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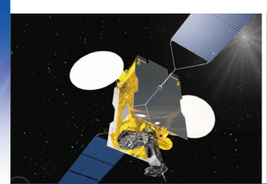
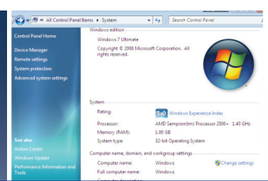
Menjana Pembangunan K-Pekerja

# OCCUPATIONAL STRUCTURE

# *Information and Communication Technology (ICT) Industry*

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# for
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**Department of Skills Development**
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# 1. EXECUTIVE SUMMARY

Information and Communication Technology (ICT) is said to be the technology of the 21st century that will drive economic and social development. Information and Communication Technology (ICT) encompasses the effective use of equipment and programs to access, retrieve, convert, store, organize, manipulate and present data and information (Gay and Blades, 2005). Realising the importance of ICT in the near future, Malaysia has to capitalise her resources to be one of the global players in ICT.

Apart from being endowed with vast ICT resources, Malaysia has in place a good policy on ICT, infrastructure, substantial human capital as well as financial means to develop ICT sector as the next engine of economic growth of the country.

The quality and skills of human resource is vital to the success of the ICT industry. So, strengthening collaboration in human resource development among the industry, public sector organisations and the academia is very important to produce quality workers.

In conducting the Occupational Analysis on the ICT sector, information on the Malaysian ICT industry was gathered through literature search, interviews with the industry players from the public and private sectors. Visits to the ICT companies and related public departments were made. A workshop was held in an attempt to get a better understanding of the organisational structure, job titles, hierarchy objectives and primary activities of the said organisation.

Information and Communication Technology is an industry with great potential. Endowed with strong government support and a substantial human resource, this industry could expand more in the future.

The Information and Communication Technology (ICT) and other related sectors will be developed further under the Third Industrial Master Plan (IMP3), 2006-2020, to transform them into a strategic enabler to support and contribute directly to the growth of the economy. The ICT and other related sectors are biotechnology, shared services and outsourcing, digital content development, bioinformatics, e-commerce, services and applications, nanotechnology, radio frequency identification, wireless technology, micro-electromechanical system, photonics and robotics.

Lack of skilled workers is identified as one of the factors affecting the ICT industry, especially skilled workers at Levels 1, 2 and 3. Thus, efforts and necessary action need to be taken to rectify the situation. Efforts to conduct Occupational Analysis in the ICT industry followed by developing national occupational skills standard and training manuals by the Department of Skills Development is timely.

Malaysia has a severe "*brain drain*" problem especially in information technologies, as the more talented professionals look for a better technical education and more challenging work abroad. The labour force manning the assembly plants is not skilled enough to man the new industries that the Government wants to attract. This issue is being addressed by allowing MSC-status companies to employ foreign talent with a quick immigration process.

# 2. CONCEPT AND STRUCTURE OF MALAYSIAN SKILLS CERTIFICATION SYSTEM

## 2.1 NATIONAL OCCUPATIONAL SKILL STANDARD (NOSS)

NOSS is defined as a specification of the competencies expected of a skilled worker who is gainfully employed in Malaysia for an occupational area and Level and a path to acquire the competencies.

| | |
|---|---|
| SKM LEVEL 1: (Operation and Production) | Competent in performing a range of varied work activities most of which are routine and predictable. |
| SKM LEVEL 2: (Operation & Production) | Competent in performing a significant range of varied work activities, performed in a variety of contexts. Some of the activities are non-routine and required individual responsibility and autonomy. |
| SKM LEVEL 3: (Supervisory) | Competent in performing a broad range of varied work activities, performed in a variety of contexts, most of which are complex and non-routine. There is considerable responsibility and autonomy and control or guidance of others is often required. |
| DKM LEVEL 4: (Executive) | Competent in performing a broad range of complex technical or professional work activities performed in a wide variety of contexts and with a substantial degree of personal responsibility and autonomy. Responsibility for the work of others and allocation of resources is often present. |

| | |
|---|---|
| DLKM LEVEL 5:<br>(Managerial) | Competent in applying a significant range of fundamental principles and complex techniques across a wide and often unpredictable variety of contexts. Very substantial personal autonomy and often significant responsibility for the work of others and for the allocation of substantial resources features strongly, as do personal accountabilities for analysis, diagnosis, planning, execution and evaluation. |

| TYPE OF SKILL CERTIFICATION | ATTRIBUTES OF COMPETENCIES |
|---|---|
| **DLKM Level 5-Managerial Level**<br>(Diploma/Advance Diploma Technology)<br>'Competent in applying a significant range of fundamental principles and complex techniques across a wide and often unpredictable variety of contexts. Very substantial personal autonomy and often significant responsibility for the work of others and for the allocation of substantial resources feature strongly, as do personal accountabilities for analysis and diagnosis, design, planning, execution and evaluation.' | |
| **DKM Level 4-Supervisory Level**<br>(Diploma/Diploma Technology)<br>'Competent in performing a broad range of complex technical or professional work activities performed in a wide variety of contexts and with a substantial degree of personal responsibility and autonomy. Responsibility for the work of others and allocation of resources is often present.' | |
| **SKM Level 3-Supervisory Level**<br>(Malaysian Skill Certificate)<br>'Competent in performing a broad range of varied work activities, performed in a variety of context, most of which are complex and non-routine. There is considerable responsibility and autonomy and control or guidance of others is often required.' | |
| **SKM Level 2-Operation and Production Level**<br>(Malaysian Skill Certificate)<br>'Competent in performing a significant range of varied work activities, performed in a variety of context. Some of the activities are non-routine and required individual responsibility and autonomy.' | |
| **SKM Level 1-Operation and Production Level**<br>(Malaysian Skill Certificate)<br>'Competent in performing a range of varied work activities, most of which are routine and predictable.' | |

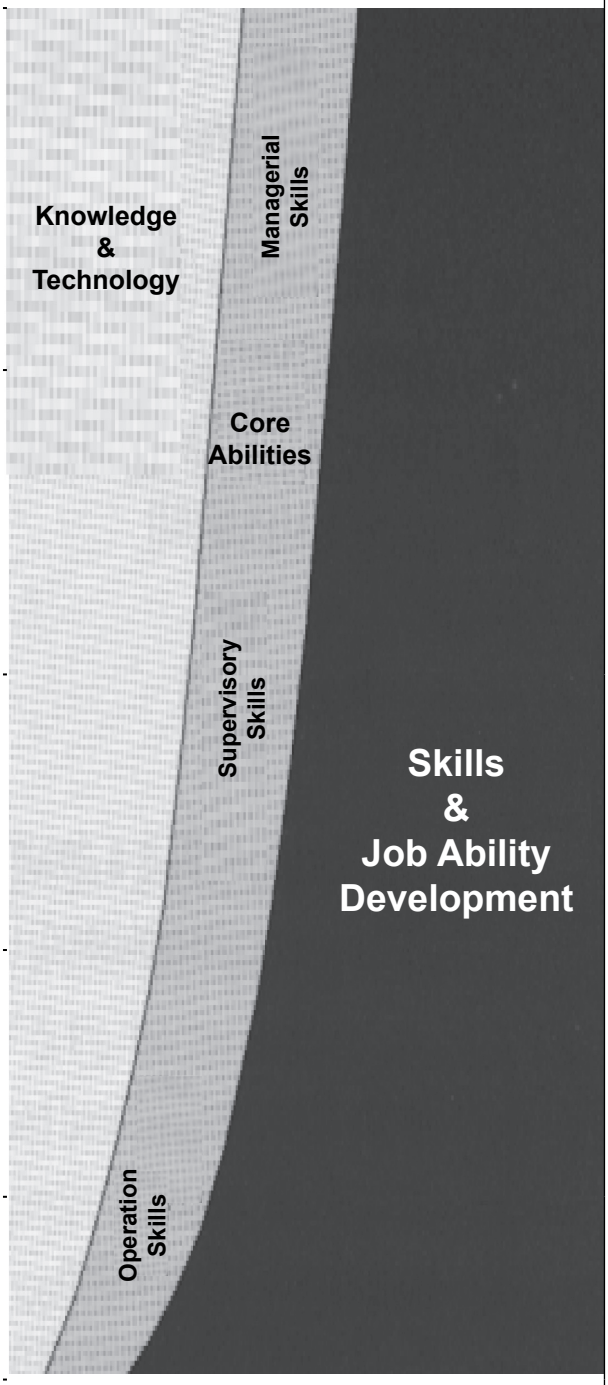



Figure 2.1: Skills Certification Structure

## UNITED KINGDOM QUALIFICATION FRAMEWORK

| Framework Level | Level Indicators |
|---|---|
| **Entry** | Entry level qualifications recognise basic knowledge and skills and the ability to apply learning in everyday situations under direct guidance or supervision. Learning at this level involves building basic knowledge and skills and is not geared towards specific occupations. |
| **1** | Level 1 qualifications recognise basic knowledge and skills and the ability to apply learning with guidance or supervision. Learning at this level is about activities which mostly relate to everyday situations and may be linked to job competence. |
| **2** | Level 2 qualifications recognise the ability to gain a good knowledge and understanding of a subject area of work or study, and to perform varied tasks with some guidance or supervisions. Learning at this level involves building knowledge and/or skills in relation to an area of work or a subject area and is appropriate for many job roles. |
| **3** | Level 3 qualifications recognise the ability to gain, and where relevant apply a range of knowledge, skills and understanding. Learning at this level involves obtaining detailed knowledge and skills. It is appropriate for people wishing to go to university, people working independently, or in some areas supervising and training others in their field of work. |
| **4** | Level 4 qualifications recognise specialist learning and involve detailed analysis of high level of information and knowledge in an area of work or study. Learning at this level is appropriate for people working in technical and professional jobs, and/or managing and developing others. Level 4 qualifications are at a level equivalent to Certificates of Higher Education. |
| **5** | Level 5 qualifications recognise the ability to increase the depth of knowledge and understanding of an area of work or study to enable the formulation of solutions and response to complex problems and situations. Learning at this level involves the demonstration of high levels of knowledge, a high level of work expertise in job roles and competence in managing and training others. Qualifications at this level are appropriate for people working as higher grade technicians, professionals or managers. Level 5 qualifications are at a level equivalent to intermediate higher education qualifications such as Diplomas of Higher Education, Foundation and other degrees that do not typically provide access to post graduate programmes. |

