the IT infrastructure (e.g. software application or hardware system) provided by the organisation 6.2 Understand the nature of the IT services or software provided by the organisation Be able to provide assistance to users on the usage of IT services or software provided by the organisation 6.3 Understand the basic workflow of help desk services Be able to effectively follow through the entire help desk service handling process of the organisation 6.4 Respond to service call 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 ▪ 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 6.5 Perform the first level assistance or investigation activities on the logged incidents Be able to ▪ 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	

	▪ 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
	6.6 Assign the follow-up party for the incidents or service requests Be able to ▪ 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
	6.7 Review the process of servicing the incident or service request Be able to ▪ 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
	6.8 Deliver Help Desk services in a professional manner Be able to ▪ 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	The integrated outcome requirements of this UoCs are the abilities to: (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®.

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	Performance Requirement 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 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 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 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 6.5 Set up, customise, maintain, update, administer and improve the knowledge base for the Help Desk Service Be able to ▪ 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 6.6 Improve the Help Desk Service resolution quality based on the evolving knowledge base Be able to ▪ 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	

	6.7 Streamline the Help Desk processes, guidelines and procedures in step with the knowledge base evolution 6.8 Maintain the knowledge base of those service requests in a professional manner	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 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
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	<u>Performance Requirement</u> 6.1 Know the structure and operation principles of Configuration Management Database (CMDB) Be able to ▪ 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 ▪ 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 ▪ 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
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	Performance Requirement 6.1 Know the System Operations guidelines, procedures and process Be able to ▪ 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 6.2 Understand the roles and responsibilities of all people involved in system operations Be able to identify appropriate personnel to follow-up the system operations of non-routine nature 6.3 Monitor and control the operating activities of the system Be able to ▪ 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 6.4 Schedule and organise the ad hoc, new request and changes in the operating activities Be able to ▪ 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	

	6.5 Plan operational activities 6.6 Handle system operations of non-routine nature or beyond the coverage of existing procedure in a professional manner	- provide inputs to the Change Manager on the change schedule coordination Be able to - assist in the setting up of the system operations instructions, guidelines, procedures, fallback plans and disaster recovery plans - review the operations instructions, guidelines, procedures and make suggestions for improvement - review the resource, tool and operation timetable to optimize the operations performance Be able to schedule, organise, monitor, control and report of the system operations of non-routine nature or beyond the coverage of existing procedure in accordance 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: (i) monitor and control the operating activities of the system operations; (ii) plan the short term operational activities of system operations functions to meet the service commitments and service level requirements with an established pool of resources and a set of process, tool and procedure; (iii) schedule and organise the ad hoc, new requests and changes in the operating activities; and (iv) tune the system operation functions with respect to resource deployment, process or tool.	
Remark	- System operations include, but are not limited to, a) IT system/server operations, b) network operations, c) voice and video conference services operations, and d) operations management - This UoCs comprises both the supervisory, day-to-day exception management and short term operational planning responsibilities of the IT system/server operations function.	

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	Performance Requirement Be able to ▪ 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 Be able to ▪ 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 Be able to ▪ 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	

	6.5 Review the operations activities, make suggestion and document for improvement 6.6 Operate the system operations in a professional manner	Be able to ▪ 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 Be able to ▪ 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	The integrated outcome requirements of this UoCs are the abilities to fulfil system operations function of an organisation by: (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	1. System operations include, but are not limited to, 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	Performance Requirement 6.1 Know the ICT infrastructure and operating environment Be able to ▪ 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 6.2 Define support process Be able to define and explain support process to calling party via ▪ listening carefully to user's description of cause of call ▪ defining, recommending and explaining the steps to be done to the user 6.3 Provide on site support services Be able to ▪ 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 6.4 Perform field service to the user's satisfaction Be able to ▪ 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	<u>Performance Requirement</u> 6.1 Know the normal behaviour of desktop hardware, software components, storage or peripheral equipment 6.2 Understand the outcome from root-cause analysis 6.3 Recover hardware and software components after failure 6.4 Ensure integrity of corporate ICT infrastructure Be able to ▪ 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 Be able to ▪ 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 Be able to ▪ 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 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	
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	Performance Requirement 6.1 Understand corporate standard operating environment with particular emphasis on security Be able to ▪ 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 6.2 Distribute technical changes to the hardware environment Be able to ▪ 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 6.3 Confirm technical changes meet corporate policy in a professional manner Be able to ▪ verify that technical changes have been properly applied to relevant device ▪ validate the changes and report any irregularities according to the organisation's procedures and policies	
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	Performance Requirement 6.1 Understand the position of problem management in support services Be able to ▪ state the goal of problem management ▪ identify potential sources of problem on problem management ▪ be conversant with the workflow in problem management services 6.2 Respond to problem/ incidents, develop and execute problem management processes Be able to ▪ 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 6.3 Conclude an service request Be able to ▪ 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 6.4 Perform problem management services in a professional manner Be able to ▪ 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	<u>Performance Requirement</u> 6.1 Have basic knowledge in IT related to change management process 6.2 Have knowledge related to a change management process 6.3 Verify, filter, log, track, report and communicate on the RFC 6.4 Provide assistance in the RFC assessment, scheduling, approval and communications with concerned parties 6.5 Review the RFC log, make suggestions and document them for improvement	

- Be able to
- identify the type of a change request
 - identify the components required in a change request
- Be able to
- execute change management process for implementing change request
 - identify the stakeholders involved in a change request
- Be able to
- 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
- Be able to
- 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
- Be able to
- 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	<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 purposes and practices of the availability management process Be able to ▪ adopt the principles of and adapt best practices for availability management process ▪ comprehend the performance level indicators 6.3 Comprehend the target/projected service level performance and performance indicators Be able to ▪ 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.) 6.4 Identify the discrepancies between the actual service level performance and performance indicators and the target/projected service level performance and performance indicators Be able to ▪ 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	

	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 6.6 Report the discrepancies and findings 6.7 Deliver, maintain, update and administer the service level performance for availability management services in a professional manner	Be able to - 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 Be able to put the discrepancies and the corresponding reasons for discrepancies into a format that facilitates the reporting to the customers and management Be able to - 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	The integrated outcome requirements of this UoCs are the abilities to: (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	Performance Requirement 6.1 Understand the nature of the system(s) that is/are involved in the release request Be able to ▪ 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 6.2 Comprehend IT knowledge in a centralized and/or distributed environment Be able to apply the required knowledge to ▪ 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 6.3 Plan, deliver, test, accept a release of hardware, software and associated documentation Be able to perform the following tasks, if necessary, in a centralized environment and / or across distributed environments, where appropriate ▪ 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	

	6.4 Maintain, update and administer associated documentation Be able to ▪ 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 6.5 Relate to other management processes Be able to ▪ 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 6.6 Deliver, maintain, update and administer the requests for release management services in a professional manner 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
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (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	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, 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	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	<u>Performance Requirement</u> 6.1 Have good knowledge of configuration management issues Be able to ▪ 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 ▪ 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 ▪ 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	1. This includes the following: 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	6.1 Understand the purposes and practices of IT service continuity and disaster recovery 6.2 Understand the organisation's plans for IT service continuity and disaster recovery 6.3 Provide recovery and operational services to enable continuous operations of the computing environment to support BCP 6.4 Provide recovery and operational services to enable continuous operations of the computing environment in a professional manner	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 Be able to comprehend the plans for IT service continuity and disaster recovery Be able to ▪ 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 Be able to ▪ 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	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	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	6.1 Understand the purposes and practices of the disaster recovery (DR) process 6.2 Understand the DR plan 6.3 Conduct initial test of the DR Plan 6.4 Conduct regular disaster recovery drills 6.5 Provide a report following each such test and advise corrective actions identified through such testing 6.6 Conduct initial tests of the Disaster Recovery Plan and thereafter conduct regular disaster recovery drills in a professional manner	Performance Requirement Be able to adopt the principles of and adapt best practices for IT service continuity and disaster recovery process for an organisation Be able to plan for an exercise to test the DR plan and to conduct disaster recovery drills Be able to ▪ prepare test procedures ▪ conduct test and identify/correct any errors ▪ update the test procedures Be able to ▪ 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 Be able to ▪ 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 Be able to ▪ 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	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 required 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	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	Performance Requirement Be able to ▪ 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 Be able to ▪ 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 Be able to ▪ 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	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	6.1 Locate security information sources 6.2 Prepare and maintain the security control documents 6.3 Prepare and maintain the security control documents in a professional manner	Performance Requirement Be able to identify and locate security information sources such as: ▪ managerial security policy and guidelines ▪ authorised security control plan ▪ industry best practices from professional bodies of local and international standards Be able to ▪ 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 Be able to ▪ 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	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 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	Performance Requirement 6.1 Have basic knowledge in IT related to release management process Be able to ▪ 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 6.2 Have knowledge related to a release management process Be able to ▪ plan and oversee the process for a release request ▪ identify the stakeholders involved in a release request 6.3 Plan and oversee the successful roll-out of new and changed software, associated hardware and documentation Be able to ▪ 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 6.4 Provide assistance in assessing, scheduling, approving and communicating with concerned parties Be able to ▪ 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	

	6.5 Review the execution of a release management process and make suggestions for future improvement 6.6 Plan, monitor, coordinate, track and control the release requests in a professional manner	Be able to ▪ 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 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
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (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	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 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	Performance Requirement Be able to ▪ 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 6.1 Understand the relationship between service level management and other operating and support activities 6.2 Source appropriate software monitors and develop appropriate techniques for installing and maintaining the software monitors 6.3 Establish and maintain the monitoring capabilities 6.4 Execute monitoring function and analyse the performance with respect to the SLA metrics Be able to identify, review and select suitable software monitors and develop internal techniques for installing and maintaining the software monitors Be able to ▪ 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 Be able to ▪ 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 Be able to ▪ 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	The integrated outcome requirements of this UoCs are the abilities to: (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	<u>Performance Requirement</u> 6.1 Understand the terms and conditions in service level agreement (SLA) Be able to ▪ 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 6.2 Ensure the currency and comprehensiveness of the SLA, OLA and underpinning contracts Be able to ▪ 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 6.3 Produce service reports and circulate to customers Be able to ▪ 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 6.4 Manage appropriate service improvement programmes (SIP) to overcome the difficulties and restore service quality Be able to instigate a SIP to identify and implement whatever actions are necessary to overcome the difficulties and restore service quality	

	6.5 Manage the day-to-day operations of service delivery in a professional manner Be able to ▪ 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	The integrated outcome requirements of this UoCs are the abilities to: (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	Performance Requirement Be able to ▪ understand the impact of System Operations functions on the business of the organisation ▪ communicate the impacts of System Operations functions on the end users Be able to ▪ 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 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 Be able to ▪ 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 Be able to define, design, establish, develop and review the system operations function of an organisation to satisfy the service level requirements ▪ 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	The integrated outcome requirements of this UoCs are the abilities to: (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	1. System operations include, but are not limited to, 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	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	<u>Performance Requirement</u> 6.1 Have knowledge in analysing the reported symptom Be able to comprehend ▪ the reported symptom and operating environment from first line field service ▪ the preliminary action taken 6.2 Understand the characteristics of the desktop hardware, software components, storage or peripheral equipment Be able to ▪ 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) 6.3 Perform root-cause analysis and execute remedial actions Be able to ▪ 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 6.4 Conclude the cause of failure quickly in a professional manner Be able to ▪ 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	Performance Requirement 6.1 Understand the system support process (See Remark 2 for an explanation of system support process) 6.2 Understand the system operation, maintenance, administration, diagnosis and recovery activities in the execution of the system support services process 6.3 Maintain and evaluate the system support services process 6.4 Perform the system maintenance and support activities in the system support services in a professional manner	
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	

	limited to, the following: 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); and c) Items related to system management services such as the following: (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. 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. 3. This UoCs involves the analysis and evaluation of the defined process for system support services.

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	Performance Requirement 6.1 Understand various principles and best practices of the system support services process Be able to ▪ adopt the principles of the system support services processes for an organisation ▪ adapt best practices for the system support services processes for an organization 6.2 Plan, monitor and oversee the execution of the system support services process Be able to ▪ 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 6.3 Plan, monitor, schedule, support and investigate processes for system support services in a professional manner Be able to plan, monitor, schedule and support system support services that are ▪ 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	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, 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); and c) Items related to system management services such as the following: (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	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	6.1 Know the Help Desk guidelines, procedures and process 6.2 Have knowledge in Change and Problem Management Services 6.3 Understand the roles and responsibilities of all people involved in IT operations 6.4 Monitor and control the Help Desk services function	Performance Requirement Be able to determine whether an incident / service request fall in the organisation's Help Desk guidelines and procedures 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 Be able to identify appropriate personnel to handle an unidentified cause incident Be able to ▪ 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

	6.5 Keep abreast with the Change and Problem Management function 6.6 Identify the follow-up party in incidents with unidentified causes 6.7 Identify the idiosyncrasy of the incidents and optimise the resources, tools or processes 6.8 Monitor an incident or service request in a professional manner	Be able to - 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 Be able to - 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 Be able to - 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 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
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (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 (ii) tune the Help Desk function with respect to resource deployment, process or tool.	
Remark	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	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	<u>Performance Requirement</u> 6.1 Understand the workflow in problem management Be able to ▪ keep abreast with the workflow in problem management ▪ comprehend the service level requirements agreed with problem management service users 6.2 Monitor and control the problem as referred from Help Desk agent or incident tracking system Be able to ▪ 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 6.3 Coordinate and facilitate problem analysis Be able to ▪ 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 6.4 Coordinate problem review and provide trend analysis information Be able to ▪ 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 6.5 Review the problem and make suggestions for improvement Be able to ▪ 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 6.6 Perform monitoring of problem management process in a professional manner Be able to ▪ 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	The integrated outcome requirements of this UoCs are the abilities to: (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	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	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	<u>Performance Requirement</u> 6.1 Have basic knowledge in IT related change management process Be able to ▪ identify the type of a change request ▪ identify the components required in a change request 6.2 Have knowledge related to change management process Be able to ▪ plan the execution of the change including the schedule and detailed steps involved in the change ▪ identify the stakeholders involved in a change request 6.3 Plan and schedule changes approved by Change Advisory Board (CAB) Be able to ▪ 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 6.4 Own and act for guardianship of the change schedule for the organisation Be able to ▪ own ▪ act for the guardianship ▪ be accountable for the change schedule in satisfying the business and IT service requirement 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
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	<u>Performance Requirement</u> 6.1 Have knowledge related to change management process Be able to ▪ 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 6.2 Know the structure, roles and responsibilities of Change Advisory Board (CAB) Be able to ▪ 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 6.3 Design, implement, enforce, monitor, control and review the change management policy, guidelines and procedures 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 6.4 Monitor, filter, control and communicate the Request for Change (RFC) submission, approval, implementation and review process Be able to ▪ 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 6.5 Convene, chair and run CAB meetings Be able to ▪ 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	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	<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 ▪ plan for an exercise to develop an improvement plan for better availability ▪ comprehend the performance level indicators 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 Be able to ▪ 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 6.4 Evaluate the various possible improvement actions among others Be able to ▪ 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) 6.5 Select a set of possible improvement actions to formulate an improvement plan Be able to ▪ 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	

	6.6 Recommend the improvement plan to the technology planning process 6.7 Recommend improvement plans as input to the technology planning process in a professional manner	Be able to communicate the proposed improvement plan effectively in both business and technical perspectives in order to gain the buy-in from management Be able to ▪ 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) 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 ▪ 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 ▪ 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	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	<u>Performance Requirement</u> 6.1 Understand the nature of the system(s) that is/are involved in the performance and capacity request Be able to ▪ 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 6.2 Comprehend IT knowledge in a centralized and / or distributed environment Be able to apply the required knowledge to ▪ 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 6.3 Review, plan, execute and monitor the performance and capacity request Be able to perform the following tasks, if necessary, in a centralized environment and / or across distributed environments, where appropriate ▪ 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	

	6.4 Collect and maintain the utilization data from a variety of hardware platforms and distributed environments for building a capacity database 6.5 Integrate the request into other planning processes 6.6 Deliver, maintain, analyse and tune the requests for performance and capacity management services in a professional manner	Be able to ▪ 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 Be able to ▪ closely link with availability and Application Development Management and work proactively ▪ be an integral part to produce Capacity Plan 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
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (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.	
Remark	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, 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	Performance Requirement 6.1 Understand the nature of the systems involved in the performance and capacity request Be able to ▪ 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 6.2 Comprehend the proactive and iterative cycle for performance and capacity management Be able to apply the required knowledge to ▪ 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 6.3 Make recommendations in a capacity plan Be able to analyse and incorporate following information in the capacity plan ▪ 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	

	testing new H/W and S/W products that might improve efficiency and effectiveness ▪ current levels and the projected levels of capacity and business services The recommendations should be quantified in terms of: ▪ 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. 6.4 Deliver, update and publish a capacity plan in a professional manner Be able to ▪ 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	The integrated outcome requirements of this UoCs are the abilities to: (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	This UoCs comprises the capacity planner competency requirement 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 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	Performance Requirement 6.1 Have basic knowledge in IT related to performance and capacity management process Be able to ▪ 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 6.2 Have knowledge related to performance and capacity management process Be able to ▪ 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 6.3 Plan and oversee the execution of a performance and capacity services plan Be able to ▪ 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 6.4 Review the lessons learnt after executing a capacity plan and make suggestions for future improvement Be able to ▪ 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	<u>Performance Requirement</u> 6.1 Have good knowledge of digital asset management Be able to ▪ understand the concept of digital asset management ▪ understand the structure of the organisation of digital assets 6.2 Monitor and control the change management database Be able to ▪ 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 6.3 Filter and communicate the service requests to appropriate parties Be able to ▪ 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	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	6.1 Understand the purposes and practices of the DR and BCP process 6.2 Monitor, coordinate and control the implementation of DR plan and BCP process 6.3 Review periodically the DR plan and BCP process covering business impact analysis of critical applications, facilities and procedures 6.4 Monitor, coordinate control and review the implementation of DR plan and BCP process in a professional manner	<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 Be able to ▪ 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 Be able to ▪ 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 Be able to ▪ 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	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	<u>Performance Requirement</u> 6.1 Locate customers and suppliers and their linkage Be able to ▪ locate Information and Communication Technology (ICT) services consumers and the corresponding service suppliers ▪ identify the activities being conducted between the customers and suppliers 6.2 Establish service level requirements from views of customer Be able to ▪ 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 6.3 Finalize the contents of the service level agreement (SLA) and the initial service level targets Be able to ▪ 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 6.4 Establish underpinning contracts and operational level agreement (OLA) Be able to ▪ 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	

	6.5 Review service regularly with the customer 6.6 Manage the service relationship with the customers and suppliers in a professional manner	Be able to - 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 Be able to - 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	The integrated outcome requirements of this UoCs are the abilities to: (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	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	6.1 Understand the non-routine situations that are not covered by existing procedures in the operation and administration of databases 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 6.3 Perform the non-routine activities with a high degree of expertise and professionalism	<u>Performance Requirement</u> Be able to ▪ 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 Be able to ▪ 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 Be able to ▪ 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	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 ▪ 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 ▪ 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 ▪ 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 ▪ 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	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	6.1 Understand security control requirements and types of security threats 6.2 Define process to protect the infrastructure from security threats 6.3 Monitor, investigate and perform corrective actions in accordance with security control policy 6.4 Define process for security control in accordance with security control policy in a professional manner	<u>Performance Requirement</u> Be able to ▪ digest the security policy and guidelines from management ▪ comprehend the security control plan ▪ identify different types of security threats to business processes Be able to ▪ define process and measures to protect the infrastructure from security threats ▪ recommend the appropriate anti-virus software (signatures) and security patches Be able to ▪ monitor alerts and reported exceptions ▪ investigate the alerts to determine the root cause ▪ carry out corrective actions in accordance with security control policy Be able to ▪ 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	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	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	<u>Performance Requirement</u> 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	
		Be able to ▪ understand the impact of Help Desk functions on the business of the organisation ▪ communicate the impacts of Help Desk functions to the end users Be able to ▪ 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 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 Be able to ▪ 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 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 ▪ 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	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	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	<u>Performance Requirement</u> 6.1 Understand the structure, problem management policy and workflow of the organisation Be able to ▪ identify the organisational structure and the position of the problem management team in it ▪ comprehend the problem management policy and the service level requirement agreed with users ▪ keep abreast with the workflow in problem management process 6.2 Keep abreast of the new service delivery plans and on-going development in IT operations Be able to comprehend the new service delivery plans across the IT organisation and the on-going development in IT operations, translate them into positioning in Problem Management process as part of the integral service delivery 6.3 Plan, design, set up and implement changes to the problem management process Be able to plan, design, set up and implement changes to the resources, work methods, tools, knowledge base and processes of the Problem Management process to satisfy the service level requirements 6.4 Liaise and review with the other IT functions and process owners Be able to ▪ liaise with the other IT function or process owners on an agreed Problem Management process service requirement ▪ review the support parties' feedback, the performance report of Problem Management process and devise plans for improvement ▪ upkeep or improve system availability and problem resolution rate 6.5 Manage the problem management process in a professional manner Be able to ▪ design, establish, develop and review the problem management process in accordance with organisation's guidelines as well as any (local and international) laws and regulatory requirements, if applicable ▪ continuously and proactively improve the problem management processes	
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) comprehend plans in the IT organisation and be able to position accordingly in the Problem Management process; (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 Problem Management process to the service level requirement level; and (iv) upkeep or improve the system availability and problem resolution rate.
Remark	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	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	Performance Requirement Be able to understand and communicate any impact of change management processes on the business of the organisation 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 Keep abreast of the new service delivery plans and on-going development in IT operations 6.4 Plan, design, set up and implement changes to the change management process 6.5 Liaise and review with the other IT functions and processes 6.6 Establish the change management process in a professional manner Be able to ▪ 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 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 Be able to ▪ 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 Be able to design, establish, develop and review the change management process of an organisation ▪ 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	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	<u>Performance Requirement</u> 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 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 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 6.4 Understand the critical business functions and requirements Be able to ▪ 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 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 6.6 Define the scope of availability measurements Be able to ▪ 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 6.7 Design, establish, develop and review the processes for availability management services in a professional manner Be able to ▪ 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	Performance Requirement Be able to understand and communicate any impact of release management policies, procedures and process on the business of the organisation 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 Outline the major activities in release management and their positions in the life-cycle of a release 6.4 Understand the relationship among release management, change management and configuration management 6.5 Design and implement efficient policies and procedures for the distribution and installation of changes to IT systems 6.6 Liaise with the IT functions and processes of change management and configuration management 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 Be able to integrate release management with change and configuration management Be able to ▪ 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 Be able to ▪ 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	

	6.7 Review, evaluate and improve the release management process 6.8 Design, establish, develop and review the release management process in a professional manner	Be able to - 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 Be able to design, establish, develop and review the release management process of an organisation - 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 release management policies, procedures and processes for servicing release requests related to both hardware and software in an organisation; and (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.	
Remark	This UoCs comprises the release management process owner for the release 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	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	<u>Performance Requirement</u> 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 6.2 Have general business knowledge of the serving organisation 6.3 Understand the business implication of the system operations 6.4 Coordinate, monitor and control the system's critical operations 6.5 Decide on operational fallback, execute disaster recovery plan and restore operation to normal during a major operational event 6.6 Review the operational decision for future improvement	
		Be able to ▪ 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 Be able to understand the implication on the business unit and of the serving organisation when executing a certain operational decision Be able to ▪ participate in the appropriate governance body so as to monitor and control the following items ➤ 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 Be able to ▪ 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 Be able to lead the post-mortem operations management review to find out the root cause

	6.7 Manage the system operations in exceptional situations and the corresponding recovery action Be able to ▪ manage the system operations in exceptional situations ▪ coordinate and enact the necessary recovery action 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.
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (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.
Remark	1. System operations include, but are not limited to, 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	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	<u>Performance Requirement</u> Be able to ▪ understand the support activities in system support services functions ▪ communicate the impacts of system support services functions to other technical support team members Be able to ▪ outline the major activities in system support services ▪ identify the resources required in each of these major activities in system support services 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 Be able to ▪ 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 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	

	6.7 Define, design, establish, develop and review the process for system support services in a professional manner Be able to define, design, establish, develop and review the system support services process of an organisation ▪ 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	The integrated outcome requirements of this UoCs are the abilities to: (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	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, 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: (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	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 ▪ 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 ▪ 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 ▪ 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 ▪ 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 ▪ 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	<u>Performance Requirement</u> 6.1 Understand the business implication of the IT systems Be able to ▪ 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 6.2 Coordinate, monitor and control the highest severity incident Be able to ▪ 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 6.3 Manage the highest severity incident in a professional manner 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 ▪ 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	<u>Performance Requirement</u> 6.1 Understand the business implication of the IT systems Be able to ▪ understand the role of IT in the major business processes of the serving organisation ▪ understand the business impact of the IT problems 6.2 Understand the IT infrastructure, system function and the inter-relationship of the IT systems Be able to ▪ 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 6.3 Lead, monitor and control chronic, repetitive, high impact or cross platform problems Be able to ▪ 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 6.4 Review problems for future improvement Be able to ▪ 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 6.5 Manage chronic, repetitive, high impact or cross platform problems in a professional manner Be able to ▪ 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	The integrated outcome requirements of this UoCs are the abilities to: (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	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®.

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	<u>Performance Requirement</u> 6.1 Know the structure and responsibilities of the Emergency Change Advisory Board (ECAB) 6.2 Know IT and its applications 6.3 Log and filter the submitted emergency change request 6.4 Convene, chair and run the ECAB on the emergency change request 6.5 Monitor and review the implementation of the approved emergency change request 6.6 Manage the emergency change request in a professional manner	
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	6.1 Have general technical knowledge of the IT services and the supporting infrastructure of the serving industry 6.2 Have comprehensive knowledge in IT and its role in the performance and capacity management process of the serving industry 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	<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 ▪ 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) Be able to ▪ 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

	6.4 Understand the relationship among business, service and resource capacity management 6.5 Define the goal and scope of performance and capacity management services for the organisation of the serving industry 6.6 Liaise with all aspects of Service Delivery and Service Support for all operational performance and capacity issues 6.7 Review, evaluate and improve the performance and capacity management process	Be able to ▪ 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 Be able to ▪ 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 Be able to • 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 Be able to ▪ 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 Be able to design, establish, develop and review the performance and capacity management process of an organisation ▪ 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	The integrated outcome requirements of this UoCs are the abilities to: (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 (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.
Remark	This UoCs comprises the Performance and Capacity Management Process Owner for the capacity 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	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	<u>Performance Requirement</u> 6.1 Comprehend asset administration process Be able to ▪ understand asset administration process ▪ define procurement, tagging, tracking, disposal and keeping of license records 6.2 Define and implement processes for IT asset management services Be able to ▪ 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 6.3 Design, establish, develop and review processes for configuration management services Be able to ▪ 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	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	6.1 Understand purposes and practices of IT service continuity and disaster recovery 6.2 Assess disaster impacts 6.3 Define processes and procedures to mitigate such risks 6.4 Perform different risk mitigation measures 6.5 Assess disaster impacts, and define processes and procedures to mitigate such risks in a professional manner	Performance Requirement Be able to adopt the principles of and adapt best practices for IT service continuity and disaster recovery process for an organisation Be able to ▪ identify and classify the critical business functions ▪ identify and classify the different disaster scenarios that can impact the critical business processes Be able to ▪ 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 Be able to ▪ implement a comprehensive backup and recovery process, including off-site storage ▪ eliminate single points of failure ▪ implement stringent physical security controls Be able to ▪ 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	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	6.1 Understand current service level management operating environment 6.2 Define, design, establish and maintain the SLM processes 6.3 Plan, design, develop and establish the SLM tools 6.4 Communicate with customers and suppliers on current developments in SLM 6.5 Manage the SLM processes in a professional manner	Performance Requirement Be able to be conversant with the following items associated with SLM ▪ the customers and suppliers ▪ the current processes and procedures ▪ the supporting infrastructure Be able to ▪ 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 Be able to ▪ 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 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 Be able to ▪ 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