| | |
|---|---|
| **6** | Level 6 qualifications recognise a specialist high level knowledge of an area of work or study to enable the use of an individual's own ideas and research in response to complex problems and situations. Learning at this level involves the achievement of a high level of professional knowledge and is appropriate for people working as knowledge-based professionals or in professional management positions. Level 6 qualifications are at a level equivalent to Bachelors degrees with honours, graduate certificates and graduates diplomas. |
| **7** | Level 7 qualifications recognise highly developed and complex levels of knowledge which enable the development of in-depth and original responses to complicated and unpredictable problems and situations. Learning at this level involves the demonstration of high level specialist professional knowledge and is appropriate for senior professionals and managers. Level 7 qualifications are at a level equivalent to Masters degrees, post graduate certificates and postgraduate diplomas. |
| **8** | Level 8 qualifications recognise leading experts or practitioners in a particular field. Learning at this level involves the development of new and creative approaches that extend or redefine existing knowledge or professional practice. |

Figure 2.2: Proposed Competencies and Skill Qualification Certification

# 3. INFORMATION AND COMMUNICATION TECHNOLOGY IN MALAYSIA–BACKGROUND OF THE SECTOR

## 3.1 PREAMBLE

Information and Communication Technology (ICT) is said to be the technology of the 21st century that will drive economic and social development. There are eight services subsectors that have been identified for further development during the IMP3 period and ICT services is one of them. It shows that ICT is very important in Malaysia's development and must be taken seriously by the government.

Today, the term information technology has ballooned to encompass many aspects of computing and technology, and the term is more recognisable than ever before. The information technology umbrella can be quite large, covering many fields. IT professionals perform a variety of duties that range from installing applications to designing complex computer networks and information databases. A few of the duties that IT professionals perform may include data management, networking, engineering computer hardware, database and software design, as well as the management and administration of entire systems.

Malaysia is presently facing a shortage of skilled workforce in specialist fields including ICT. So, the government plans to harness ICT as a new source of growth and wealth creation and sustaining Malaysia's position as a competitive global multimedia hub destination particularly in offshore Shared Services and Outsourcing (SSO).

## 3.2 DEFINITION OF INFORMATION AND COMMUNICATION TECHNOLOGY

Information can be defined as knowledge of specific events or situations that has been gathered or received by communication; intelligence or news. While communication is the exchange of thoughts, messages, or information, as by speech, signals, writing or behavior. Technology describes the application of science, especially to industrial or commercial objectives.

There is a wide array of “information and communication technology” with different techniques and applications. The guidance in the Qualifications and Curriculum Authority (QCA) Schemes of Work for ICT defines ICT as *“the computing and communication facilities and features that variously support teaching, learning and a range of activities in education.”*

*Wikipedia* defines Information and Communications Technology - or technologies (ICT) as an umbrella term that includes all technologies for the manipulation and communication of information. The term is sometimes used in preference to Information Technology (IT), particularly in two communities: education and government.

Although, in the common usage it is often assumed that ICT is synonymous with IT; ICT in fact encompasses any medium to record information (magnetic disk/tape, optical disks (CD/DVD), flash memory etc. and arguably also paper records); technology for broadcasting information - radio, television; and technology for communicating through voice and sound or images - microphone, camera, loudspeaker, telephone to cellular phones. It includes the wide variety of computing hardware (PCs, servers, mainframes, networked storage), the rapidly developing personal hardware market comprising mobile phones, personal devices, MP3 players, and much more; the full gamut of application software from the smallest home-developed spreadsheet to the largest enterprise packages and online software services; and the hardware and software needed to operate networks for transmission of information, again ranging from a home network to the largest global private networks operated by major commercial enterprises and, of course, the Internet.

## 3.3 CURRENT ANALYSIS OF THE SECTOR/SUBSECTORS OF INFORMATION AND COMMUNICATION TECHNOLOGY

Malaysia is blessed with a wealth of resources that lend themselves to the development of Information and Communication Technology. As ICT presented the best opportunities to increase productivity and improve competitiveness, several programs and projects were implemented to encourage a wider diffusion of ICT in the economy. A key initiative was the Multimedia Super Corridor (MSC), which was designated as a world test-bed for ICT development.

In addition, a set of world-leading cyber laws was enacted to provide an enabling environment for the development of ICT. The main cyber law was the Communication and Multimedia Act 1998, aimed at promoting deregulation, streamlining licensing procedures and categories as well as facilitating market liberalisation.

In Malaysia presently, the Information and Communication Technology (ICT) and other related sectors such as biotechnology, shared services and outsourcing, digital content development, bioinformatics, e-commerce, services and applications, nanotechnology, radio frequency identification, wireless technology, micro-electromechanical system, photonics and robotics are presently facing a shortage of a skilled workforce. So, these sectors will be developed further under the Third Industrial Master Plan (IMP3) to transform them into a strategic enabler to support and contribute directly to the growth of the economy.

## 3.4 POLICIES, ASSOCIATIONS AND DEVELOPMENT PLAN FOR INFORMATION AND COMMUNICATION TECHNOLOGY

### (i) National IT Agenda (NITA)

The National IT Agenda formulated in 1996 provided the framework for the orderly development of the country into an information and knowledge-based society by 2020. This policy focused on human development and leveraging on the public-private sectors partnership. The framework was based on the balanced development of three key elements, namely, people, info structure and applications.

In order to achieve the goals of NITA, the National IT Council (NITC) launched the Strategic Thrusts Agenda with the primary objective of effectively facilitating the migration of Malaysians and institution into the emerging networked global environment. Five strategic thrusts areas were identified, namely, e-Economy, e-Public Services, e-Community, e-Learning and e-Sovereignty. Under the e-Economy strategic thrust area, all sectors of the economy were envisioned to create value and wealth through the successful participation in the emerging knowledge-driven global economy.

With e-Public Services, focus was given to the provision of people-oriented customer-focused services electronically. To facilitate the interaction and communication among communities to improve the quality of life, e-Community was formulated while e-Learning was to focus on cultivating a lifelong learning culture. Meanwhile, e-Sovereignty focused on building a resilient national identity in the face of challenges to the nation.

The NITC also established the Strategic Thrusts Implementation Committee (STIC) to carry out the Strategic Thrusts Agenda. Since its establishment, STIC managed to galvanise the public and private sectors to implement 30 projects. Examples of such projects included the E-Community Resource Exchange, National Grid of Learning, ICT Community Chest and SJ2005.

In an attempt to develop an information and knowledge-based society, the NITC held Information Society (InfoSoc) conference and exposition events annually, aimed at providing a framework and platform for dialogues and exchange of national and international experiences on ICT as well as to raise the awareness of the Malaysian public about Information Age developments. In this endeavor, the Government in collaboration with Global Knowledge Partnership also hosted the Second Global Knowledge Conference (GKII) in March 2000 in Kuala Lumpur to deliberate on issues pertaining in developing a knowledge-based society through ICT development.

To facilitate the realization of NITA, the Demonstrator Applications Grant Scheme (DAGS) was established in April 1998. DAGS aimed at promoting the use of ICT and multimedia for socio-economic development through developing communities enabled by electronic networks. During the Plan period, 37 community-based projects were implemented involving an expenditure of RM48 million. E-Thalassaemia, NutriWeb, CyberCare and Masjid as a Neighbourhood Centre were examples of DAGS projects.

### (ii) Communication and Multimedia Act 1998 (CMA)

Malaysia's IT and telecommunication regulatory environment underwent a major change with the enactment of the Communication and Multimedia Act 1998 (CMA). The Act defines a regulatory framework in support of ten national policy objectives for the communication industry:

(a) To establish Malaysia as a major global centre and hub for communication and multimedia information and content services;

(b) To promote a civil society where information-based services will provide the basis of continuing enhancements to quality of work and life;

(c) To grow and nurture local information resources and cultural representation that facilitates the national identity and global diversity;

(d) To regulate the long-term benefit of the end-user;

(e) To promote a high level of consumer confidence in service delivery from the industry;

(f) To ensure provision of affordable services over ubiquitous national infrastructure;

(g) To create a robust applications environment for end-users;

(h) To facilitate the efficient allocation of resources such as skilled labour, capital, knowledge and national assets;

(i) To promote the development capabilities and skills within Malaysia's convergence industries;

(j) To ensure information security and network reliability and integrity.