	▪ continuously and proactively improve on the SLM processes
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (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	6.1 Understand the management of databases in exceptional situations 6.2 Manage the recovery actions for databases in exceptional situations 6.3 Manage the performance of recovery actions for databases with a high degree of expertise and professionalism	<u>Performance Requirement</u> Be able to ▪ 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 Be able to ▪ 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 Be able to ▪ 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	6.1 Have knowledge of the requirements of database operations, administration and support functions 6.2 Design, develop and establish database operations, administration and support functions 6.3 Evaluate and review database operations, administration and support functions 6.4 Manage database operations, administration and support functions with a high degree of expertise and professionalism	<u>Performance Requirement</u> Be able to ▪ identify the processes necessary for database operations, administration and support functions ▪ identify the relevant stakeholders and their needs (See Remark 1 for examples of the required processes) Be able to ▪ 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 Be able to ▪ 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 Be able to ▪ 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	1. Examples of the processes for database operations, administration and support functions include, but are not limited to, 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	Performance Requirement Be able to ▪ 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 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 Be able to ▪ 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 Be able to ▪ 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,	

	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); and c) Items related to system management services such as the following: (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	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	6.1 Familiarise with corporate security issues 6.2 Investigate security incidents to identify any security loopholes/breaches 6.3 Make recommendations for improvement 6.4 Investigate security incidents to identify any security loopholes/breaches and make recommendations for improvement in a professional manner	Performance Requirement Be able to be conversant with corporate security issues such as ▪ 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 Be able to ▪ monitor and control the day-to-day security checking ▪ investigate security incidents to identify any security loopholes/ breaches ▪ make recommendations for improvement Be able to ▪ assess the cost, benefit and effectiveness of the recommendations ▪ implement the recommendations Be able to ▪ 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	1. The participant is assumed to have comprehensive knowledge in IT and its applications. 2. This UoCs comprises both planning and operating security services 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	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	6.1 Know various QA activities for software product 6.2 Know how to relate the defined QA plan with implied conditions 6.3 Perform product related QA activities 6.4 Perform Quality Monitoring and Feedback	<u>Performance Requirement</u> Be able to understand the interrelationship of various QA activities for software product See Remark 2 for some examples of software project QA activities 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 Be able to ▪ 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 Be able to ▪ 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 ➢ on the product QA activities and results ➢ from QA's perspective on the product's compliance with standards and processes

	6.5 Perform QA activities in a professional manner Be able to perform QA activities as well as Quality Monitoring and Feedback on a software product ▪ 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
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (i) perform various QA activities; and (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.
Remark	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	<u>Performance Requirement</u> 6.1 Know how to evaluate the quality of various software artefacts Be able to ▪ 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 See Remark 3 for examples of software artefacts in a software product 6.2 Summarize product quality issues and lessons learned 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 See Remark 4 for examples of software project quality issues and lessons learned 6.3 Conduct casual and trend analysis to drive quality process improvement Be able to ▪ 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 See Remark 5 for examples of tools and techniques for the analysis 6.4 Perform objective evaluation of a software product in a professional manner Be able to perform objective evaluation of a software product based on the defined software QA plan ▪ 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.	

	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.

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	<u>Performance Requirement</u> 6.1 Understand the requirements of a QA implementation plan Be able to ▪ 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 6.2 Execute the organisational level QA plans Be able to ▪ 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 6.3 Review the execution of the organisational QA plans Be able to ▪ review QA activities for individual software products/services against the following aspects of the organisational QA strategies ➢ Effectiveness ➢ Efficiency ➢ Value ▪ evaluate the effectiveness of each execution 6.4 Implement QA policies and procedures in a professional manner Be able to ▪ 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	Performance Requirement 6.1 Understand available relevant certification standards Be able to ▪ 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 6.2 Plan and obtain a suitable software QA certification of international standards Be able to ▪ 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 6.3 Maintain the certification of international standards Be able to ▪ 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	1. Within this UoCs, “software product” refers to software product, software service or software project. 2. Examples of the related activities should include 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	<u>Performance Requirement</u> 6.1 Understand organisational level quality initiatives Be able to ▪ 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 6.2 Plan and execute quality initiatives Be able to ▪ plan for the execution of quality initiatives ▪ develop and setup the QA acceptance/reject criteria ▪ promote the quality culture in the organization 6.3 Plan and execute the organisational quality initiatives in a professional manner Be able to ▪ 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	<u>Performance Requirement</u> 6.1 Understand the training requirements for QA activities Be able to ▪ 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 ▪ 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 ▪ 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	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 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	Performance Requirement 6.1 Know how to identify the quality requirements and quality measurement criteria of a software product Be able to ▪ 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 6.2 Establish quality requirements of the software product Be able to ▪ 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 See Remark 3 for the meaning of QC in a software product 6.3 Ensure that the overall QA plan is in alignment with the client's quality requirements Be able to communicate with clients to ensure that the overall QA plan aligns with the client's quality requirements 6.4 Prepare QA requirements of a software product in a professional manner Be able to prepare QA requirements of a software product ▪ 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	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	<u>Performance Requirement</u> 6.1 Know various components of a project QA plan Be able to ▪ 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 6.2 Know how to select adequate tools and techniques for the required QA activities Be able to ▪ analyse the project input before selecting tools and techniques for QA activities ▪ understand the appropriate tools and techniques available for the required QA activities 6.3 Develop a software project QA plan Be able to ▪ 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 6.4 Develop a software project QA plan in a professional manner Be able to ▪ 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	1. Within this UoCs, "software product" takes a boarder meaning of software project, software product, and software services. 2. A project QA plan includes, but is not limited to, topics such as 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	6.1 Have knowledge of the requirements of establishing a QA entity in an organisation 6.2 Formulate the needs to establish a QA entity and appropriate supporting infrastructure for an organisation and the resources required 6.3 Prepare a QA proposal 6.4 Liaise with the senior management to agree on a QA proposal in alignment with corporate policy	<u>Performance Requirement</u> Be able to ▪ 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 Be able to ▪ 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 Be able to prepare a proposal with budget considerations by presenting a business case for the establishment a QA entity See Remark 3 for the content of the QA proposal Be able to ▪ 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

	6.5 Secure the resources (including recruitment) to set up the agreed QA entity 6.6 Establish a QA entity in a professional manner	Be able to ▪ 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 Be able to establish a QA entity ▪ 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.
7. Assessment Criteria	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.	
Remark	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 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: 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	<u>Performance Requirement</u> 6.1 Understand the vision and mission statements of QA as laid down by an organisation Be able to articulate the vision and mission statements of QA for software products or services at the organisational level 6.2 Formulate QA policies and procedures Be able to ▪ 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 6.3 Formulate QA policies and procedures in a professional manner Be able to ▪ 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	<u>Performance Requirement</u> 6.1 Have knowledge in the operation routines of an organisation 6.2 Coordinate and manage the execution of operation routines 6.3 Manage the operation routines in a professional manner Be able to understand operation routines of an organisation and the purpose of each individual routine in achieving the organisation's business strategies Be able to ▪ 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 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	
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	6.1 Understand characteristics of effective communication 6.2 Know the audience and the information needed to be conveyed 6.3 Consolidate information for delivery 6.4 Deliver message related to business or software products and software services to team members and clients effectively	<u>Performance Requirement</u> Be able to recognize that good communication is accurate, clear, concise, coherent, and appropriate to the subject Be able to ▪ 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 Be able to ▪ 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 Be able to ▪ 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		<u>Performance Requirement</u> 6.1 Know the behaviour in listening Be able to ▪ 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 ➢ 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 6.2 Develop listening skills Be able to ▪ 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

	6.3 Demonstrate proficiency in listening to clients and team members on business information related to software products and software services Be able to ▪ 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
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (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
Remark	

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	6.1 Know the principles of presentation 6.2 Prepare for a presentation 6.3 Deliver effective presentation on information related to general business and technical information to team members and clients in logical order	<u>Performance Requirement</u> Be able to recognise that ▪ 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 Be able to ▪ 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 Be able to ▪ 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 ➢ Key Point 1, Supporting Material, Transition ➢ Key Point 2, Supporting Material, Transition ➢ Key Point 3, Supporting Material ➢ Closing: Summary and ' To do '

	6.4 Improve effectiveness of presentation Be able to ▪ 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	Define user requirements
2. Code	111162L4
3. Range	This UoC involves defining user requirements of IT application and communicating with stakeholders to produce a user requirement document
4. Level	4
5. Credit	6 (for reference only)
6. Competency	Performance Requirements 6.1 Know the stakeholders and information needed to be conveyed ● understand the relationship of business requirements, user requirements and system requirements for defining an IT application development project ● identify the stakeholders who will be the users of the IT application to be developed ● collect profile of stakeholders, whenever possible, to preliminarily identify what the users do with the IT application or what activities the users must be able to perform ● understand any constraints on the delivery of information such as time and location etc. 6.2 Consolidate information for delivery ● collect relevant data and compose a draft appropriate to the communication assignment ● explain the use of special terms and short forms ● bridge the gap between technical and non-technical people by communicating technical terms in generic terms ● seek recommendation or approval from management before release of information where necessary 6.3 Exhibit professionalism in the user requirement document ● follow the organisation's style and format to prepare the user requirement document ● produce accurate and concise the user requirement document
7. Assessment Criteria	The integrated outcome requirement of this UoC are the abilities to : ● understand and identify the needs of stakeholders for an IT application design project ● communicate technical information to non-technical people effectively ● Produce accurate and concise user requirement document
8. Remark	

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

1. Title	Manage organisation resources for implementation across multiple processing environment
2. Code	111163L4
3. Range	This UoC involves managing organisation computing resources devoted to multiple platform processing environment for the benefits of the organisation.
4. Level	4
5. Credit	3 (for reference only)
6. Competency	Performance Requirements 6.1 Understand the key principles of managing computing resources ● Be able to know the principles of managing the computing resources across multiple processing environment ■ Automation ■ Identity and Access Management ■ Continuous integration and development ■ Optimisation of course costs and consumption 6.2 Understand the available resources of the organisation ● Be able to ■ list the on-premise computing resources of the organization accurately ■ understand the computing resources required for the future business development 6.3 Define the computing resources management plan in accordance with the IT strategies ● Be able to ■ manage on-premise computing resources effectively ■ choose the suitable on-demand service models across multiple processing environment, such as ◆ Infrastructure as a service (IaaS) ◆ Platform as a service (PaaS) ◆ Software as a service (SaaS) ◆ Function-as-a-Service (FaaS) 6.4 Formulate plans to manage organisation computing resources for the benefits of the organisation ● Be able to formulate plans for managing the computing resources on-premises and on multiple processing environment according to the business requirements

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

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	<u>Performance Requirement</u> 6.1 Understand the requirements of Ethics and Professionalism Appraisal Policy 6.2 Prepare the Ethics and Professionalism Appraisal Policy 6.3 Prepare the Ethics and Professionalism Improvement Policy 6.4 Prepare the Ethics and Professionalism Remedial Policy 6.5 Communicate the benefits of the Appraisal Policy	
		Be able to ▪ 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 Be able to develop an Appraisal Policy that covers, at least, the following items ▪ 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 Be able to develop the Improvement Policy that covers, at least, the following items ▪ 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 Be able to develop the Remedial Policy that covers, at least, the following items ▪ the objectives of a remedial policy ▪ method of study ▪ assessment team ▪ guidelines for the remedial actions for different levels of professionalism behaviour ▪ appeal mechanism Be able to state the benefits of the appraisal policy to the stakeholders, such as supervisors, employees and services users

	6.6 Develop the policies and guidelines for the appraisal of the enactment of professionalism in an organisation in a professional manner Be able to develop the policies and guidelines for the management of the enactment of professionalism ▪ 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) 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..
Remark	Items of an Ethics and Professionalism Appraisal Policy include: 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	6.1 Understand the requirements of appraisal mechanism for the enactment of professionalism in an organisation 6.2 Define and establish the appraisal mechanism and train appraisers 6.3 Train appraisers 6.4 Define and establish the appraisal process in a professional way	<u>Performance Requirement</u> Be able to ▪ 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 On the basis of the approved policies and guidelines, be able to define and establish appraisal mechanisms, such as ▪ 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 ➢ 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 Be able to provide appraisers with adequate training to enable them to make fair and objective assessments and to carry out effective appraisal interviews Be able to define and establish the appraisal process ▪ 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	6.1 Understand the monitoring requirements of the defined appraisal mechanism for the enactment of professionalism in an organisation 6.2 Monitor the defined appraisal mechanism 6.3 Monitor the appraisal mechanism in a professional way	<u>Performance Requirement</u> Be able to ▪ 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 Be able to ▪ 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 See Remarks 1 and 2 for examples of Assessment Data and Results, respectively Be able to monitor the appraisal mechanism so as to ▪ 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	Performance Requirement 6.1 Understand the review requirements of the existing appraisal mechanism for the enactment of professionalism in an organisation Be able to ▪ 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 6.2 Perform the review of the existing appraisal mechanism Be able to ▪ 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 6.3 Make suggestions on the existing appraisal mechanism Be able to ▪ identify areas for improvement to the existing appraisal mechanism ▪ obtain approvals from stakeholders on the suggestions made 6.4 Perform the review of the existing appraisal mechanism in a professional way Be able to perform the review of the existing appraisal mechanism ▪ 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	<u>Performance Requirement</u> 6.1 Know the intellectual property rights and data privacy requirements 6.2 Understand the legal protection applicable to copyright work 6.3 Understand different types of licenses 6.4 Respect and protect the proprietary interests of the information owners	

	6.5 Protect the data privacy 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 ▪ Collection limitation principle ▪ Data quality principle ▪ Purpose specification principle ▪ Use limitation principle ▪ Security safeguards principle ▪ Openness principle ▪ Individual participation principle 6.6 Perform the protection of intellectual property and data privacy in a professional way Be able to perform the protection of intellectual property and data privacy ▪ 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) protect intellectual property such that no copyright infringement activities are carried out in the organisation; and (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.
Remark	

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	6.1 Know the new business direction, technologies and skills required by the organisation and industry 6.2 Know the related training opportunities available 6.3 Search for the right training opportunities and gain the financial support and endorsement 6.4 Have the habit of being constantly aware of new technologies and skills training to suit the needs of organisation and the society	<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 Be able to know the related training opportunities available in the organisation or industry (both on-the-job training or course training) Be able to identify the right training opportunities (both continuous professional development institutions and courses) and gain necessary financial support and endorsement 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
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	6.1 Know the training opportunities available for acquiring new knowledge and skills 6.2 Take up training courses, self-study, practice exercises, and review course materials 6.3 Achieve and attain required learning outcomes, if any	<u>Performance Requirement</u> Be able to ▪ 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 Be able to ▪ 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 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.
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	ITSWG508A	
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	6.1 Have basic insights into the business of the industry 6.2 Understand the strategic innovation of ICT 6.3 Identify business opportunities	<u>Performance Requirement</u> Be able to ▪ 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 Be able to suggest ways to ▪ create new market opportunities ▪ promote good values to customers ▪ transform technological innovations into business opportunities for the business and the organisation Be able to ▪ 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	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	6.1 Understand the basic principles of sales and marketing 6.2 Develop and establish sales and marketing strategies and plans 6.3 Establish a marketing team to develop and execute marketing and brand strategy, tactics and plans 6.4 Establish sales force and execute the marketing and sales plan to achieve sales target and results	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 Be able to ▪ 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 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 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
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	6.1 Understand the basic principles of product / service marketing and branding 6.2 Develop and establish a marketing strategy for the product / services brand 6.3 Set up and establish a marketing team to develop, execute and manage product / services brand 6.4 Develop, establish and review corporate and product identity	Performance Requirement 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 Be able to ▪ 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 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 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
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	6.1 Understand characteristics of effective technical communication 6.2 Know the audience and information needed to be conveyed 6.3 Consolidate information for delivery 6.4 Deliver corporate message related to software development, maintenance, and service provision effectively	<u>Performance Requirement</u> Be able to recognize that good communication is accurate, clear, concise, coherent, and appropriate to the subject Be able to ▪ 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 Be able to ▪ 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 Be able to ▪ 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	6.1 Know the behaviour in listening 6.2 Develop listening skills	<u>Performance Requirement</u> Be able to ▪ 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 ➢ 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 Be able to ▪ 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

	6.3 Demonstrate proficiency in listening to information related to software development, maintenance, and service provision Be able to ▪ 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
7. Assessment Criteria	The integrated outcome requirements of this UoCs are the abilities to: (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
Remark	

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	Performance Requirement 6.1 Know the principles of presentation Be able to recognise that ▪ 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 6.2 Prepare for a presentation Be able to ▪ 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 6.3 Deliver presentation on information related to software development, maintenance, and service provision in logical order Be able to ▪ 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 ➤ Key Point 1, Supporting Material, Transition ➤ Key Point 2, Supporting Material, Transition ➤ Key Point 3, Supporting Material ➤ Closing: Summary and ' To do '	

	6.4 Improve effectiveness of presentation Be able to ▪ 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 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.
Remark	

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	6.1 Know the background information about team building 6.2 Build an effective management, software development, maintenance, or service provision team	<u>Performance Requirement</u> Be able to ▪ 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 ➢ build trust among themselves ➢ allow differences ➢ recognise individual strengths, styles and skills ➢ keep lines of communication flexible ➢ ensure tolerance ➢ allow mistakes Be able to ▪ 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	6.1 Know the behaviour in interpersonal and people networking skill 6.2 Exercise interpersonal and people networking skills 6.3 Demonstrate proficiency in interpersonal and people networking skill to achieve positive team relationships	<u>Performance Requirement</u> Be able to ▪ understand the importance of communication among members in a team ▪ recognise potential benefits of effective interpersonal and people networking skill such as ➤ 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 Be able to ▪ 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 Be able to ▪ 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	Performance Requirement 6.1 Know the typical scenario in negotiation Be able to ▪ 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 6.2 Identify facts relevant to negotiation process Be able to ▪ identify the reasons for negotiation such as ➢ 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 6.3 Negotiate to reach a resolution related to software development, maintenance, and service provision Be able to ▪ 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	

	▪ 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: (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	6.1 Acquire general management skills for managing contracts 6.2 Understand the general impact of finance, accounting and government laws on contracts 6.3 Manage contractors' performance 6.4 Manage contractual change requests 6.5 Adhere to the highest standard of ethical business practices in all business dealings	<u>Performance Requirement</u> Be able to ▪ 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 Be able to ▪ comply with the rules ▪ review compliance options and challenges, and ▪ recommend the preferred approach with reasons Be able to review outputs from different processes and from different providers, and compare them against the contractual requirements Be able to ▪ 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 Be able to ▪ 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.	

Remark	

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	<u>Performance Requirement</u> 6.1 Have knowledge of procurement policies and skills Be able to ▪ 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 6.2 Conduct procurement in a way that contributes to a positive image for the individuals and organisations Be able to ▪ 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 6.3 Represent ones skills, knowledge and experiences with honesty and integrity Be able to ▪ 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 6.4 Champion the health and safety concerns into decision-making 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 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 Be able to ▪ 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	

	- 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: (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	6.1 Utilize IT and related resources 6.2 Check any misuse on the IT and related resources 6.3 Make replenishment on the IT and related resources	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 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 Be able to ▪ plan the availability of IT and related resources, and ▪ obtain the relevant resources so that the company actions could be executed smoothly with enough resources
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	6.1 Know the forward corporate plan 6.2 Recruit and /or retain IT staff 6.3 Develop IT staff 6.4 Maintain the best mix of skill set in the organisation	<u>Performance Requirement</u> Be able to ▪ 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 Be able to ▪ 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 Be able to ▪ 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 Be able to keep people with the best possible mix of skill sets in the organisation for effective and efficient operations
7. Assessment Criteria	The integrated outcome requirement of this UoCs are the abilities to: (i) recruit, develop and retain IT staff for the sustainability of the organisation; and (ii) maintain the best mix of skill sets in the organisation in order to achieve the most effective and efficient operations.	
Remark		

	● understand how the IT system will continue if on premise goes down but the cloud platform is still running, and vice versa, if applicable
7. Assessment Criteria	The integrated outcome requirements of this UoC are the abilities to ● develop and obtain approval of a BCP strategy by obtaining senior management support ● building business continuity model
8. Remark	This UoC replaced ITSWIS519A “Establish a business continuity planning strategy”

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	6.1 Understand staff development initiatives 6.2 Manage staff performance 6.3 Manage staff appraisal 6.4 Keep professional practice in managing staff performance and appraisal	<u>Performance Requirement</u> Be able to ▪ 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 Be able to ▪ 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 Be able to ▪ 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 Be able to ▪ 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	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	<u>Performance Requirement</u> 6.1 Understand the current development trends of a business Be able to summarize the business trends related to the organisation 6.2 Review the existing business strategies and policies against the business trends and business performance of the organisation Be able to ▪ 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 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) 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	
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	Acquire and protect the copyrights and IP rights related to IT
2. Code	111161L5
3. Range	This UoC involves acquiring and protecting the copyrights and IP rights related to IT in the context of risk management within an organisation
4. Level	5
5. Credit	3 (for reference only)
6. Competency	Performance Requirements 6.1 Know of copyrights and IP rights ● 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 ● review the adoption and impact of new IP requirements to the digital economy development 6.2 Acquire and protect the copyrights and IP rights ● 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 6.3 Exhibit professionalism ● 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 UoC are the abilities to ● ensure that the organisation will not infringe on copyrights and IP rights in the usage of IT ● properly manage and enforce the copyrights and IP rights related to IT owned by the organisation
8. Remark	This UoC replaced ITSWG523A “Acquire and protect the copyrights and IP rights related to IT”

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	ITSWG601A	
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	6.1 Have knowledge of the relevant international standards 6.2 Adopt international standards 6.3 Adapt international standards 6.4 Set international standards 6.5 Adopt and adapt international standards in a professional way	<u>Performance Requirement</u> Be able to ▪ identify the relevant international standards that are applicable to the organisation ▪ refer to the appropriate experts for guidance where necessary Be able to ▪ understand and apply the focuses of various international standards in the industry ▪ evaluate and identify the best standards for organisational needs Be able to ▪ 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 Be able to ▪ participate in setting standards for appropriate levels of competence ▪ strive to achieve those competence standards Be able to ▪ 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	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	6.1 Have good knowledge of issues in preparation of peer review 6.2 Seek and provide peer review 6.3 Deliver evaluations in a professional manner	<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. Be able to ▪ seek and utilize peer review ▪ provide critical review of others' work Be able to ▪ 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	Performance Requirement Be able to ▪ understand the specific and unique needs of a team ▪ understand the various theories and techniques available for leading and motivating a team 6.1 Have knowledge of the theories and techniques of leading and motivating a team Be able to ▪ 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 6.2 Apply suitable skills in leading and motivating a team Be able to ▪ 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 6.3 Lead and motivate a team with a high degree of expertise and professionalism to execute business strategies and plans	
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	Performance Requirement Be able to ▪ understand the various analytical methods and techniques related to problem solving ▪ understand the IT tools, if any, available in relation to the various methods 6.1 Have knowledge of various analytical methods and techniques Be able to ▪ 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 6.2 Apply analytical methods and techniques to problem solving Be able to ▪ 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 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	
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	<u>Performance Requirement</u> 6.1 Have knowledge of the theories and techniques of delegation Be able to ▪ 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 6.2 Apply suitable skills in delegating responsibilities Be able to ▪ 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 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 Be able to ▪ 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	6.1 Understand business performance reports and analytics 6.2 Define key performance indicators 6.3 Forecast the business performance 6.4 Monitor the business performance	<u>Performance Requirement</u> 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 Be able to define key performance indicators of the organisation such as profits/loss, market share, and business growth metrics Be able to predict, project and forecast the business performance using statistical models based on existing business performance metrics Be able to monitor the business performance on an appropriate regular basis with reference to the business performance report and managerial accounts
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	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	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	6.1 Have knowledge of current IT risk mitigation techniques 6.2 Understand the requirements for a risk mitigation plan 6.3 Develop risk mitigations strategies and plans related to IT with a high degree of expertise and professionalism	<u>Performance Requirement</u> Be able to understand current risk mitigation techniques and their strengths and weakness Be able to relate an organisation's risk management requirements with reference to standard methodologies and organisation's guidelines if applicable Be able to ▪ 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	<u>Performance Requirement</u> 6.1 Have knowledge about risk factors to be reviewed Be able to ▪ understand the risk factors identified ▪ understand the risk assessment review processes 6.2 Execute and monitor risk mitigation plans Be able to ▪ 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 6.3 Review risk factors related to IT with a high degree of expertise and professionalism Be able to ▪ 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 6.4 Execute and monitor risk mitigation plans with a high degree of expertise and professionalism Be able to ▪ 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	<u>Performance Requirement</u> 6.1 Understand change Be able to ▪ understand the importance and need for changes ▪ understand the implications of changes 6.2 Cope with changes positively Be able to ▪ 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 ▪ 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	6.1 Understand IT related resources 6.2 Find out the return of investment 6.3 Allocate and prioritize IT and related resources	<u>Performance Requirement</u> Be able to ▪ 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 Be able to ▪ 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 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
7. Assessment Criteria	The integrated requirements of this UoCs are the abilities to: (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 (ii) distribute the resources properly to each individual action plan for maximizing the return of investment under incomplete as well as inconsistent information.	
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	6.1 Have good knowledge of staff succession 6.2 Develop IT staff succession plans 6.3 Maintain IT staff succession plans 6.4 Maintain sufficient workforce in organisation	<u>Performance Requirement</u> Be able to ▪ understand the importance of staff management ▪ understand the phenomenon and implications of staff turnover ▪ understand the matching of skill set requirements to established post Be able to ▪ 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 Be able to ▪ 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 Be able to keep human resources at optimal level for best customer services
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	ITSWG617A	
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	6.1 Have good mastery on basic investment concepts 6.2 Establish business cases 6.3 Develop assessment criteria	<u>Performance Requirement</u> Be able to ▪ comprehend qualitative finance and investment concepts ▪ master basic quantitative finance techniques and ratios Be able to ▪ 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 Be able to ▪ 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	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	<u>Performance Requirement</u> 6.1 Have knowledge of SDLC and software development process Be able to ▪ 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 6.2 Apply the knowledge of SDLC and software development process in developing software for an organisation Be able to ▪ 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 6.3 Enhance effectiveness and efficiency in software development through the use of SDLC and software development process in an organisation Be able to ▪ 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	ITSWG620A	
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	Performance Requirement 6.1 Have knowledge of IT operations and IT processing Be able to ▪ 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 6.2 Apply the knowledge of IT operations and IT processing in the management of an organisation Be able to ▪ manage the activities involved in IT operations and IT processing ▪ make use of IT tools, if any, in the management of these activities 6.3 Enhance the effectiveness and efficiency of IT operations and IT processing in an organisation Be able to ▪ 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	Performance Requirement 6.1 Have knowledge of IT project management Be able to ▪ 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 6.2 Apply the knowledge of IT project management in managing IT projects for an organisation Be able to ▪ 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 6.3 Enhance the effectiveness and efficiency of IT project management in an organisation to meet its business goals and objectives Be able to ▪ 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 to meet its business goals and objectives	
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	ITSWG622A	
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	Performance Requirement 6.1 Have knowledge of organisational and project level quality assurance Be able to ▪ 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 6.2 Apply the knowledge of organisational and project level quality assurance for an organisation Be able to ▪ 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 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 Be able to ▪ 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	ITSWG623A	
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	6.1 Have knowledge of international standards in information security 6.2 Apply international standards in managing information security for an organisation 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	<u>Performance Requirement</u> Be able to ▪ 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 Be able to ▪ 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 Be able to ▪ 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 so as to meet the organisation's business goals and objectives
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	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	6.1 Understand the existing market ecological landscape and its competitive and regulatory forces 6.2 Identify new market and new customers 6.3 Capture market and competitor intelligence 6.4 Analyse and confirm collected intelligence with scientific proofs	<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 Be able to ▪ 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 Be able to establish connection to and network with relevant sources of market and competitor intelligence Be able to ▪ 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	ITSWG701A	
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	Performance Requirement Be able to ▪ 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 6.1 Apply appropriate knowledge and skills in leading and motivating team members to exercise their fullest capabilities and capacities 6.2 Lead and motivate a team with a high degree of expertise and professionalism to attain extraordinary goals and accomplish incredible task Be able to ▪ 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: ITSWG604A	