### (iii) PIKOM

**PIKOM**, the Association of the Computer and Multimedia Industry, Malaysia is the association representing the information and communications technology (ICT) industry in Malaysia. PIKOM works to improve the business climate in the interests of all its member companies and to promote industry growth in line with national aspirations. **PIKOM's** members include:

- Suppliers of equipment in computing and telecommunications
- Software developers and suppliers
- Providers of professional and educational ICT services
- Network operators
- Suppliers of value added services in ICT

**PIKOM's** objectives are to:

- Spearhead, promote & coordinate development of resources, professional skills and programs in the local ICT industry.
- Represent the local ICT industry to the Government and private sector both locally and overseas.
- Provide a focal forum for solution providers to meet, discuss and solve common problems of the ICT industry and to advance programs for its development.
- Foster high standards of conduct, service and performance throughout the ICT industry.
- Obtain, process and disseminate relevant information to the ICT industry.
- Provide industry and trade related services to members.

**PIKOM** has taken on the task of growing the size and capability of the ICT industry in Malaysia by creating opportunities for its members as well as all Malaysians to capture the benefits offered by advances in ICT.

### (iv) MDeC

Multimedia Development Corporation (MDeC) is a unique high powered government-owned corporation, established to facilitate the development and promotion of MSC Malaysia, the premier Malaysian ICT initiative. MDeC is tasked to advise the Malaysian Government on ICT legislation and policies, develop MSC Malaysia as a key growth driver of the economy and set breakthrough standards for ICT and multimedia operations. MDeC also promotes MSC Malaysia locally and globally, as well as supports companies which are located within the MSC Malaysia designated areas. MDeC works closely with various parties and government agencies to ensure that MSC Malaysia offers a conducive enabling environment for companies to harness the full potential of ICT and multimedia technologies.

### (v) MSC Malaysia

MSC Malaysia is a national initiative spearheaded by the Malaysian Government to promote both the national ICT industry and provide a test-bed for the global ICT industry. MSC Malaysia provides a conducive enabling environment designed to facilitate companies to harness the full potential of ICT and multimedia technologies. With its ideal business environment coupled with the availability of talent resources, the MSC Malaysia has attracted participation from major global ICT companies to develop and host their leading-edge technologies in the designated MSC Malaysia Cybercities. MSC Malaysia also provides the ideal growth environment for Malaysian ICT SMEs to transform themselves into world-class companies.

### (vi) Information and Communication Technology and the Ninth Malaysia Plan

In the Ninth Malaysia Plan, the government plans to harness ICT as a new source of growth and wealth creation and sustaining Malaysia's position as a competitive global multimedia hub destination particularly in offshore Shared Services and Outsourcing (SSO). A major portion of the ICT allocation will be for the computerisation of government ministries and agencies as well as bridging the digital divide initiatives largely for the supply and maintenance of computers and Internet access.

Specific funding will be made available to promote ICT content and entrepreneurship development. Under the Ninth Malaysia Plan, plans are for Malaysia to leverage on the network environment alongside the next wave of the Multimedia Super Corridor (MSC) expansion, including the development of cyber cities and where feasible, cybercentres.

All in these efforts will be to move forward towards a knowledge-based economy. The Ninth Malaysia Plan will focus on the development of existing MSC cyber cities as well as, where viable, newly-identified MSC cyber cities in Perak, Melaka, Johor and Sarawak.

These strategic initiatives will be complemented by parallel efforts in nurturing human resources, building local content, strengthening intellectual property rights (IPR) protection, enhancing information security and increasing e-enabled activities among the people in general. At the same, the necessary infrastructure, infrastructure and pro-business environment will be strengthened to provide greater access to ICT advancement as well as more opportunities to participate in the global digital economy.

The Ministry of Energy, Water and Communication will continue to take lead in telecommunication infrastructure development as well as support and upgrade the telecentres and School net in close collaboration with the Ministry of Rural and Regional Development and the Ministry of Education. The National Mission comprises five thrusts, where the first thrust is to move the economy up the value chain. The Government aims to increase the value add of existing economic sectors as well as generate new knowledge-intensive activities and employment in ICT, biotechnology and services. The Government will also build an environment which encourages the private sector to take a leading role in the country's economic development.

The Government will; continue to implement measures to ensure that Malaysia remains a choice destination for ICT-based investments. Malaysia will realise its potential by continuing to promote the development of the shared services and outsourcing industry. Local companies will be urged to develop outsourcing and other high value added activities. The Government will develop new fields such as the local digital content industry and bioinformatics.

Specific attention will be given to promote the widespread use of 'e-dagang'. Development of the Multimedia Super Corridor (MSC) will be focused on the development of corridor networks, encompassing the 3 existing cyber cities and 4 new cyber centres that will be developed, as well as enhancing facilities at Cyberjaya. To enhance access to financing sources, various funds and programs will be developed while existing funds will be strengthened.

**(vii) The Third Industrial Malaysia Plan (IMP3)**

The government expects the services sector to assume a major role in driving the growth of the economy during the Third Industrial Master Plan (IMP3) spanning from 2006 to 2020.

Eight services sub-sectors have been identified for further development during the IMP3 period namely business and professional services, distributive trade, construction, education and training, healthcare services, tourism services, ICT services and logistics.

The ICT and other related sectors will be developed further under the Third Industrial Master Plan (IMP3), 2006-2020, to transform them into a strategic enabler to support and contribute directly to the growth of the economy. The focus areas are namely biotechnology, Shared Services and Outsourcing, digital content development, bioinformatics, e-commerce, services and applications, nanotechnology, radio frequency identification, wireless technology, micro-electromechanical system, photonics and robotics.

Voice over Internet Protocol (VoIP) and Internet telephony services would be further enhanced to provide higher quality services and the demand to be created would lead to cheaper voice services. On e-commerce, the report said it would be widely applied in the manufacturing and services sector.

Digital content development will also be expanded rapidly, in tandem with the integrated broadband infrastructure to be created under the strategy. Under the second phase of the development of MSC Malaysia, business-friendly environment, wireless broadband facility and other transportation and infrastructure amenities would be further enhanced.

The Malaysia Information, Communication and Multimedia Services Strategy (MyICMS 886) would remain as the major policy thrust for the ICT sector with additional initiatives such as further developing Cyberjaya to be the national ICT hub, said the IMP3 report issued by the Ministry of International and Industry (MITI). MyICMS 886 has eight services, eight infrastructure types and six growth areas for development deployment during IMP3.

**(viii) The Malaysia Information, Communication and Multimedia Services Strategy (MyICMS 886)**

The MyICMS 886 (Malaysian Information, Communication and Multimedia Services 886) *Strategy* identifies eight (8) service areas which have been targeted to propel Malaysia in the delivery of advanced information, communication and multimedia services towards improving the quality of life of Malaysians and at boosting Malaysia's global competitiveness.

The MyICMS 886 aims to create a catalystic cycle by enhancing the existing investments in ICMS infrastructure that will support future growth of ICMS services.

The introduction of the eight (8) new services catalyses and promotes the development of eight (8) essential infrastructures - both *hard and soft*. These new services and infrastructures are aimed at generating growth in six (6) areas that have been identified as key for the consumers and businesses in Malaysia.

**(a) High Speed Broadband**

The High Speed Broadband Service encompasses both last mile wire line and wireless access services. The service provides high speed and high capacity portable Internet service while on the move or stationary.

**(b) 3G & Beyond**

For 3G & Beyond, the services will encompass voice, video and high-speed data services. The 3G services will continue to be expanded for extensive nationwide coverage and enhanced to cater for higher data speeds.

### (c) Mobile TV

Arising from the hype surrounding the possibilities with the Internet over the last ten years, there is increasing interest in offering extensive multimedia services to mobiles.

### (d) Digital Multimedia Broadcasting

Digital multimedia broadcasting will cover both Terrestrial and Satellite TV and Audio services. Digital multimedia broadcasting will provide quality audio and video services over TV sets as well as handheld devices or mobile phones and other radio receivers.

### (e) Digital Home

Digital homes use networking technologies to integrate appliances, devices, and services within the home to control and monitor the entire living space from within the home as well as from remote locations.

### (f) Short Range Communication (e.g. RFID-based)

The Short Range Communication services will support the creation of short-range wireless connections type of applications which use very low power. Among the technologies categorised under this service are RFID (radiofrequency identification), UWB (ultra wideband), Bluetooth and Zigbee. Examples of applications would include use in inventory management, the supply chain management, transportation and logistics, livestock management and security and access control.

### (g) VoIP/Internet Telephony

VoIP (Voice over Internet Protocol) and Internet Telephony in general, offers cheaper phone services over the Internet. VoIP phones can integrate with other services available over the Internet, including sending and receiving messages or data files in parallel with the voice conversation, audio

conferencing, managing address books and passing of information on whether other users (e.g. friends or other associates) are available online to interested parties.

### (ix) Approach employed by Malaysia to Develop Information and Communication Technology Sector

Malaysia offers a pool of talented human resources, but there is presently a shortage of skilled workforce in specialist fields in engineering, ICT and high technologies.

Strengthening collaboration in human resource development among the industry, public sector organisation and the academia; reviewing laws legislations to provide flexibility and mobility in employment; and intensifying automation and labour-saving initiatives comprise the remaining thrusts.

The Ministry said strategies to increase the supply of technically-skilled workforce include reviewing and enhancing the capacity of vocational schools and community colleges, upgrading skills training to school leavers in vocational schools and community schools and increasing the supply of highly skilled workforce in the 17-23 age groups, from the present 30 percent to 40 percent by 2010.

According to MITI, the challenges in meeting human resources requirements in the IMP3 include enhancing total factor productivity, regional integration, enhancing capacity building and increasing employment opportunities for people with disabilities.

During the 2006-2010 periods, total employment in the economy is projected to register an average annual growth of 1.9 per cent, from 10.9 million workers in 2005 to 12 million in 2010.