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

1. Title	Utilise the preset data visualisation dashboard/display tools for visual data representations.
2. Code	111151L4
3. Range	This UoC involves a good understanding of the basic functionalities of data visualisation dashboard/displays in order to obtain the key visual data representations and to generate business insights.
4. Level	4
5. Credit	6 (For Reference Only)
6. Competency	Performance Requirements 6.1 Understand the basic functionalities of data visualisation dashboard/displays ● Be able to: ■ understand the basic functionalities of data visualisation dashboard/displays ■ have knowledge of the operation of preset data visualisation dashboard/display ■ have knowledge of the business insights by using the preset data visualisation dashboard/display 6.2 Utilise the preset data visualisation dashboard/display tools for key visual data representation based on the required business insights ● Be able to: ■ utilise the preset data visualisation dashboard/display tools (such as Tableau, Power BI, Sisense, etc.) for key visual data representation 6.3 Manage and evaluate the preset data visualisation dashboard/display tools ● Be able to ■ manage and evaluate the visual representation result of the preset data visualisation dashboard/display tools based on the required business insights
7. Assessment Criteria	The integrated outcome requirement of this UoCs are the abilities to: ● understand the basic functionalities of data visualisation dashboard/displays ● utilise the preset data visualisation dashboard/display tools to obtain the key visual data representations based on the required business insights
8. Remark	

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

1. Title	Develop and perform data acquisition and collection processes and conduct pre-processing and exploratory data analysis
2. Code	111131L5
3. Range	This Uoc involves conducting data acquisition processes including hack/wrangle complex data, selecting appropriate techniques relevant to the problem. Utilising a range of data audit techniques and approaches for data quality assessment and data quality verification. Conducting data cleaning of noisy, incomplete data or data with data quality issues
4. Level	5
5. Credit	3 (For Reference Only)
6. Competency	Performance Requirements 6.1 Have knowledge of data acquisition and collection processes and pre-processing and exploratory data analysis ● Be able to: ■ have knowledge of data acquisition and collection processes (See Remark 1) ■ have knowledge of pre-processing and exploratory data analysis (See Remark 2) 6.2 Appraise and manage different data acquisition methods ● Be able to use appropriate methods to acquire data from internal or external sources 6.3 Conduct pre-processing and transformation of the data ● Be able to conduct pre-processing and transformation of the data to ensure that it is in the optimal format, layout or shape for the project purposes using feature engineering or exploratory data analysis 6.4 Conduct and review data quality processes ● Be able to conduct and review data quality assessment for missing values, duplicates, multiple sources and inconsistent formats
7. Assessment Criteria	The integrated outcome requirements of this UoC are the abilities to: ● have knowledge of data acquisition and collection processes and pre-processing and exploratory data analysis; and ● develop and perform data acquisition and collection processes and conduct pre-processing and exploratory data analysis to obtain the data being valid, accurately interpreted, and applicable to the desired contexts
8. Remark	1. Various Data Acquisition Methods are collecting new data; converting/transforming legacy data; sharing/exchanging data; and

	purchasing data. This includes automated collection (e.g., of sensor-derived data), the manual recording of empirical observations, and obtaining existing data from other sources. 2. Exploratory data analysis (EDA) is a term for certain kinds of initial analysis and findings done with data sets, usually early on in an analytical process. Pre-processing of the data will be performed by analysing the data either categorical or numerical, visualizing them and some statistical decision.

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

1. Title	Develop compliance framework for the meeting of ethical and regulatory requirements related to enterprise data
2. Code	111132L6
3. Range	This UoC involves developing a compliance framework for meeting ethical standards, local and international regulatory requirements for every stage in the enterprise data lifecycle (e.g. data ownership and data privacy) for an enterprise to achieve business objectives and goals.
4. Level	6
5. Credit	9 (For Reference Only)
6. Competency	Performance Requirements 6.1 Know the enterprise data ethical and regulatory requirements ● understand the types of data involved ● identify how legal, policy and/or ethical constraints might impact enterprise data ● explain how ethical, compliance, and legal issues should/must be considered in enterprise data ● Demonstrate awareness of personal privacy issues related to the collection and usage of enterprise data (See remark 1) 6.2 Develop the compliance framework ● evaluate some of the established ethical and legal issues in enterprise data faced by the organisation ● Create compliance framework that addresses the ethical and regulatory concerns about the enterprise data 6.3 Exhibit professionalism ● Be able to: ■ apply industry best practices to the develop compliance framework ■ 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 requirement of this UoC is the ability to identify data governance obligations, challenges, emerging legal and ethical data privacy, security best practices and uncertainties within a given context
8. Remark	1. To meet regulatory requirements and avoid fines by documenting the lineage of the data assets and the access controls related to the data

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

1. Title	Define data classification policy for enterprise
2. Code	111133L6
3. Range	This UoC involves defining the data classification policy for enterprises to achieve enhancement in data performance and utilisation based on identifiability, level of sensitivity, and criticality to the enterprise data.
4. Level	6
5. Credit	6 (For Reference Only)
6. Competency	Performance Requirements 6.1 Understand the data classification and types of data classification policies ● Have knowledge of: ■ data classification (See Remark 1) and various types of data classification policies (See Remark 2) ■ the key performance indexes of data performance and utilisation (See Remark 3) 6.2 Define the data classification policy for enterprise ● Be able to define and establish the data classification policy for enterprise to achieve enhancement in data performance and utilisation 6.3 Evaluate the data performance and utilisation ● Be able to evaluate the data performance and utilisation based on identifiability, level of sensitivity, and criticality to the enterprise data
7. Assessment Criteria	The integrated outcome requirement of this UoCs is the ability to define the data classification policy for enterprise to achieve enhancement in data performance and utilisation based on identifiability, level of sensitivity and criticality to the enterprise data
8. Remark	1. Data classification categorises data in a way that conveys the sensitivity of information with respect to the confidentiality, integrity, and availability. For example, the data can be categorised as sensitive, public, confidential or personal. 2. Data classification policy concerned with: - the management of information to ensure that sensitive information is handled with respect to the threat it poses to an organisation - how this gathered data is being used and structured within an organisation to allow authorised personnel to get the right pieces of information at the right time, view and access information 3. Data performance and utilisation should consider the identifiability, level of sensitivity and criticality to the enterprise data.

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

1. Title	Enforce enterprise data standards for business needs
2. Code	111134L6
3. Range	This UoC involves defining, maintaining and enforcing data standards for business needs with data privacy and security in information systems adapted for the organisation
4. Level	6
5. Credit	6 (For Reference Only)
6. Competency	Performance Requirements 6.1 Appraise the existing data standards and principles ● Be able to: ■ appraise the existing data standards and principles for modelling, metadata, security, reference data and master data 6.2 Defines the enterprise data standards and principles ● Be able to: ■ define the enterprise data standards and principles concerning the business requirements (See Remark 1) for modelling, metadata, security, reference data, master data, etc. throughout the data lifecycle (See Remark 2) 6.3 Review enterprise data standards and principles ● Be able to ■ review the enterprise data standards and principles such as data privacy policies, ethical and social issues, proactively complying with regulations, and allow easy collaboration with data professionals 6.4 Assign data quality responsibilities ● Be able to ■ assign data quality responsibilities in order to measure and follow up on data quality KPIs related to the general performance KPIs within the enterprise
7. Assessment Criteria	The integrated outcome requirement of this UoC is the ability to assign data quality responsibilities in order to measure and follow up on data quality KPIs related to the general performance KPIs within the enterprise
8. Remark	1. The business requirements include (but not limited to) ethical concerns, regulatory compliances, international and local standards, etc. 2. Data lifecycle includes (but not limited to) data ownerships, data custodians, data retention, data sharing, data archive and data disposal

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

1. Title	Understand the use of data concepts and topologies to design data topology suitable for an enterprise
2. Code	111135L6
3. Range	Understand the use of data concepts and typologies with data dimensions to read, work with and communicate about data by putting it in proper context throughout the data life cycle for any enterprise to be successful with any type of analytics.
4. Level	6
5. Credit	3 (For Reference Only)
6. Competency	Performance Requirements 6.1 Understand the use of data concepts and topologies with data dimensions under different categories ● Be able to: ■ understand the use of data concepts and topologies with data dimensions (See Remark 1) under different categories (See Remark 2) 6.2 Familiar with the flows of enterprise data ● Have knowledge of the data flow, such as in which parts of the organization will data be generated, which divisions require data to function, how data flows are managed, and how data changes in transition 6.3 Know the various layers of data ● Have knowledge of various data layers (See Remark 3) from raw statistics or snippets of unstructured data (for example, social media post) to actionable insight throughout the data lifecycle.
7. Assessment Criteria	● The integrated outcome requirement of this is the ability to have a properly designed data topology that is sustainable, future-proofing and resistant to the continuous changes that are associated with data characteristics (See Remark 4), providing the foundation for any enterprise to be successful with any type of analytics
8. Remark	1. The data topology is an approach for classifying and managing real-world data scenarios. There are three core elements of a data topology: - zone map - data flow - data layer 2. The data categories include (but not limited to): - discrete vs. continuous - structured vs. unstructured - number of dimensions 3. The data layers include data sources layer, data storage layer, data

	processing/analysis layer and data output layer. The data layers connects with the types of data management approach such as data warehousing or data lake, types of data acquisition options such as new data collection, data extraction or data-as-a-services 4. The data characteristics include volume, variety, velocity, veracity, and perception of the data's value

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

1. Title	Identify and evaluate the data sources to fulfil the data requirements in support of business objectives
2. Code	111136L6
3. Range	This UoC involves identifying the reliable and dependable data sources with respect to defined data policies, enterprise data standards or use cases in support of business objectives
4. Level	6
5. Credit	6 (For Reference Only)
6. Competency	Performance Requirements 6.1 Identify and understand the data sources and data requirements ● appreciate data requirements and issues of availability and accessibility ● understand the business objectives ● identify data requirements that are in support of business objectives ● identify data sources that aligned with the data requirements 6.2 Evaluate the data sources against the requirements ● establish the key required internal and external data sources as well as data availability and accessibility for data projects ● Utilise extensive knowledge of a range of data sources both internal and external to the organisation, including where and how they were collected from (See Remark 1), where and how they are stored, and their interrelationships, to verify the relevance of potential data sources 6.3 Exhibit professionalism ● Be able to: ■ apply industry best practices to identify and evaluate the data sources ■ 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 requirement of this UoC are the abilities to: ● manage the processes of data source identification in establishing the availability and accessibility of data from different sources to fulfil the data requirements in support of business objectives ● identify and evaluate data sources effectively
8. Remark	1. Customer data platforms are primarily focused on collecting and aggregating first-party data, but they can also store second and third party data as well

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

1. Title	Manage and implement different data acquisition options for the identified internal or external sources
2. Code	111137L6
3. Range	This UoC involves managing and implementing the different data acquisition options for the identified data sources (both internal and external). The options include collecting new data, converting/transforming legacy data, sharing/exchanging data and purchasing data through subscription or data-as-a-service solution
4. Level	6
5. Credit	6 (For Reference Only)
6. Competency	Performance Requirements 6.1 Know of different data acquisition options ● Have knowledge of the data description, various data acquisition and wrangling techniques (See Remark 1) ● Appraise and manage various data acquisition options 6.2 Manage and implement different data acquisition options ● Acquire data from all the identified internal and external sources (both structured or unstructured data) using different techniques, such as ETL batch processing, streaming ingestion, scrapers, APIs and crawlers ● Utilise various data wrangling techniques, such as parsing, and algorithms for complex and multi-source data ● Aware of the privacy and ethical implications of sourcing internal and external data 6.3 Exhibit professionalism ● Be able to: ■ apply industry best practices to manage and implement different data acquisition options ■ 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 requirement of this UoC is the ability to collect the appropriate and up-to-date data through various data acquisition and wrangling techniques to obtain the data being valid, accurately interpreted, and applicable to the desired contexts with respect to the identified data sources
8. Remark	1. Various data acquisition options (for first-party, second-party and third-party data) include (but not limited to) new data collection, legacy

	data transformation/conversion, data sharing/exchange, data subscription and/or data-as-a-service solution. This includes automated collection (e.g., of sensor-derived data), the manual recording of empirical observations, and obtaining existing data from other sources.

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

1. Title	Define and establish the data architectures
2. Code	111138L6
3. Range	Evaluate, define, and apply appropriate practices and methodologies to establish data architecture to support the defined data policies, standards and rules
4. Level	6
5. Credit	3 (For Reference Only)
6. Competency	Performance Requirements 6.1 Understand various data policies and architecture principles ● Be able to: ■ understand the data governance and relevant strategies throughout the data lifecycle ■ understand data policies for data ownership, data custody, data retention, data sharing (both internal and external), data archive and data disposal ■ understand data architecture framework, standards and principles for data modelling, metadata, data security, reference data, master data, etc. 6.2 Define data policies for different data assets ● Be able to: ■ understand the data governance and define the data policies for the organisation based on the business objectives ■ define data architecture framework for different data assets to align with the standards, practices, and regulatory requirements on the use of data in the organisation and the business environment 6.3 Define architecture principles ● Be able to: ■ understand the data governance and define architecture principles (See Remark 1) for different data assets to align with their data management requirements and policies
7. Assessment Criteria	The integrated outcome requirement of this UoC is the ability to define data policies and architecture principles for an organisation's data assets for considering the industrial standards and regulatory requirements
8. Remark	1. Architecture principles include (but not limited to) how data should be identified, requested, organised, accessed, processed/analysed, presented, etc. [This UoC replaced ITSWAR610A "Define and establish a data architectures"]

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	111139L6
3. Range	This UoC involves reviewing the 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 the data policies of the organisation
4. Level	6
5. Credit	6 (For Reference Only)
6. Competency	Performance Requirements 6.1 Understand various architecture viewpoints supported by different data architecture artefacts in terms of various data categories or data classification (See Remark 1) ● Be able to: ■ understand how various architecture viewpoints can be used to address the needs of different stakeholders, e.g. managers, software developers and the information requirements, meeting the data policies of the organisation ■ understand the advantages and disadvantages of different architecture viewpoints in representing data assets (See Remark 2) 6.2 Baseline the existing data assets ● Be able to: ■ 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 ● Be able to ■ 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 the selection of architectural viewpoints 6.4 Develop mappings between existing data assets and the target data architecture ● Be able to ■ 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 6.5 Perform gap analysis between existing data assets and the target data architecture ● Be able to ■ 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
7. Assessment Criteria	The integrated outcome requirement of this UoC are the abilities to: ● develop mappings between existing data assets and the target data architecture; and ● perform gap analysis between existing data assets and the target data architecture to assure that the target data architecture can meet the business requirements
8. Remark	1. For example, one of the data categories refers to structure data, semi-structured data or unstructured data. And the data classification refers to public data, personal data, sensitive data or confidential data 2. Different architecture viewpoints are supported by different types of artefacts. For example, - business process models (e.g. flowcharts, UML activity diagrams) provide the viewpoints to understand how data is flowed between business processes; - conceptual and logical models present the structures and relationships of data entities; and - Multilayered architecture is used for different data categories and/or data classifications - Data dictionaries list and specific data entities in a table format, e.g. spreadsheet [This UoC replaced ITSWAR612A "Check usability of a target data architecture"]

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

1. Title	Conduct and review pre-processing and transformation of the data with data quality assessment
2. Code	111140L6
3. Range	This Uoc involves conducting pre-processing and transformation of the data and review data quality to ensure that it is in the optimal format, layout or shape for the project purposes using feature engineering, exploratory data analysis and a range of data audit techniques and approaches
4. Level	6
5. Credit	6 (For Reference Only)
6. Competency	Performance Requirements 6.1 Have knowledge of pre-processing and exploratory data analysis (See Remark 1) 6.2 Appraise and manage pre-processing and transformation of the data to ensure that it is in the optimal format, layout or shape for the project purposes, i.e., feature engineering 6.3 Conduct exploratory data analysis to perform initial investigations on data so as to discover patterns, to spot anomalies, to test hypothesis and to check assumptions with the help of summary statistics and graphical representations 6.4 Conduct data quality assessment with extensive knowledge of the data, potential issues such as missing values, duplicates and inconsistent formats, and the implications for the data science/analytics process
7. Assessment Criteria	The integrated outcome requirement of this UoCs are the abilities to have relevant knowledge and conduct the appropriate pre-processing, exploratory data analysis and data quality assessment to ensure the data in the optimal format and perform initial investigation on data quality (See Remark 2)
8. Remark	1. Preprocessing of the data will be performed by analysing the data either categorical or numerical, visualizing them and some statistical decision. Exploratory data analysis (EDA) is a term for certain kinds of initial analysis and findings done with data sets, usually early on in an analytical process. 2. Data should be valid, accurately interpreted, and applicable to the desired contexts

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

1. Title	Appraise and select the appropriate data management tools, services and/or platforms to manage the target data based on different requirements
2. Code	111141L6
3. Range	Appraise different data management tools/services/platforms in the existing market and select the appropriate data management tools/services/platforms to manage the target data based on different requirements including capacity, performance, reliability, recoverability, discovery scheme, security, etc.
4. Level	6
5. Credit	3 (For Reference Only)
6. Competency	Performance Requirements 6.1 Understand the practices of data management throughout its lifetime through the internal (and external) data streams of an enterprise ● Be able to: ■ understand the data management being a comprehensive set of concepts, procedures, practices, processes, and a number of systems that allow for an organization to gain control of the data assets ■ know the data operations covered in data management (See Remark 1) ■ know the requirements of using different data management tools/services/platforms (See Remark 2) 6.2 Appraise various data management tools and services in the existing market ● Be able to: ■ appraise various data management tools/services/platforms (See Remark 3) in the existing market based on different knowledge areas (See Remark 4) 6.3 Select the appropriate data management tools/services/platforms to manage the target data based on different requirements ● Be able to ■ select the appropriate data management tools/services/platforms to manage the target data based on different requirements 6.4 Perform supplier management of data management tools/services/platforms ● Be able to ■ perform supplier management of the data management tools/services/platforms to ensure the right suppliers are

	chosen to meet the data objectives 6.5 Assess the target data management tools/services/platforms ● Be able to ■ assess the target data management tools/services/platforms for the data management effectiveness and maturity
7. Assessment Criteria	The integrated outcome requirement of this UoC is the ability to know the practices of data management and select the appropriate data management tools/services/platforms to manage the target data. While at the same time achieving high availability and disaster recovery, securing data, providing privacy, and following compliance requirements, etc.
8. Remark	1. Data management covers the following operations (but not limited to): - create, access, and update data across diverse data tiers - store data across clouds and on-premise - use data across applications, analytics, and algorithms - provide high-availability and disaster recovery - secure data and provide privacy - archive and destroy data based on retention rules and compliance requirements. 2. The requirements of using different data management tools and services include (but not limited to) capacity, performance, reliability, recoverability, discovery scheme, security, etc. 3. There are various popular data management tools/services/platforms in the existing market, i.e., Oracle Data Management Suite, SAP Data Management, IBM Infosphere Master Data Management Server, Microsoft Master Data Services, Talend, Tableau, Amazon Web Services - Data Lakes and Analytics, Google Cloud - Big Data Analytics, etc. 4. Knowledge areas found in Data Management: - Open source data management - Data architecture and data model design software - Master and reference data management - Database management - Data storage and operations: data warehousing and data lake - Document collection and analysis - Metadata management - Data quality management - Data analysis - Data security and protection

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

1. Title	Design customised data management tools and services to manage the target data for an organisation
2. Code	111142L6
3. Range	This Uoc involves designing and developing data management tools and services that are not available from the existing markets to manage the target data based on different requirements including capacity, performance, reliability, recoverability, discovery scheme, etc.
4. Level	6
5. Credit	6 (For Reference Only)
6. Competency	Performance Requirements 6.1 Understand the practices of data management throughout its lifetime through the internal (and external) data streams of an enterprise ● know the data management being a comprehensive set of concepts, procedures, practices, processes, and a number of systems that allow for an organization to gain control of the data assets ● know the data operations covered in data management (See Remark 1) ● know the requirements of using different data management tools/services/platforms (See Remark 2) ● know the differences among in-house, outsourced and hybrid development of data management tools/services/platforms 6.2 Design and develop the right data management tools/services/platforms to fill the gap between the data management requirements and the data management tools/services/platforms from existing markets ● select the appropriate design and development tools/environments for building the targeted data management tools/services/platform ● design and develop the right data management tools/services/platforms to fill the gap between the data management requirements and the outsourced data management tools/services/platforms from existing markets ● test the developed data management tools/services/platforms 6.3 Evaluate the developed data management tools/services/platforms with the integration of existing ones based on the use of the data
7. Assessment Criteria	The integrated outcome requirement of this UoCs are the abilities to: ● design and develop the right data management tools and services that are not available from the existing markets to perform the necessary data management processes to meet the data requirements for the organisation

	● evaluate the developed data management tools/services/platforms with the integration of existing ones based on the data objectives
8. Remark	1. Data management covers the following operations (but not limited to): - create, access, and update data across diverse data tiers - store data across clouds and on-premise - use data across applications, analytics, and algorithms - provide high-availability and disaster recovery - secure data and provide privacy - archive and destroy data based on retention rules and compliance requirements. 2. The requirements of using different data management tools and services include (but not limited to) capacity, performance, reliability, recoverability, discovery scheme, security, etc.

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

1. Title	Perform the overall data management processes from the in-house, outsourced or hybrid tools/services/platforms using the identified tools.
2. Code	111143L6
3. Range	This UoC involves performing the overall data management processes (such as extraction, transformation, load, storage, disposal, etc.) using the identified tools to manage the data across diverse data tier and data retrieval processes in a growing variety of data usages.
4. Level	6
5. Credit	9 (For Reference Only)
6. Competency	Performance Requirements 6.1 Know the data management process ● understand the different processes need to carry out the task ● assess and identify the best tools for each process ● understand the complexity of tools/services/platforms that are involved ● identify the data tier involved and potential problems that could arise 6.2 Perform the overall data management processes ● create, access and update the data across a diverse data tier and data retrieval processes in a growing variety of apps, analytics, and algorithms ● manage the storage of data across multiple / distributed data stores (See Remark 1) ● perform the relevant tasks of archiving and destroying the data in accordance with retention schedules and compliance requirements ● manage the infrastructures and environments of performing the data management processes for both in-house and outsourced data management tools/services/platforms ● review the overall data management tools/services/platforms for the data management effectiveness and maturity 6.3 Exhibit professionalism ● Be able to: ■ apply industry best practices to perform the data management processes ■ comply with the organisation's guidelines and procedures as well as any (local and international) laws and regulatory requirements, if applicable
7. Assessment	The integrated outcome requirement of this UoC are the abilities to:

Criteria	● perform the overall data management processes from the in-house, outsourced or hybrid tools/services/platforms to meet the requirements of effectiveness, maturity, compliances, etc. in a growing variety of data usages ● review the overall data management tools/services/platforms for the data management effectiveness and maturity
8. Remark	1. Data storage platforms include (but not limited to) database server, data warehouse, data lake, etc.

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

1. Title	Appraise, select and integrate the appropriate data analytics and/or modelling solutions to perform the data analytics process based on different requirements
2. Code	111144L6
3. Range	Appraise different data analytics solutions and/or modelling tools in the existing market and select the appropriate data analytics solutions and/or modelling tools to perform the data analytics process with handling bigger and more complex data, getting more precise results, having faster responses, etc.
4. Level	6
5. Credit	6 (For Reference Only)
6. Competency	Performance Requirements 6.1 Understand the practices of data analytics solutions and/or modelling tools throughout its lifetime through the internal (and external) data streams of an enterprise ● Be able to: ■ understand the data analytics and data model being a comprehensive set of concepts, procedures, practices, processes, and a number of systems that allow for an organization to analyse the data ■ aware of a wide range of core data science/analytics techniques, their advantages, disadvantages and areas of application in different dimensions (See Remark 1) ■ aware of the necessity of the data analytics and data models, relevant objectives, time and resource requirements 6.2 Appraise various data analytics solutions and/or modelling tools in existing market ● Be able to: ■ appraise various data analytics solutions and/or modelling tools (See Remark 2) in the existing market based on different analytics capabilities (See Remark 3) 6.3 Select the right data analytics solutions and/or modelling tools ● Be able to ■ select the right data analytics solutions and/or modelling tools with different analytics capabilities based on different business values 6.4 Perform supplier management of data analytics solutions and/or modelling tools ● Be able to ■ perform supplier management of the data analytics solutions

	and/or modelling tools to ensure the right suppliers are chosen to meet the analytics capabilities based on different business values 6.5 Assess the target data analytics solutions and/or modelling tools ● Be able to ■ assess the target data analytics solutions and/or modelling tools for the data analytics effectiveness and maturity
7. Assessment Criteria	The integrated outcome requirement of this UoCs are the abilities to: ● have knowledge of the practices of data analytics/models ● select the appropriate data analytics solutions and/or modelling tools to perform the analytic processes to meet the requirements with different analytics capabilities based on different business values
8. Remark	1. Data dimensions: - traditional vs. emerging data - structured vs. unstructured data 2. There are various popular data analytics solutions and/or modelling tools in the existing market, i.e., Apache Spark, Apache Storm, PIG and HIVE, SAS, Tableau, Microsoft Power BI, SAP BusinessObjects, Google Data Studio, IBM Cognos, Oracle Analytics Cloud, Amazon Web Services (Analytics), etc. 3. Different analytics capabilities (with algorithms and modelling techniques) includes (but not limited to): - discover relationships between variables (regression) - discover relationships over time (time series analysis) - distinguish between noise and meaningful information (signal analysis) - discover meaningful groupings of data points (cluster analysis) - experiment to find the most effective variation of a website, product, etc. (A/B/N Testing) - organize data points into known categories (classification) - experiment with a system virtually (simulation modelling) - extract geographic or topological information (spatial analysis) - use data to forecast or infer behaviour (predictive modelling) - combine data sources to recognize events (complex event processing) - extract consumer reactions based on social media behaviour (sentiment analysis) - discover meaningful nodes and relationships on networks (network analysis) - improve a process or function based on criteria (optimization) - find answers to human questions using artificial intelligence (deep question answering) - extract meaning from human speech or writing (natural language processing)

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

1. Title	Build the analytics solutions/models to support better business decisions and improve performance
2. Code	111145L6
3. Range	This UoC involves building and managing the data analytics solutions/models using identified data analytics tools and/or modelling tools/processes with precise and faster results to support better business decisions and improve performance
4. Level	6
5. Credit	6 (For Reference Only)
6. Competency	Performance Requirements 6.1 Understand the practices of data analytics solutions/models, data analytics tools and/or modelling tools throughout its lifetime through the internal (and external) data streams of an enterprise ● Be able to: ■ understand the data analytics solutions/models and relevant data analytics tools and/or modelling tools/processes being a comprehensive set of concepts, procedures, practices, processes, and a number of systems that allow for an organization to analyse the data ■ aware of a wide range of core data science/analytics techniques (See Remark 1), their advantages, disadvantages and areas of application in different dimensions (See Remark 2) ■ aware of the necessity of the data analytics solutions and data models, relevant objectives, time and resource requirements 6.2 Build the right data analytics solutions/models/processes based on the data analytics requirements ● Be able to: ■ design and build the right data analytics solutions/models/processes using identified analytics tools and/or modelling tools from existing markets based on requirements ■ test the developed data analytics solutions/models/processes 6.3 Evaluate the developed data analytics solutions/models/processes ● Be able to: ■ evaluate the developed data analytics solutions/models/processes based on the data objectives
7. Assessment Criteria	The integrated outcome requirement of this UoC is the ability to design and build right data analytics solutions/model/processes using identified data analytics tools and/or modelling tools with obtaining precise and

	faster results to support better business decisions and performances of organisation
8. Remark	1. The analytics techniques include (but not limited to) statistical methods, data mining methods, machine learning, deep learning, reinforcement learning, artificial intelligence 2. Data dimensions: - traditional vs. emerging data - structured vs. unstructured data

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

1. Title	Perform model training, testing and validation in evaluating and optimising the model based on various metrics
2. Code	111146L6
3. Range	This UoC involves performing model training, testing and validation to evaluate the model by modifying the parameters based on various metrics to obtain an appropriate and/or optimised model
4. Level	6
5. Credit	6 (For Reference Only)
6. Competency	Performance Requirements 6.1 Understand the needs of model training, testing and validation ● Be able to: ■ have knowledge of model training, testing and validation ■ have knowledge of various evaluation methods and tools to evaluate the model based on various metrics (See Remark 1) 6.2 Create a model evaluation plan to test model quality and validity ● Be able to: ■ create model evaluation plan with procedures or mechanisms to test model quality and validity by using separate data set in train, validation sets and test sets based on various metrics 6.3 Perform model training, testing and validation and evaluate the model ● Be able to: ■ perform model training, testing, validation and evaluation by modifying the parameters based on the model evaluation plan to obtain an appropriate and/or optimised model
7. Assessment Criteria	The integrated outcome requirement of this UoC are the abilities to: ● have knowledge of model training, testing and validation, create the model evaluation plan based on various metrics ● perform model training, testing and validation to evaluate the model by modifying the parameters based on model evaluation plan to obtain an appropriate and/or optimised model with appropriate model quality and validity
8. Remark	1. The evaluation metrics include (but not limited to) performance, fairness, explainability, robustness, safety, etc.