### (x) Current Status of The Information and Communication Technology Industry Sector

In Malaysia, there is presently a shortage of skilled workforce in information and communication technology. So, since Malaysia implemented the first computer system in 1996, the Government

has introduced various initiatives to facilitate the greater integration of ICT to improve capacities in every area of life, including the enhancement of education and training programs.

Currently, Malaysia is making effort to steer the economy towards a knowledge-based one. Furthermore, “Vision 2020”, Malaysia’s long term vision, calls for sustained, productivity-driven growth, possible only with a technologically literate, critically thinking workforce, prepared to participate fully in the global economy of the 21st century. At the same time, Malaysia’s National Philosophy of Education calls for “developing the potential of individuals in a holistic and integrated manner, so as to produce individuals who are intellectually, spiritually, emotionally and physically balances and harmonious.

According to the European Commission, the importance of ICT’s lies less in the technology itself than in its ability to create greater access to information and communication in under served populations. Many countries around the world have established organisations for the promotion of ICT, because it is feared that unless less technologically advanced areas have a chance to catch up, the increasing technological advances in developed nations will only serve to exacerbate the already-existing economic gap between technological “have” and “have not” areas.

The global worldwide ICT Shared Services and Outsourcing (SSO) market is expected to grow at a CAGR of 15 per cent over the next few years, reaching USD 1.43 trillion by 2009 as compared to USD 930 billion in 2006. “The outsourcing need is growing and we intend to fully leverage on our achievements to meet this need,” he said adding ICT services like SSO contributed RM2.8 billion to the nation’s Gross Domestic Product of RM495.6 billion.

So, Malaysia plans many ways to improve the usage of ICT among Malaysian citizens. It is very important to position Malaysia as a competitive knowledge-based economy, with ICT facilitating the development. In this regard, the ICT infrastructure will be expanded, particularly to rural areas to bridge the digital divide and enable all citizens to have equitable access to knowledge and information.

## 3.5 SKILLED WORKER REQUIREMENT IN THE LOCAL INDUSTRY SECTOR

The ongoing revolution in ICT led to changes taking place in the composition of employment and in the labour market. The demand for ICT workers comprising hardware engineers, software engineers, systems analysts, computer programmers and technical support personnel increased from 88,160 in 1998 to 108,200 in 2000. This represented a rapid growth of 10.7 per cent per annum compared with the overall employment growth of 3.7 per cent during the same period.

The technical support personnel and systems analysts were the two largest groups, representing 32.1 per cent and 23.7 per cent, respectively. On the supply side, it was estimated that about 20,260 students graduated from public and private institutions in ICT and related engineering courses in 1999. Of the total number of graduates, almost 71 per cent were from private institutions, indicating the important role of the private sector in ICT training. There were 170 private institutions and 28 public institutions offering ICT courses as at October 1999. While private institutions offered courses mainly at the diploma and bachelor degree Levels, the public institutions mainly focused on the bachelor and post-graduate levels.

As ICT becomes increasingly ubiquitous, the demand for ICT workers will grow rapidly, both to enable the use of existing technologies as well as to develop such technologies for the future. As reported in the Study on the Manpower Requirements to Support the Application and Diffusion of ICT in Malaysia, 'the most required technical skills will be Local Area Network (LAN) administration, PC technical support, PC Programming and client server computing.

To meet the increasing demand for ICT workers, efforts will be made to improve and expand ICT education. At the school level, about 8,000 primary and secondary schools will be provide with computer facilities by the end of the Plan period while computer-aided teaching and learning will be intensified with the development of software for the various subjects. Internet access will also be made available to schools and for those in the rural areas where conventional means of access may be a problem, access will be provided by satellite communication, especially the VSAT technology.

The objective is to increase computer literacy among students as well as expose them to the benefits of the Internet, particularly those in the rural areas. Both the public and private institutions of higher learning will also introduce more ICT and related engineering courses.

ICT training will continue to be given emphasis as the pace of technological change in ICT will necessitate ongoing training for the ICT workforce. Firms will be encouraged to send their workers for training to keep their skills up-to-date, thereby increasing their output and productivity. To facilitate this, the Government will provide tax incentives to reduce the cost of training to firms. The HRDF will also continue to provide disbursements for ICT-based training. In addition, new apprenticeship schemes in areas related to ICT will be introduced.

The negative influences in the Internet, such as misreporting and abuse of knowledge, can pose a security threat to the nation. To counter such influences, a code of ethics in the conduct of activities over the Internet will be inculcated beginning at the school level.

As part of the effort to meet the rising demand for ICT workers, particularly in the MSC area, one each in Cyberjaya and Malacca. Equipped with high speed ATM's, multimedia learning facilities and digital libraries, MMU offers a spectrum of ICT and multimedia-based courses at the undergraduate and post-graduate levels.

By the end of 2000, about 9,000 students were enrolled in these courses. Of this total, about 22 per cent were ICT bachelor degree undergraduates. To meet the needs of the MSC, the Government successfully undertook a number of initiatives to adequately meet the demand for knowledge workers. These included measures introduced to increase the number of institutions of higher learning. This was accelerated by the awarding of MSC status to institutions of higher learning or their faculties that focused on training of knowledge workers in priority areas such as ICT, engineering and management.

With the anticipated rapid growth in e-commerce, many public and private institutions offered business studies courses with e-commerce content. The numbers of students enrolled in these courses were 6,075 in 1999 in

both public and private institutions, mainly at the bachelor degree Level. The numbers of business graduates with e-commerce training were 1,398 in 1999.

ICT-based training was also given emphasis among the working population to upgrade their ICT knowledge and skills. Under the Human Resource Development Fund (HRDF), RM101.6 million or 14.7 per cent were disbursed for ICT- based courses during the Seventh Plan period. This involved the financing of 296,800 training places.

## 3.6 INDUSTRIAL COMPETITION AT INTERNATIONAL LEVEL

Malaysia is currently undergoing the transformation from being industrial-based to being a knowledge-based economy. To achieve this goal, ICT is acknowledged as one of the key engines of growth. This extends not only to the development of a robust ICT industry for local consumption and the export market, but also to the promotion and adoption of ICT usage in other industries as well as by the nation. These goals have been set in the Ninth Malaysia Plan, and significant progress has already been made-such as MSC, Malaysia's expansion beyond its original corridor to 12 cyber cities and cyber centres.

Malaysia's economy has been one of the most robust in South East Asia, enjoying rapid development with an average annual GDP of 7.6% between 1989 and 1999. Although Malaysia had not been sparred from the 1999 Asian financial crisis, the government's prompt actions had resulted in the country registering one of the strongest recoveries within the region since.

This International Data Corporation (IDC) study shows how IT services markets in Malaysia are influenced by the slowdown in the U.S. economy and other nationwide activities. The emergence of Malaysia as an IT hub in the Asia/Pacific region has contributed positive sentiments to the IT industry. In 2008, the overall IT services market is expected to increase at 12.14%."The growth in services market is largely driven by the latest trends in technologies and solutions. Overall, the market outlook for IT services is improving with continuous government initiatives and private sectors progressing toward the use of ICT," says Peter Hee, market analyst, IT Research, IDC Malaysia.

The Malaysian government in 1996, invested heavily in creating the Multimedia Super Corridor (MSC) to attract domestic and foreign investors to its ICT industry. The MSC currently serves as the backbone of the ICT infrastructure in the country and is supported by a high-speed link that connects it to Japan, the ASEAN countries, USA and Europe.

For the period 2005-2010, ICT expenditure in Malaysia is expected to grow at a Compounded Annual Growth Rate of over 10 percent. By 2010, IDC forecasted that ICT expenditure in Malaysia will reach RM22 billion. The development and widespread usage of ICT are central to the realization of Vision 2020 of a knowledge based economy. ICT usage has improved efficiencies among the Malaysian enterprises and has also directly increases Malaysia's competitiveness in the global economy. Digitalisation enables the convergence of the computer, telecommunication and consumer segments. The computing segment is the largest application segment for semiconductor consumption in Asia while communication and consumer applications are the fastest growing segments.

Malaysia has been ranked globally, as the third most favored location for outsourcing of business processes. Malaysian ICT companies are capable of a wide range of services worldwide, including in the areas of;

- mobile and wireless communication
- business application software development
- internet-based business applications in the financial sector
- digital content development
- e-commerce for networking and outsourcing
- bio-informatics and
- e-government

Malaysia has and will continue to be a top choice for off-shoring in the IT space to companies in the West Asia. Progressive Government policies and efforts in offering a world-class environment and attractive incentives through special zones will continue to attract business from around the globe.

# 4. METHODOLOGY OF OCCUPATIONAL ANALYSIS - INFORMATION AND COMMUNICATION TECHNOLOGY SECTOR

In conducting the Occupational Analysis, a kick off meeting was held primarily to strategise the Plan of Action in accordance with guidelines as presented by JPK in terms of scope of study, time frame and representation by panel of ICT experts from both public and private sector as stipulated in the letter of offer. After the kick off meeting, a Plan of Action was formulated taking into consideration the activities and time frame required. The details are as in *Annex 1 Implementation Schedule – Occupational Analysis of Information and Communication Technology Sector*.

This chapter is divided into 2 sections; the proposed methodology to construct the Occupational Definition for the respective Job Titles and the methodology of the overall Occupational Analysis Process.

## 4.1 METHODOLOGY TO CONSTRUCT OCCUPATIONAL DEFINITION

This is a proposed methodology formulated by the facilitator, Dr. Amiron Ismail who is an experienced facilitator in NOSS, COS, LG and WIM development. This methodology is used in order to produce an Occupational Definition that is clear on the main job scope of the job title, the verb used is according to level of difficulty and the object is clearly described.