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Software Products and Software Services (SW) branch
Unit of Competencies

1. Title	Design customised analytics and modeling tools for an organisation
2. Code	111147L6
3. Range	This UoC involves designing and developing the customised data analytics solutions and/or modelling tools (if ready-made solutions/tools are not sufficient) by applying different technologies (such as ML and AI techniques) for an organisation.
4. Level	6
5. Credit	3 (For Reference Only)
6. Competency	Performance Requirements 6.1 Understand the practices of data analytics processes, data analytics solutions and/or modelling tools throughout its lifetime through the internal (and external) data streams of an enterprise ● know the data analytics solutions and/or modelling tools/processes being a comprehensive set of concepts, procedures, practices, processes, and a number of systems that allow for an organization to analyse the data ● know a wide range of core data science/analytics techniques, their advantages, disadvantages and areas of application in different dimensions (See Remark 1) ● know different analytics technologies (See Remark 2) ● know the necessity of the data analytics and data models, relevant objectives, time and resource requirements 6.2 Plan and develop the right data analytics solutions and/or modelling tools/processes to fill the gap between the data analytics/models requirements and the data analytics solutions and/or modelling tools/processes from existing markets ● select the appropriate design and development programming tools, languages and environments (See Remark 3) for building the targeted data analytics solutions and/or modelling tools/processes ● design and develop the right data analytics solutions and/or modelling tools/processes to fill the gap between the data analytics/models requirements and the outsourced data analytics solutions and/or modelling tools/processes from existing markets ● test the developed data analytics solutions and/or modelling tools/processes 6.3 Evaluate the developed data analytics solutions and/or modelling tools/processes with the integration of existing ones based on the data objectives
7. Assessment	The integrated outcome requirement of this UoC are the abilities to:

Criteria	● design and develop the right data analytics solutions and data model using the right data analytics solutions and/or modelling tools/processes which are not available from the existing markets in order to meet the data requirements for the organisation ● Evaluate the developed data analytics solutions and/or modelling tools/processes with the integration of existing ones based on the data objectives
8. Remark	1. Data dimensions: - traditional vs. emerging data - structured vs. unstructured data 2. The analytics technologies include (but not limited to) statistical methods, data mining methods, machine learning, deep learning, reinforcement learning through various AI techniques 3. The programming languages/platforms include (but not limited to) R, Python, Anaconda, IDLE, Jupyter Notebook, Spyder, etc.

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

1. Title	Understand the use of data visualisation and the factors in selecting and using various data visualisation tools
2. Code	111148L6
3. Range	This UoC involves understanding the use of data visualisation and the factors (such as the usage, user habits and user expectations) of selecting and using data visualisation tools to provide an accessible way to see and understand trends, outliers, and patterns in business data
4. Level	6
5. Credit	3 (For Reference Only)
6. Competency	Performance Requirements 6.1 Understand the use of data visualisation and various visualisation tools ● Be able to: ■ have knowledge of data visualisation and use of data visualisation through the exploration and explanation to benefit from making enterprise data more understandable 6.2 Have knowledge of various data visualisation tools ● Be able to: ■ have knowledge of various visualisation tools with different data visualisation types (See Remark 1) for different functions (See Remark 2) and purposes (See Remark 3) 6.3 Have knowledge of evaluating the visual representation with the targeted visualization tools ● Be able to ■ evaluate the visual representation with the targeted visualization tools with the various requirements (See Remark 4)
7. Assessment Criteria	The integrated outcome requirement of this UoC are the abilities to: ● have knowledge of data visualisation and the factors of selecting the right data visualisation tools ● use identified data visualisation tools to provide an accessible way to see and understand trends, outliers, and patterns in business data
8. Remark	1. Different types of visualisation tools include (but not limited to) "Graphs/Plots", "Diagrams", "Tables", "Maps/Geographical", "Others" 2. Different functions of visualisation tools include (but not limited to) "Comparisons", "Proportions", "Relationships", "Hierarchy", "Concepts", "Location", "Part-to-a-whole", "Distribution", "How things work", "Processes and methods", "Movement or flow", "Patterns", "Range", "Data over time", "Analysing text", "Reference tool", "Network"

	3. Different functions of visualisation tools include (but not limited to) dashboards, annual reports, sales and marketing materials, investor slide decks, and virtually anywhere else information needs to be interpreted immediately 4. Different requirements of visualisation tools include (but not limited to) ease of use, ability to handle huge sets of data, ability to output an array of different chart, graph, and map types, cost effectiveness

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Software Products and Software Services (SW) branch
Unit of Competencies

1. Title	Appraise the various data visualisation tools and select the appropriate tools according to user requirements
2. Code	111149L6
3. Range	Appraise different data visualisation tools in the existing market and select the appropriate data visualisation tools to grasp difficult concepts or identify new patterns interactively
4. Level	6
5. Credit	3 (For Reference Only)
6. Competency	Performance Requirements 6.1 Have knowledge of various data visualisation and various visualisation tools in the existing market ● Be able to: ■ have knowledge of data visualisation and various visualisation tools (See Remark 1) in the existing market 6.2 Appraise the data visualisation tools in existing market to the business needs ● Be able to: ■ appraise the data visualisation tools in the existing market to the data requirements for the business needs 6.3 Select and use the right data visualisation tools ● Be able to: ■ select the right data visualisation tools to provide an accessible way to see and understand trends, outliers, and patterns in business data ■ use the visualisation tools to create visual representations of large data sets based on various factors such as the usage, user habits and user expectations 6.3 Develop the automated process of creating visual representations ● Be able to ■ develop the automated process of creating visual representation for key analytics results 6.4 Evaluate the visual representation with the targeted visualization tools ● Be able to ■ evaluate the visual representation with the targeted visualization tools with the various requirements (See Remark 5)
7. Assessment Criteria	The integrated outcome requirement of this UoC are the abilities to: ● have knowledge of data visualisation and the factors of selecting the right data visualisation tools ● use the identified data visualisation tools to provide an accessible

	way to see and understand trends, outliers, and patterns in business data
8. Remark	1. Different visualisation tools in existing market include (but not limited to) Tableau, Infogram, Looker, Zoho Analytics, Sisense, IBM Cognos Analytics, Microsoft Power BI, SAP Analytics Cloud,

Information and Communications Technology Industry Training Advisory Committee
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Unit of Competencies

1. Title	Design customised data visualisation tools based on the business requirements
2. Code	111150L6
3. Range	This UoC involves designing customised data visualisation tools (if ready-made solutions/tools are not enough) based on the final business purpose (such as, what data for visualization? what decision to be made?) of the organisation.
4. Level	6
5. Credit	3 (For Reference Only)
6. Competency	Performance Requirements 6.1 Understand the practices of data visualisation processes, customised data visualisation tools throughout its lifetime through the internal (and external) data streams of an enterprise ● know the data visualisation being a comprehensive set of concepts, procedures, practices, processes, and a number of systems that allow for an organization to give the business insight through the visual data representations ● know a wide range of core data visualisation techniques, their advantages, disadvantages and areas of application in different dimensions (See Remark 1) ● know different development technologies for data visualisation (See Remark 2) ● know the necessity of the visual data representations, data visualisation tools, relevant objectives, time and resource requirements 6.2 Plan and develop the right customised data visualisation tools to fill the gap between the data visualisation requirements and the data visualisation tools from existing markets ● select the appropriate design tools, programming language and environment and development packages/libraries (See Remark 3) for building the customised data visualisation tools ● design and develop the right customised data visualisation tools to fill the gap between the data visualisation requirements and the outsourced data visualisation tools from existing markets ● test the customised data visualisation tools 6.3 Evaluate the developed customised data visualisation tools with the integration of existing ones based on the required business insights
7. Assessment Criteria	The integrated outcome requirement of this UoC are the abilities to: ● design and develop right visual data representations using right customised data visualisation tools which are not available from the existing markets in order to meet the required business

	insights for the organisation ● evaluate the developed customised data visualisation tools with the integration of existing ones based on the required business insights.
8. Remark	1. Data dimensions: - traditional vs. emerging data - structured vs. unstructured data 2. The development technologies for data visualisation include (but not limited to) computer graphics, UX design, ergonomic design, statistical knowledge, programming, etc. 3. The design tools include (but not limited to) Spyder (Python), Jupyter Notebook (Python), RStudio (R). The programming language and environment include (but not limited to) R (data analysis), Python (data analysis), javascript (web), Java (general), C++ (general), etc. The development packages/libraries include (but not limited to) Matplotlib (Python), Ggplot (Python)/Ggplot2 (R), Leaflet (R, Javascript), D3.js (Javascript), Chart.js (Javascript), Google Chart Tools (API), Microsoft Power BI (API)

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Software Products and Software Services (SW) branch
Unit of Competencies

1. Title	Develop clear and actionable recommendations based on the analysis results to the stakeholders for decision support
2. Code	111152L6
3. Range	This UoC involves developing the clear actionable recommendations and decision supports based on complex or multiple data analytics output to identify long-term trends with the potential to impact business outcomes
4. Level	6
5. Credit	3 (For Reference Only)
6. Competency	Performance Requirements 6.1 Utilise extensive knowledge of the organisation context and strategies, the data analytics capability and extensive experience in the practical application of outputs/models 6.2 Identifies trends and patterns in complex data sets and the implications for the organisation 6.3 Develop actionable insights and decision making supports based on complex or multiple data science/analytics outputs 6.4 Utilise organisational and data science/analytics knowledge to identify long-term trends with the potential to impact operational outcomes
7. Assessment Criteria	The integrated outcome requirement of this UoC is the ability to develop clear actionable recommendations and useful decision supports based on complex or multiple data analytics output to identify long-term trends with the potential to impact business outcomes
8. Remark	

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Software Products and Software Services (SW) branch
Unit of Competencies

1. Title	Keep awareness towards autonomous decision making process on the impact of business
2. Code	111153L6
3. Range	Keep awareness of various issues towards the autonomous decision-making process on the impact of business. Identify the technologies used in the autonomous decision-making process and appraise the relevant ethical challenges. For example, AI is one of the technologies widely used. The relevant ethical challenges include lack of transparency of AI tools, neutrality issues, new concerns for fairness and risk for human rights and other fundamental values
4. Level	6
5. Credit	3 (For Reference Only)
6. Competency	Performance Requirements 6.1 Keep awareness of various issues (See Remark 1) towards autonomous decision making process 6.2 Identify the technologies for system design and analytics tools used in the autonomous decision making process 6.3 Appraise the relevant ethical challenges (See Remark 2) for autonomous systems
7. Assessment Criteria	The integrated outcome requirement of this UoC is the ability to keep awareness on the feasibility of using autonomous systems in business operations in a responsive and trustworthy fashion
8. Remark	1. The issues include (but not limited to) trends, applicability, insight, etc. 2. For example, AI is one of the technologies widely used. The relevant ethical challenges include lack of transparency of AI tools, neutrality issues, new concerns for fairness and risk for human rights and other fundamental values

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Software Products and Software Services (SW) branch
Unit of Competencies

1. Title	Perform and evaluate the autonomous decision making process
2. Code	111154L6
3. Range	This UoC involves performing the autonomous decision-making process with various approaches (such as AI and data mining) to identify significant patterns, and make probabilistic predictions for business intelligence. Various evaluation methods are used to evaluate the autonomous decision-making process
4. Level	6
5. Credit	6 (For Reference Only)
6. Competency	Performance Requirements 6.1 Understand the fundamental aspects of autonomy (See Remark 1), classification for autonomy levels and complexity issues of autonomous system design (See Remark 2) 6.2 Develop the autonomous decision-making process with various technologies (See Remark 3) to identify significant patterns and make probabilistic predictions for business intelligence 6.3 Familiar with various evaluation methods for the autonomous system, including ontology & phenomenology-based method and cognitive & computational-based methods
7. Assessment Criteria	The integrated outcome requirement of this UoC is the ability to develop and perform the autonomous decision making process to obtain significant patterns and probabilistic predictions with trustworthiness and reliability for business intelligence
8. Remark	1. Fundamental aspects of autonomy include (but not limited to) perception, refection, goal management, planning and self-adaptation. 2. Complexity issues of autonomous system design: degree of trustworthiness, autonomic complexity, design complexity and implementation complexity 3. The technologies include (but not limited to) statistical machine learning, computer vision, natural language processing, knowledge retrieval and reasoning, formal methods of planning, etc