Below are the main steps in producing the Occupational Definition for the respective job titles obtained in the Occupational Analysis:

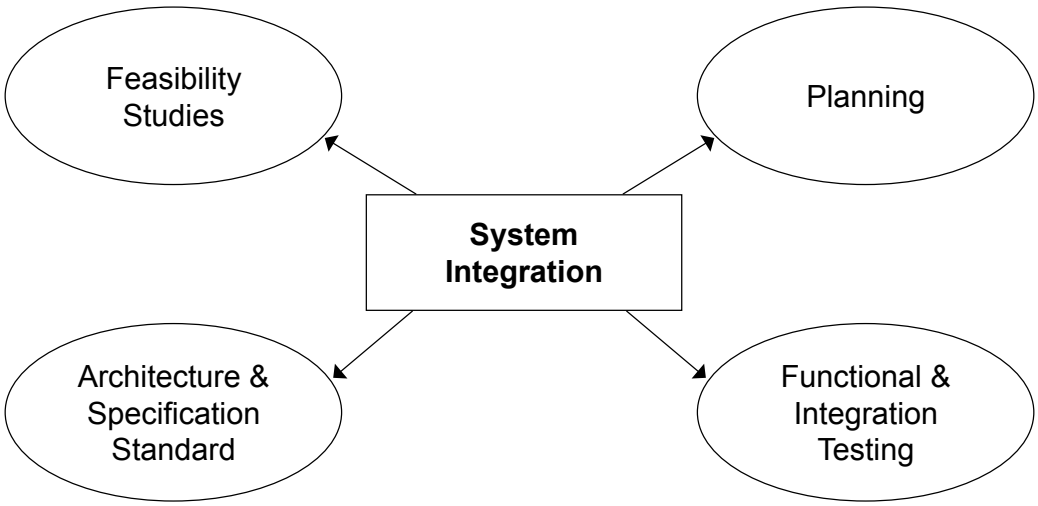
(i) Determine the main subsectors and areas in the sector
(ii) Identify the job titles
(iii) Identify the job scope

To describe the Occupational Definition clearly, the statement must consist of a ***Verb, Object*** and ***Qualifier***. The rationale of determining the definition attributes are, to ensure consistency and continuity of using those attributes right from Occupational Analysis, Job Analysis to Task Analysis Developmental.

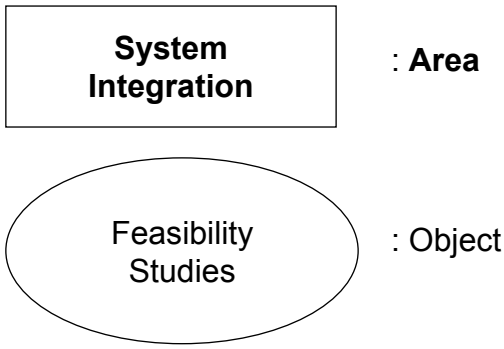
**(a) Object**

Firstly, the object is determined before the other two attributes. The object of any job is the main determinant of distinguishing one job to the other. For example, a demi-chef (kitchen sub-sector of Hotel Industry), deals with food and cooking utensils as the objects in performing tasks. While, a hairdresser deals with client's hair, hairdressing chemical, etc.

The Objects are acquired from the expert panel members during a brainstorming session and written on DACUM cards so that all panel members can see the Objects identified. Objects of those in the related area or subsector of the ICT industry are determined such as in the example below:




***Legend :***



**(b) Verb**

The Verb is then determined based on the level of difficulty of the identified job titles, such as below:

- ***Object** : architecture and specification standard*
- *Verb for Level 6 : **Prepare***
- *Verb for Level 7 : **Analyse***
- *Verb for Level 8 : **Evaluate***

Hence, the contents of the job definitions will be as below

- **System Integration Project Executive (Level 6)**
  - ✓ ***Prepare** architecture and specification standard + (qualifier)*
- **System Integration Project Manager (Level 7)**
  - ✓ ***Analyse** architecture and specification standard + (qualifier)*
- **System Integration Project Director (Level 8)**
  - ✓ ***Evaluate** architecture and specification standard + (qualifier)*

**(c) Qualifier**

Based on the example above, the statement is not clear as there is no qualifier for the object, therefore a qualifier must be added to further clarify it. Below is an example:

- *Analyse architecture and specification standard **for system development and integration.***

## 4.2 METHODOLOGY OF THE OVERALL OCCUPATIONAL ANALYSIS PROCESS

**(i) Literature survey**

As outlined by the guidelines, a literature survey on the ICT sector was carried out to get some insight on the scope, policy, program, activities in the context of the Malaysian scenario. The scope covered under this search includes definitions, current analysis of the sector/subsector, current status of the ICT industry sector, skilled workers requirement in the local industry and the industrial competition at international level.

**(ii) Identifying industry & public players**

The literature search findings were used as a guide to identify the scope of occupational study and analysis. Based on the good relationship with ICT companies, players from the ICT sector were identified and short listed for further communication and contact.

**(iii) Establish contact with the ICT sector players**

A pool of ICT experts from the industry and public sector were contacted. The list of experts is in Annex 2.

**(iv) Information gathering**

In the process of gathering the information, two methods were adopted, namely; brainstorming and the Developing a Core-Curriculum (DACUM) session. The brainstorming and DACUM session was attended by expert panels who discussed the different subsectors and areas. The information gathered was then used as input to the occupational analysis of the said industry.

**(v) Analysing the information**

Based on the activities done as above, substantial data and information were collected. The data and information were discussed and analysed in several in-house workshops attended by selected key person or experts from the public and industry sector. The presence of the key persons or experts was to help in the development of the Occupational Analysis for this sector.

During this session, attempts to reframe the ICT Subsector in Malaysia were done using the following framework:

(a) Scope of the ICT sector and its subsector
(b) Main area
(c) Major occupational group of the industry
(d) Job title
(e) Hierarchy structure (Level 1 – 8)
(f) Occupational definition

**(vi) Organise Workshop with expert panels**

Three (3) workshops were conducted in the development of the Occupational Analysis of the ICT sector. The details of the workshops are as below:

(a) Held on the 28th and 29th June, 2008 at the Straits Meridian, Malacca. The objectives of the workshop were:
- Presentation of preliminary findings
  - Outline of Job Title
  - Career structure
  - Hierarchy structure (Level 1 – 8)
  - Occupational Definition
- Occupational Analysis Session
- Validation of the findings

(b) Held on the 12th and 13th July, 2008 at the Straits Meridian, Malacca. A total of 15 experts in the field of Information and Communication Technology attended the workshop. The objectives of the workshop were to
- Review of:
  - Job Titles
  - Career structure
  - Hierarchy structure (Level 1 – 8)
  - Occupational Definition
- Occupational Analysis Session
- Validation of the findings

(c) Held on the 19th till the 21st July, 2008 at the Lisbon Hotel, Malacca. The objectives of the workshop were:
- Validation and verification (proofreading) of:
  - Job Titles
  - Career structure
  - Hierarchy structure (Level 1 – 8)
  - Occupational Definition

# 5. FINDINGS

The findings from the research of the ICT sector's Occupational Analysis can be divided into 4 categories, which are the existing job titles, proposed job titles, the mapping between the proposed job titles to the existing ones and the leveling & entry level justification.

## 5.1 EXISTING JOB TITLE AND HIERARCHY OF ICT SECTOR

Based on the existing job titles in DSD's NOSS Registry, the ICT sector in Malaysia is categorically divided into 3 major sectors namely Information Technology-Computer, Information Technology-Multimedia and Information and Communication Technology-Security.

For the Information Technology–Computer sector, five major areas are identified, namely Computer Systems, Computer Networks, Information Systems, Application Development and Multimedia. A total of 16 job titles are present from Level 2 until Level 5 for all areas. The Information Technology–Multimedia sector has four major areas namely Animation & Visual, Audio, Video and Authoring. A total of 11 job titles are present from Level 2 until Level 5.

As for the Information and Communication Technology–Security sector, four major areas are identified, namely ICT Application Security, ICT System Security, ICT Network Security and ICT Operation Security and Security Management. A total of 3 job titles are present for Level 3 only.