新舊能力單元對照表

Specification of Competency Standards (Version 2) 能力標準說明(第二版)					Specification of Competency Standards (Version 1) 能力標準說明(第一版)			
Specification of Competency Standards (SCS) 能力標準說明	Functional Area 職能範疇	UoC Code 能力單元編號	UoC Title	能力單元名稱	UoC Code 能力單元編號	UoC Title	能力單元名稱	Remarks
Communications and Information Services 通訊與訊息服務	Network Infrastructure and Operation 網絡基建及營運	111429L4	Implementing monitoring equipment to monitor infrastructure failure and security breaches	實施設備監控，以監控基建故障和安全性漏洞	ITCSNO431A	Implementing monitoring equipment to monitor infrastructure failure and security breaches	實施監控設備，以監控基建故障和安全性漏洞	Replacement of UoC 取代能力單元
		111430L4	Develop a plan to monitor network infrastructure performance	管理網絡基礎設施性能	108058L3 ITCSNO418A	Monitor performance of digital media infrastructure Analysing performance reports	監控數碼媒體基建性能 分析效能報告	Replacement of UoC 取代能力單元
		111106L3	Perform installation, configuration and testing of network equipment and devices	進行網絡設備的安裝，配置和測試	ITCSNO306A	Perform installation, configuration and testing of network equipment	進行網絡設備的安裝，配置和測試	Replacement of UoC 取代能力單元
		111107L4	Perform network testing	進行網絡測試	ITCSNO424A	Perform network testing	進行網絡測試	Replacement of UoC 取代能力單元
Digital Media Technology 數碼媒體科技	DMT Architecture 數碼媒體科技架構	111108L6	Develop digital content delivery network strategy	開發數碼內容傳遞網絡策略	108052L6	Develop content delivery network strategy for digital media business	為數碼媒體業務開發內容傳遞網絡策略	Replacement of UoC 取代能力單元
	Marketing Management 營銷管理	111109L7	Formulate digital marketing strategy	制定數碼營銷策略	107914L7	Formulate digital marketing strategy	制定數碼營銷策略	Replacement of UoC 取代能力單元
		111110L6	Formulate digital marketing strategy for Mainland China	制定在中國內地使用的數碼營銷策略	108027L6	Formulate digital marketing strategy for Mainland China	制定在中國內地使用的數碼營銷策略	Replacement of UoC 取代能力單元
	Operational Management 營運管理	111115L4	Create motion graphics	創作動態圖形	107944L4	Create motion graphics	創作動態圖形	Replacement of UoC 取代能力單元
		111119L3	Prepare for live video and audio capture	準備實時視頻和音頻擷取	107970L3	Prepare for digital video capture	準備數碼視訊擷取	Replacement of UoC 取代能力單元
Operation and Support 營運與支援	System & Hardware 系統與硬件支援	111122L2	Record problem/fault reports	記錄問題/錯誤報告	ITCSNO207A	Record problem/fault reports	記錄問題/錯誤報告	Replacement of UoC 取代能力單元
Software Products and Software Services 軟件產品及軟件服務	Architecture 軟件架構	111123L6	Define data governance policies and architecture principles	訂定資料管理政策和架構原則	ITSWAR608A	Define data manage policies and architecture principles	訂定資料管理政策和架構原則	Replacement of UoC 取代能力單元
		111124L6	Develop application integration architecture	發展應用系統綜合架構模式	ITSWAR617A ITSWAR618A	Recommend application integration architecture models Develop application integration architecture resources	推薦應用系統綜合架構模式 發展應用系統綜合架構模式的資源	Replacement of UoC 取代能力單元

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Specification of Competency Standards (SCS) 能力標準說明	Functional Area 職能範疇	UoC Code 能力單元編號	UoC Title	能力單元名稱	UoC Code 能力單元編號	UoC Title	能力單元名稱	Remarks
Software Products and Software Services 軟件產品及軟件服務	Architecture 軟件架構	111125L6	Review, design and re-engineer business processes to form a new business architecture	檢討、設計及重整業務程序以建立新的商業架構	ITSWAR607A	Review, design and re-engineer business processes to form a new business architecture	檢討、設計及重整業務程序以建立新的商業架構	Replacement of UoC 取代能力單元
		111126L6	Determine technology mix for the design and development of embedded software systems	確定嵌入式軟件系統的設計和發展的技術組合	ITSWAR620A	Determine technology mix for the design and development of embedded software systems	確定嵌入式軟件系統的設計和發展的技術組合	Replacement of UoC 取代能力單元
		111127L5	Define metrics to ensure that a technology architecture meets the business goals	訂定度量指標，確保技術架構符合企業目標	ITSWAR508A	Define metrics to ensure that a technology architecture meets the business goals	訂定度量指標，確保技術架構符合企業目標	Replacement of UoC 取代能力單元
		111129L5	Model technology architecture	塑造技術架構	ITSWAR507A	Model technology architecture	塑造技術架構	Replacement of UoC 取代能力單元
	Data Science 數據科學	111138L6	Define and establish the data architectures	訂定和建立資料架構	ITSWAR610A	Define and establish a data architectures	訂定和建立資料架構	Replacement of UoC 取代能力單元
		111139L6	Check usability of a target data architecture	檢查目標資料架構的實用性	ITSWAR612A	Check usability of a target data architecture	檢查目標資料架構的實用性	Replacement of UoC 取代能力單元
	Design, Development & Maintenance 設計、開發與維護	111155L6	Define a system migration plan	訂定系統遷移計劃	ITSWDM611A	Define a software deployment / migration plan	訂定軟件部署/遷移計劃	Replacement of UoC 取代能力單元
		111157L6	Perform risk assessment on system migration	執行系統遷移的風險評估	ITSWDM610A	Perform risk assessment on software deployment and migration	執行軟件部署和遷移的風險評估	Replacement of UoC 取代能力單元
		111159L4	Verify and validate that the deployed / migrated software and the existing software are functioning properly	核實和確認部署/遷移的軟件和現有的軟件的正常運作	ITSWDM405A	Verify and validate that the deployed/migrated software and the existing software are functioning properly in the context of deploying and migrating software	核實和確認部署/遷移的軟件和現有的軟件的正常運作	Replacement of UoC 取代能力單元
		111160L4	Perform system testing against user, technical and hosting requirements	針對用戶、技術和託管要求執行系統測試	ITSWDM401A	Perform testing activities to facilitate different levels of testing	執行測試活動，促進不同程度的測試	Replacement of UoC 取代能力單元
	Generic Skills 通用技能	111161L5	Acquire and protect the copyrights and IP rights related to IT	獲取和保修與資訊科技有關的版權和知識產權	ITSWG523A	Acquire and protect the copyrights and IP rights related to IT	獲取和保修與資訊科技有關的版權和知識產權	Replacement of UoC 取代能力單元

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Software Products and Software Services 軟件產品及軟件服務	Information Security 資訊保安	111164L6	Develop information security standard, policies and guidelines for the organization	為企業制訂網絡安全標準、政策和準則	ITCSPL606A	Establish security policy for the products / services	為產品/服務建立保密政策	Replacement of UoC 取代能力單元
		111165L6	Develop response and recovery plans	制訂應變和復原計劃	ITSWIS614A	Develop response and recovery plans	制訂應變和復原計劃	Replacement of UoC 取代能力單元
		111166L6	Review key controls metrics regularly to fulfill the security standard	定期檢討關鍵績效指標以達到保安標準	ITSWIS609A	Establish metrics to manage information security governance framework	設立處理資訊保安管治架構的度量指標	Replacement of UoC 取代能力單元
		111170L5	Develop procedures to implement incident response plan	制定程序以實施事件應對計劃	ITSWIS614A	Develop response and recovery plans	制訂應變和復原計劃	Replacement of UoC 取代能力單元
		111171L5	Develop procedures to maintain and comply with the information security standard and policies of the organisation	制定程序以維護和遵守企業的網絡安全標準和政策	ITSWIS506A	Develop information security practices and procedures	制訂資訊保安慣例和常規	Replacement of UoC 取代能力單元
		111174L5	Identify the potential security threats to the organisation	確定和評估企業的潛在保安風險	ITSWIS605A	Identify the potential security threats to the company	確定和評估風險	Replacement of UoC 取代能力單元
		111175L5	Manage the execution of response and recovery plans	處理應變和復原計劃的執行	ITSWIS511A	Manage the execution of response and recovery plans	處理應變和復原計劃的執行	Replacement of UoC 取代能力單元
		111176L5	Perform network security assessment for the organization	為企業進行網絡安全評估	ITCSNO530A	Define network infrastructure access policies	釐定網絡基建的接入政策	Replacement of UoC 取代能力單元
		111177L5	Prepare and deliver information system security audit report	準備和提交資訊系統保安審計報告	ITSWIS514A	Prepare and deliver information system security audit report	準備和提交資訊系統保安審計報告	Replacement of UoC 取代能力單元
		111178L5	Prepare documentation to report the security testing and findings	準備安全測試和結果報告	ITSWIS512A	Establish procedures documenting security incident	建立記錄保安事件的程序	Replacement of UoC 取代能力單元
		111179L5	Propose appropriate countermeasures to prevent security attacks	提出適當的對策以防止安全攻擊	ITSWIS525A	Minimize information security risks	減低資訊保安風險	Replacement of UoC 取代能力單元

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Software Products and Software Services 軟件產品及軟件服務	Project Management 項目管理	111197L5	Conduct solicitation planning	實施徵集計劃	ITSWPM521A	Conduct solicitation planning	實施徵集計劃	Replacement of UoC 取代能力單元
		111198L5	Conduct project closure with respect to time	處理與時間有關的項目結束	ITSWPM505A	Conduct project closure with respect to time	處理與時間有關的項目結束	Replacement of UoC 取代能力單元
		111199L4	Analyze the available solutions from IT service providers	分析資訊科技服務提供商的解決方案	ITSWPM523A	Conduct source selection and/or contract development	進行外發的來源挑選和/或合同發展	Replacement of UoC 取代能力單元
		111200L4	Prepare system operation documentation	編制系統操作文檔	ITSWPM403A	Establish project communications documentation requirements	制定項目通訊的檔案編制要求	Replacement of UoC 取代能力單元
	Strategic Management 策略管理	111201L6	Formulate business strategies and policies	制定業務策略及政策	ITSWSM602A	Formulate business strategies and policies	制定業務策略及政策	Replacement of UoC 取代能力單元
		111202L6	Identify and evaluate information technologies that support the objectives of an organisation	辨識及評估支援企業的目標的資訊科技	ITSWSM612A	Identify and evaluate information technologies that support the objectives of an organisation	辨識及評估支援組織的目標的資訊科技	Replacement of UoC 取代能力單元
		111203L6	Maintain the portfolio management with different stakeholders	維護與不同持份者的投資組合管理	ITSWG618A	Manage and maintain the portfolio and relationship with business partners	處理和保持與商務夥伴的投資組合和關係	Replacement of UoC 取代能力單元
		111205L6	Review and comply with organisational policies and procedures, relevant laws and regulatory requirements	檢討及遵從企業的政策和程序、相關法律和監管要求	ITSWG624A ITSWG602A	Comply with relevant laws and regulatory requirements Comply with organisational policies and procedures, relevant laws and regulatory requirements	遵照有關的法律和管理要求 遵從機構的政策和程序、相關法律和監管要求	Replacement of UoC 取代能力單元
		111206L6	Set policy to control data security and privacy	制定政策管理資料保安及私隱	ITWSM611A	Set policy to control data security and privacy	制定政策管理資料保安及私隱	Replacement of UoC 取代能力單元
		111209L5	Establish a business continuity planning strategy	建立商業延續計劃的策略	ITSWIS519A	Establish a business continuity planning strategy	建立商業延續計劃的策略	Replacement of UoC 取代能力單元
		111210L5	Formulate IT plan	擬定資訊科技計劃	ITWSM503A	Formulate IT plan	擬定資訊科技計劃	Replacement of UoC 取代能力單元

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Software Products and Software Services 軟件產品及軟件服務	Strategic Management 策略管理	111212L6	Formulate global and local business strategies	制定全球和本地的業務策略	108015L7 ITCSSG503A ITCSSG602A	Formulate global and local business strategy Formulate global and local marketing strategies Define business strategies and policies	制定全球和本地的業務策略 制定全球及地區市場策略 釐定業務策略和政策	Replacement of UoC 取代能力單元
		111213L6	Formulate strategies on business relation management	制定業務關係管理策略	ITSWG618A ITCSSG508A ITCSSG521A	Manage and maintain the portfolio and relationship with business partners Formulate partner/supplier relationship strategies Manage and maintain the portfolio and relationship with business partners	處理和保持與商務夥伴的投資組合和關係 制定合作夥伴/供應商關係之策略 管理和維繫與業務合作夥伴之間的關係和組合	Replacement of UoC 取代能力單元
		111214L6	Formulate human resource strategy	制定人力資源策略	108021L5 ITCSSG606A	Formulate human resource strategy Formulate human resource strategies	制定人力資源策略 制定人力資源策略	Replacement of UoC 取代能力單元
		111215L6	Formulate vision and mission statements	制定願景和使命聲明	ITSWSM601A ITCSSG601A	Formulate vision and mission statements Formulate vision and mission statements	制定遠景及使命聲明 制定願景和使命的聲明	Replacement of UoC 取代能力單元
		111216L6	Establish and implement information management and control policy	建立和實施資訊管理和保安政策	ITSWSM611A ITSWSM506A 108022L5	Set policy to control data security and privacy Collect and distribute disseminate information Manage information strategy to facilitate product development and marketing	制定政策管理資料保安及私隱 搜集及分發資訊 管理資訊策略以促進產品開發和市場營銷	Replacement of UoC 取代能力單元
		111217L5	Manage marketing and public relation plans	管理營銷和公關計劃	ITSWSM508A ITCSSG403A	Manage product/services brand through the use of IT Implement Public Relation Plans	利用資訊科技管理產品/服務品牌 實施公關計劃	Replacement of UoC 取代能力單元
		111218L5	Establish contingency and risk mitigation plans	建立應急和風險緩解策略	ITSWG609A ITCSSG501A ITCSSG512A	Develop business continuity plans and disaster recovery plans related to IT Formulate risk mitigation strategies and plans Develop business continuity and disaster recovery plans	確定和評估與資訊科技有關的風險因素 制定風險緩解策略和計劃 發展業務連續性和災難恢復計劃	Replacement of UoC 取代能力單元