Thus, under the ICT sector, a total of 30 job areas have been identified to exist in Malaysia ranging from minor to major activities. Below are the existing Job Titles:

## INFORMATION TECHNOLOGY-COMPUTER

| | Computer System | Computer Network | Information System | Application Development |
|---|---|---|---|---|
| **L5** | D-041-5 System Engineer | D-051-5 Network Engineer | D-060-5 Information Systems Manager | D-070-5 Application Development - System Analysis |
| **L4** | D-041-4 Assistant System Engineer | D-051-4 Assistant Network Engineer | D-060-4 Information Systems Executive | D-070-4 Application Development - Analyst Programmer |
| **L3** | D-041-3 Computer System Technician | D-051-3 Computer Network Technician | D-060-3 Information Systems Administrative Supervisor | D-070-3 Application Development-Lead Programmer |
| **L2** | D-041-2 Computer System Assistant Technician | D-051-2 Computer Network Assistant Technician | D-060-2 Information Systems Assistant | D-070-2 Application Development - Programmer |
| **L1** | *- No Level -* | | | |

Figure 5.1: Previous OA Matrix for Information Technology-Computer

## INFORMATION TECHNOLOGY-MULTIMEDIA

<table>
<tr><td></td><td colspan="5">Multimedia Production</td></tr>
<tr><td>L5</td><td colspan="5">D-120-5<br>Multimedia Creative Director</td></tr>
<tr><td>L4</td><td colspan="5">D-120-4<br>Multimedia Creative Manager</td></tr>
<tr><td>L3</td><td colspan="2">D-112-3<br>Multimedia Designer – Animation & Visual</td><td>D-100-3<br>Multimedia Designer - Audio</td><td>D-090-3<br>Multimedia Designer - Video</td><td>D-080-3<br>Multimedia Designer - Authoring</td></tr>
<tr><td>L2</td><td>D-110-2<br>Multimedia Artist - Animation</td><td>D-111-2<br>Multimedia Artist - Visual</td><td>D-100-2<br>Multimedia Artist - Audio</td><td>D-090-2<br>Multimedia Artist - Video</td><td>D-080-2<br>Multimedia Artist - Authoring</td></tr>
<tr><td>L1</td><td colspan="5">- No Level -</td></tr>
</table>

Figure 5.2: Previous OA Matrix for Information Technology-Multimedia

## INFORMATION AND COMMUNICATION TECHNOLOGY-SECURITY

<table>
<tr><th></th><th>ICT Application Security</th><th>ICT System Security</th><th>ICT Network Security</th><th>ICT Operation Security and Security Management</th></tr>
<tr><td>L5</td><td colspan="4" rowspan="2">Not Available</td></tr>
<tr><td>L4</td></tr>
<tr><td>L3</td><td colspan="2">D-300-3<br>ICT System Security and Application Technician</td><td>D-301-3<br>ICT Network Security Technician</td><td>D-302-3<br>ICT Operation Security Assistant Officer</td></tr>
<tr><td>L2</td><td colspan="4" rowspan="2">- No Level -</td></tr>
<tr><td>L1</td></tr>
</table>

Figure 5.3: Previous OA Matrix for Information and Communication Technology Security

## 5.2 NEWLY IDENTIFIED SUBSECTORS

The newly identified subsectors for the ICT sector were obtained through literature research and discussions with industry experts during the development workshop sessions. According to Malaysia's Industrial Plan (IMP3), The Ninth Malaysian Plan (RMK9), the MYICMS Strategy and other related national economical plans, the nation is targeted to propel itself in the delivery of advanced information, communication and multimedia services towards improving the quality of life of Malaysians and at boosting Malaysia's global competitiveness.

During the development workshops, the panel members had identified 6 new subsectors, (compared to the existing 3 subsectors) that reflect the current scenario and main ICT Subsectors currently in Malaysia. The 6 subsectors are listed as below:-

(i) ICT System
(ii) Application System Development
(iii) ICT Security
(iv) System Integration
(v) Data Management
(vi) Digital Creative

The OA matrices for these 6 sectors are included in this section. A total of 53 job titles exist in the proposed subsectors. The detailed Job Titles and Hierarchies are included in Annex 3.

### (i) ICT System

This subsector is the fundamental subsector of ICT as it covers jobs dealing with ICT systems either stand alone or networked. This subsector is considered as a pre-requisite for many other subsectors in the ICT sector because competency in this subsector is important to the competency to perform in other specialised ICT subsectors. The job titles in this subsector can be seen to be the majority of the ICT workforce in any type of organisation today.

This subsector consists of 2 main areas; ICT Computer System and ICT Network System. It starts as one area from Level 2 until Level 4 because the skills and knowledge are similar for both of the areas. At Level 5 and

Level 6, the job scope is more specialised between the ICT Computer System and ICT Network System technologists.

**(a) ICT Computer System**

This area or pillar defines the job scope dealing with ICT computer systems such as the installation, configuration, troubleshooting and maintenance of hardware and software components of an ICT computer system either stand-alone or networked. It also involves preventive maintenance, system recovery, Standard Operating Procedures, network cabling, and networking devices.

**(b) ICT Network System**

At Level 5 and 6, the ICT Network technologists must be able to configure high end networking devices which include unified communication functions, manage operation of VOIP server systems, configure and monitor soft switch applications, Quality of Service (QoS) in high end network devices and other high end networking job functions that entail the current advancement of networking technologies.

At Level 7 and Level 8, the specialists play a major role in driving business direction according to emerging ICT technologies.

**(ii) Application System Development**

This subsector is said to be the 'brains' of the ICT industry as applications provide the software that define the utilisation of ICT systems. Compared to the existing job titles in application system development, the industry observes that if the next generation of workforce were more specialised in the different areas of application system development, this would save the employer's time and cost spent to train them for the different types of programming. This is because each of the areas of programming languages are rapidly changing and evolving; it would be more efficient for a specialised programmer to update their knowledge in their respective programming areas. The following are the different programming areas observed and proposed:

### (a) Multimedia Programming

This programming area involves multimedia based programming language and scripting. The coding produced will function as the engine for the digital creative products.

### (b) Web Based/WAP Programming

This consists of web-based and object oriented programming language and scripting usually used to develop web content such as websites, portals, e-learning and e-commerce. To accommodate the expanding trend of web access via mobile phones, Wireless Application Protocol programming is also important.

### (c) Server Programming

It has been observed that Malaysia is lacking programmers specialised in this area as currently, local organisations have to employ foreign personnel at an expensive rate. Therefore, there is a need for programmers that are competent using host-based server programming language and scripting.

### (d) Desktop Programming

Involves desktop applications and information systems which serve to be an important information management tool in any organisation. It also involves hardware interfacing and programming that deals directly to the hardware such as C and C++.

### (e) Database Programming

The industry observes a lack of local database programmers who are efficient in designing and developing databases. Databases have become an important element of organisations as they contain the information critical to their operation. Therefore, competent database programmers are required to meet the expanding use of information in Malaysia's knowledge based economy.

Those in this subsector begin at Level 3 as a Junior Programmer who will be trained in all the basics of programming and will be able to choose a more specialised programming language at

Level 4 until Level 5 as mentioned above. At Level 6, they will conduct the duties of a System Analyst that will be common for the five programming languages except for database programming known in the industry as a Database Administrator. At Level 7 and Level 8, the specialists will conduct application development R & D activities, feasibility studies, provide consultancy and recommend the appropriate solution to support the business policies and directions.

**(iii) ICT Security**

Currently, ICT systems of most organisations can be easily accessed via the web thus making these systems more susceptible to threats such as viruses, hackers, system intrusion and data security breaches. Maintaining network and system security is required as this is the main entry point of most system attacks. Security at the user end is also important. Therefore a rigid implementation of security measures of an organisation's ICT system and personnel competent to maintain this security is also important. Important duties to be covered in this subsector are such as security audit policy, load balancing, intrusion detection & prevention systems, access control, and vulnerability test procedures.

ICT security starts at Level 5, with the prerequisite of Level 4 ICT system. This is because in the industry, only those at this Level are allowed to handle the ICT system and network devices used for ICT security.

**(iv) System Integration**

The job titles in this subsector reflect the need of efficient project managers in order to conduct a system integration project in a timely and systematic manner according to user requirements. Important aspects that must be included in the job scope of those in this subsector are such as system architecture specification standards, planning techniques, Service Level Agreements and Guarantees, public relations, contingency planning, budgeting, documentation standards, functional & integration testing and feasibility studies.

The lowest level of the System Integration subsector is at Level 6, which is as a System Integration Project Executive until Level 8, the System Integration Project Director. The prerequisite is to obtain Level 5 either

from the ICT System subsector or Application Development subsector because those with a high Level of knowledge and skills can understand the technical aspects of system integration projects.

**(v) Data Management**

Data management is seen as a critical part of most organisations, for example, banks, hospitals and such. As Malaysia is heading towards having a knowledge based economy, the efficient management of data is important and thus invoking the need of more data management personnel.

The job scope in the data management subsector consists of backup activities, data integrity, database management systems, data security, data access control, database performance tuning, disaster recovery plan and database logging.

The job titles that exist are at Level 6, Database Administrator (Data Management) and Level 7 Database Manager. The prerequisite to enter at Level 6 is Level 5 from Application System Development or from the ICT System subsector.

**(vi) Digital Creative**

The digital creative subsector is becoming more lucrative as the expanding trend of animation and interactive media is now used widely in local films, web sites, cartoons and marketing campaigns. With the advent of incorporating digital creative effects into most digital content that will trigger the aesthetic appeal which is natural to consumers from anywhere on the globe, the increase of the creative workforce to enhance our creative representation will in turn enhance marketing appeal to Malaysia's industry.

Four main areas have been identified:

**(a) Animation**

The industry feels that not only must there be an increase of technically competent personnel in this area but those who are able to visualize the storyboard and develop ideas that are more

creative. This area involves the storyline of any digital creative product and competent personnel are important to ensure the message of any digital creative product is precisely conveyed.

**(b) Audio**

The use of audio in the digital creative field requires personnel competent to provide audio-related services in the production as needed; and to perform a variety of technical tasks relative to the assigned area of responsibility. The job scope includes voice talent scouting, voice over, handling audio equipment, recording, audio editing, studio management, composing audio, project management and quality control.

**(c) Video**

The use of video in digital creative production requires personnel technically competent in handling video equipment; perform technical duties related to the delivery of video media, teleconferences and record video cable-casts and satellite programs for instructional purposes. The digital creative video pillar involves video encoding, video rendering, video effects and filing management.

**(d) Interactive Media**

Interactive Media starts at Level 4 where the prerequisite is Level 3 from any Digital Creative area. The Interactive Media Designer and Director deal with digital work flow, media materials, content services, storage media equipment, instructional design, media operation equipment, media application integration and copyright. They research and analyse requests for new or improved creative concepts with emphasis on architecture, business need and benefit for various interactive media projects. They also provide creative and strategic direction for interactive media projects including digital content and creative assets.

| SUBSECTOR | ICT SYSTEM | |
|---|---|---|
| **LEVEL / AREA** | **ICT COMPUTER SYSTEM** | **ICT NETWORK SYSTEM** |
| **L8** | ICT SYSTEM PRINCIPAL SPECIALIST * | |
| **L7** | ICT SYSTEM SPECIALIST * | |
| **L6** | ICT COMPUTER SYSTEM PRINCIPAL TECHNOLOGIST * | ICT NETWORK SYSTEM PRINCIPAL TECHNOLOGIST * |
| **L5** | ICT COMPUTER SYSTEM TECHNOLOGIST * | ICT NETWORK SYSTEM TECHNOLOGIST * |
| **L4** | ICT SYSTEM SENIOR TECHNICIAN | |
| **L3** | ICT SYSTEM TECHNICIAN | |
| **L2** | ICT SYSTEM ASSISTANT TECHNICIAN | |
| **L1** | *- No Level -* | |

**Note: (i) * Critical job titles**

Figure 5.5: ICT System subsector

| SUBSECTOR | APPLICATION SYSTEM DEVELOPMENT | | | | |
|---|---|---|---|---|---|
| **LEVEL / AREA** | **MULTIMEDIA PROGRAMMING** | **WEB BASED / WAP PROGRAMMING** | **SERVER PROGRAMMING** | **DESKTOP PROGRAMMING** | **DATABASE PROGRAMMING** |
| **L8** | APPLICATION SYSTEM DEVELOPMENT PRINCIPAL SPECIALIST * | | | | |
| **L7** | APPLICATION SYSTEM DEVELOPMENT SPECIALIST * | | | | |
| **L6** | SYSTEM ANALYST * | | | | DATABASE ADMINISTRATOR * (APPLICATION SYSTEM DEVELOPMENT) |
| **L5** | MULTIMEDIA ANALYST PROGRAMMER * | WEB BASED/ WAP ANALYST PROGRAMMER | SERVER ANALYST PROGRAMMER * | DESKTOP ANALYST PROGRAMMER | DATABASE SENIOR PROGRAMMER * |
| **L4** | MULTIMEDIA PROGRAMMER * | WEB BASED/WAP PROGRAMMER | SERVER PROGRAMMER * | DESKTOP PROGRAMMER | DATABASE PROGRAMMER* |
| **L3** | JUNIOR PROGRAMMER | | | | |
| **L2** | *- No Level -* | | | | |
| **L1** | *- No Level -* | | | | |

**Note: (i) Prerequisite to Level 3 Junior Programmer is Level 2 ICT system**

**(ii) *Critical job titles**

Figure 5.6: Application System Development subsector

| LEVEL / SUBSECTOR | SYSTEM INTEGRATION |
|---|---|
| **L8** | SYSTEM INTEGRATION PROJECT DIRECTOR * |
| **L7** | SYSTEM INTEGRATION PROJECT MANAGER * |
| **L6** | SYSTEM INTEGRATION PROJECT EXECUTIVE * |
| **L5** | *- No Level -* |
| **L4** | *- No Level -* |
| **L3** | *- No Level -* |
| **L2** | *- No Level -* |
| **L1** | *- No Level -* |

**Note: (i) Prerequisite Level 6 is Level 5 ICT Computer System or ICT Network System or Application System Development**
**(ii) * Critical job titles**

Figure 5.6: System Integration subsector

| SUBSECTOR / LEVEL / AREA | ICT SECURITY |
|---|---|
| **L8** | *- No Level -* |
| **L7** | ICT SYSTEM SECURITY SPECIALIST * |
| **L6** | ICT SYSTEM SECURITY PRINCIPAL TECHNOLOGIST * |
| **L5** | ICT SYSTEM SECURITY TECHNOLOGIST * |
| **L4** | *- No Level -* |
| **L3** | *- No Level -* |
| **L2** | *- No Level -* |
| **L1** | *- No Level -* |

**Note: (i) Prerequisite to Level 5 ICT System Security is Level 4 ICT Computer System or ICT Network System**

**(ii) *Critical Job Titles**

Figure 5.7: ICT Security subsector

| LEVEL / SUBSECTOR | DATA MANAGEMENT |
|---|---|
| **L8** | *- No Level -* |
| **L7** | DATABASE MANAGER * |
| **L6** | DATABASE ADMINISTRATOR *<br>(DATA MANAGEMENT) |
| **L5** | *- No Level -* |
| **L4** | *- No Level -* |
| **L3** | *- No Level -* |
| **L2** | *- No Level -* |
| **L1** | *- No Level -* |

**Note: (i) Prerequisite to Level 6 Database Administrator is Level 5 ICT Computer System or ICT Network System or Application System Development**

**(ii) *Critical Job Titles**

Figure 5.8: Data Management subsector

| SUBSECTOR | DIGITAL CREATIVE | | | | | | |
|---|---|---|---|---|---|---|---|
| **LEVEL / AREA** | **ANIMATION** | | | | **AUDIO** | **VIDEO** | **INTERACTIVE MEDIA** |
| **L8** | *- No Level -* | | | | | | |
| **L7** | DIGITAL CREATIVE PROJECT MANAGER * | | | | | | |
| **L6** | DIGITAL CREATIVE DIRECTOR * | | | | | | |
| **L5** | ART DIRECTOR | | ANIMATION DIRECTOR | STORYBOARD DIRECTOR | AUDIO DIRECTOR * | VIDEO DIRECTOR* | INTERACTIVE MEDIA DIRECTOR * |
| **L4** | LEAD BACKGROUND ARTIST | LAYOUT ARTIST | LEAD ANIMATOR | STORYBOARD ARTIST | AUDIO SENIOR TECHNICIAN * | VIDEO SENIOR TECHNICIAN * | INTERACTIVE MEDIA DESIGNER * |
| **L3** | GRAPHIC ARTIST | | | | AUDIO TECHNICIAN * | VIDEO TECHNICIAN * | *- No Level -* |
| **L2** | GRAPHIC JUNIOR ARTIST | | | | AUDIO ASSISTANT TECHNICIAN * | VIDEO ASSISTANT TECHNICIAN * | *- No Level -* |
| **L1** | *- No Level -* | | | | | | |

**Note: (i) Prerequisite to Level 4 Interactive Media Designer is Level 3 Graphic Artist or Audio Technician or Video Technician**

**(ii) *Critical Job Titles**

Figure 5.9: Digital Creative subsector

## 5.3 MAPPING BETWEEN THE PROPOSED JOB TITLES TO THE EXISTING JOB TITLES

Due to the rapid development in ICT, the existing job titles in DSD's Registry of Job Titles for the ICT sector have been reviewed and enhanced. The new proposed job titles reflect a more refined and specialised spectrum of job titles, while still maintaining the main framework of the ICT sector of the existing job titles. Two visual representations of the mapping between the proposed job titles to the existing ones are included in this section, the first is an overall view of all the subsectors; *Figure 5.10: Mapping Between the Proposed Job Titles to the Existing Job Titles* and the following Figures are mapped matrices of the different proposed subsectors to the existing NOSS.

### 5.3.1 Overall Mapping Between the Proposed Job Titles to the Existing Job Titles

#### (i) ICT Systems

It can be seen that the ICT systems subsector is mapped to the Computer System and Network System areas. This is because the new ICT system subsector's job scope deals with both computer and network systems as currently in the industry, the two areas are more related to one another.

#### (ii) Application System Development

All 5 areas of programming (i.e.: Web Based/WAP, Multimedia, Server, Desktop and Database) map directly to the existing area of application system development. The difference is that the new areas are more specialised according to the types of programming that exist in the industry today.

#### (iii) ICT Security

The revised ICT Security job area still maintains network security, application security, ICT operation security, security management, and system security. However they are combined under one area because they are similar in job scope and closely related.

### (iv) System Integration

System Integration is mapped to all the 4 areas in the existing IT – Computer sector because this area requires the personnel to be well versed in all the four components of an ICT system, the computer and network system, application system development and information management.

### (v) Data Management

Data Management is mapped to the existing Information Systems area because it deals with the management of data and information. It is also mapped to Application System Development because in order to manage the data, the personnel must understand how to control the information via the database. This aspect was not included in the existing Information Systems area which mostly focuses on the administration and management in the office and not on information management technology.

### (vi) Digital Creative

This area is mapped to the existing multimedia sector , the different name is given to this area as the industry panel felt that it reflected the content of the job scope better compared to multimedia as the main medium is digital in a creative form. The new proposed areas are animation, interactive media, audio and video.

Animation, audio and video map directly to the existing areas under multimedia. However, authoring has been included in the proposed area, Multimedia Programming under the Application System Development subsector because it mostly involves programming and is more suitable if grouped under the Application System Development subsector.

Interactive media is a new area proposed under the Digital Creative subsector. Those in the Interactive Media area incorporate digital creative elements to products in order to enhance their appeal.

### 5.3.2 Mapping Between the Proposed Job Titles to the Existing NOSS

There are some issues regarding the mapping between the proposed job titles to the existing job titles:

**Leveling**

In accordance with JPK's requirement to take into consideration job titles extended from the existing Level 5 up to Level 8, many of the existing leveling has been changed to a higher level than the existing one.

**Matching of Proposed Job Title to Existing Job Title's Job Scope**

Some subsectors and areas have either been combined into the same area (due to the similar job scope of the previous areas, i.e. ICT Security) or have been expanded to include more specialised areas that have a potential of rapid development (i.e. Application Development)

**New existing Job Title, Area or Subsector**

As there are newly defined job titles, areas and subsectors, it is not possible to map them to existing NOSSes. However, mapping has been done between the proposed job titles to existing NOSSes according to the job scope that is felt relevant and can be used as reference.

Below is a brief explanation of the matrix for each subsector, please refer to the relevant matrix for the subsector:

**(i) ICT System**

It can be seen from the mapped matrix that the leveling has not changed dramatically except that the leveling is until Level 8. The job titles have changed to reflect the discussions conducted with the OA development panel to match job titles used in the industry. The previous areas of Computer Systems have been combined at some levels, as they are similar in job scope.

### (ii) Application Development

The leveling for Application Development's entry level has been pushed from Level 2 to Level 3 as the skills and knowledge required to become a Junior Programmer are more suitable at Level 3, this includes the nature of work of a Junior Programmer. The subsequent levels follow the level 'promotion' until Level 6.

The proposed areas' job scope and course content has been further specialized to accommodate current demands, however, the previous job titles which were more generic were more suitable for Desktop programming and basic Database programming and therefore could not be mapped to the newly proposed areas such as Server programming, Multimedia programming and Web Based programming. Multimedia programming is mapped to the Authoring NOSS under IT-Multimedia.

### (iii) ICT Security

The current ICT Security NOSS is at Level 3 whereas the NOSS for Level 4 and 5 have not yet been developed. However, the proposed job titles begin at Level 5, ICT Security Technologist, because in the industry only those at the engineer or technologist level can handle ICT Security for a particular company. The content of the existing Level 3 NOSS may be the same for the proposed Level 5 job title and can be referred to.

### (iv) System Integration

This is a newly proposed subsector that has never had any NOSS development before. It starts at Level 6, System Integration Project Executive, where the content from the existing Level 5 NOSS of Information Systems, Application Development, Computer Systems and Network Systems can be referred to.

### (v) Data Management

This is also a newly proposed subsector that has never had any NOSS development before. It starts at Level 6, Database Administrator, where the content from the existing Level 5 NOSS of Information Systems, Application Development, Computer Systems and Network Systems can be referred to.

### (vi) Digital Creative

It can be seen from the matrix that the existing NOSS for D-120-5 can be mapped to the proposed Level 5 job titles as they both have the job scope as a Director. However, the proposed job titles are more specialized according to the 4 different areas in Digital Creative. The proposed job titles for Level 4 could not be mapped to the existing Level 4 NOSS because the job scope of the existing job titles were more for a manager, where as in the proposed job titles, the job scope is as specialized artists, technicians and designers. The Level 2 and Level 3 proposed job titles can be mapped to existing NOSSes according to their respective areas. The existing Authoring job titles can not be mapped to the proposed job titles in Digital Creative but it can be mapped to the newly proposed Application Development-Multimedia Programming.

| PROPOSED JOB TILES/ / EXISTING JOB TITLES | | ICT System | | Application System Development | | | | | ICT Security | System Integration | Data Management | Digital Creative | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ICT Computer system | ICT Network system | Multimedia Programming | Server Programming | Desktop Programming | Web Based Programming | Database Programming | | | | Animation | Audio | Video | Interactive Media |
| IT-Computer System | Information System | | | | | | | | | | | | | | |
| | Computer System | | | | | | | | | | | | | | |
| | Network System | | | | | | | | | | | | | | |
| | Application Development | | | | | | | | | | | | | | |
| IT - Security | ICT App. Sec | | | | | | | | | | | | | | |
| | ICT N/Work Sec. | | | | | | | | | | | | | | |
| | ICT Sys. Sec. | | | | | | | | | | | | | | |
| | ICT Operation Sec. & Sec. Mgmt | | | | | | | | | | | | | | |
| IT-Multi media | Animation & Visual | | | | | | | | | | | | | | |
| | Audio | | | | | | | | | | | | | | |
| | Video | | | | | | | | | | | | | | |
| | Authoring | | | | | | | | | | | | | | |

Figure 5.10: Mapping Between the Proposed Job Titles to the Existing Job Titles

| SUB SECTOR / LEVEL | ICT SYSTEM | | INFORMATION SYSTEM D-060 | | | | COMPUTER SYSTEM D-041 | | | | NETWORK SYSTEM D-051 | | | | APPLICATION DEVELOPMENT D-070 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ICT COMPUTER SYSTEM | ICT NETWORK SYSTEM | D-060 -2 | D-60 -3 | D-060 -4 | D-060 -5 | D-041 -2 | D-041 -3 | D-041 -4 | D-041 -5 | D-051 -2 | D-051- 3 | D-051 -4 | D-051 -5 | D-070 -2 | D-070 -3 | D-070 -4 | D-070 -5 |
| L8 | ICT System Principal Specialist | | | | | | | | | | | | | | | | | |
| L7 | ICT System Specialist | | | | | | | | | | | | | | | | | |
| L6 | ICT Computer System Principal Technologist | | | | | | | | | | | | | | | | | |
| L6 | ICT Network System Principal Technologist | | | | | | | | | | | | | | | | | |
| L5 | ICT Computer System Technologist | | | | | | | | | | | | | | | | | |
| L5 | ICT Network System Technologist | | | | | | | | | | | | | | | | | |
| L4 | ICT System Senior Technician | | | | | | | | | | | | | | | | | |
| L3 | ICT System Technician | | | | | | | | | | | | | | | | | |
| L2 | ICT System Assistant Technician | | | | | | | | | | | | | | | | | |
| L1 | *- No Level -* | | | | | | | | | | | | | | | | | |

| SUB SECTOR / LEVEL | APPLICATION SYSTEM DEVELOPMENT | APPLICATION DEVELOPMENT D-070 | | | | AUTHORING | |
|---|---|---|---|---|---|---|---|
| | | D-070-2 | D-070-3 | D-070-4 | D-070-5 | D-080-2 | D-080-3 |
| L8 | Application System Development Principal Specialist | | | | | | |
| L7 | Application System Development Specialist | | | | | | |
| L6 | System Analyst | | | | | | |
| L6 | Database Administrator | | | | | | |
| L5 | Multimedia Analyst Programmer | | | | | | |
| L5 | Web Based/WAP Analyst Programmer | | | | | | |
| L5 | Server Analyst Programmer | | | | | | |
| L5 | Desktop Analyst Programmer | | | | | | |
| L5 | Database Senior Programmer | | | | | | |
| L4 | Multimedia Programmer | | | | | | |
| L4 | Web Based/WAP Programmer | | | | | | |
| L4 | Server Programmer | | | | | | |
| L4 | Desktop Programmer | | | | | | |
| L4 | Database Programmer | | | | | | |
| L3 | Junior Programmer | | | | | | |
| L2 | *- No Level -* | Prerequisite to Level 3 Junior Programmer is Level 2 ICT system | | | | | |
| L1 | *- No Level -* | | | | | | |

| SUB SECTOR/ LEVEL | ICT SECURITY | ICT APPLICATION SECURITY D-300 | | | ICT SYSTEM SECURITY D-300 | | | ICT NETWORK SECURITY D-301 | | | ICT OPERATION SECURITY AND SECURITY MANAGEMENT D-302 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | D-300-3 | D-300-4 Not Available | D-300-5 Not Available | D-300-3 | D-301-4 Not Available | D-301-5 Not Available | D-301-3 | D-301-4 Not Available | D-301-5 Not Available | D-302-3 | D-302-4 Not Available | D-302-5 Not Available |
| L8 | *- No Level -* | | | | | | | | | | | | |
| L7 | ICT System Security Specialist | | | | | | | | | | | | |
| L6 | ICT System Security Principal Technologist | | | | | | | | | | | | |
| L5 | ICT System Security Technologist | | | | | | | | | | | | |
| L4 | *- No Level -* | Prerequisite to Level 5 ICT System Security is Level 4 ICT Computer System or ICT Network System | | | | | | | | | | | |
| L3 | *- No Level -* | | | | | | | | | | | | |
| L2 | *- No Level -* | | | | | | | | | | | | |
| L1 | *- No Level -* | | | | | | | | | | | | |

| SUB SECTOR/ LEVEL | SYSTEM INTEGRATION | INFORMATION SYSTEM D-060 | | | | COMPUTER SYSTEM D-041 | | | | NETWORK SYSTEM D-051 | | | | APPLICATION DEVELOPMENT D-070 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | D-060 -2 | D-060 -3 | D-060 -4 | D-060 -5 | D-041 -2 | D-041 -3 | D-041 -4 | D-041 -5 | D-051 -2 | D-051 -3 | D-051 -4 | D-051 -5 | D-070 -2 | D-070 -3 | D-070 -4 | D-070 -5 |
| L8 | System Integration Project Director | | | | | | | | | | | | | | | | |
| L7 | System Integration Project Manager | | | | | | | | | | | | | | | | |
| L6 | System Integration Project Executive | | | | | | | | | | | | | | | | |
| L5 | *- No Level -* | **Prerequisite to Level 6 is Level 5 ICT Computer System or ICT Network System or Application System Development** | | | | | | | | | | | | | | | |
| L4 | *- No Level -* | | | | | | | | | | | | | | | | |
| L3 | *- No Level -* | | | | | | | | | | | | | | | | |
| L2 | *- No Level -* | | | | | | | | | | | | | | | | |
| L1 | *- No Level -* | | | | | | | | | | | | | | | | |

| SUB SECTOR/ LEVEL | DATA MANAGEMENT | INFORMATION SYSTEM D-060 | | | | COMPUTER SYSTEM D-041 | | | | NETWORK SYSTEM D-051 | | | | APPLICATION DEVELOPMENT D-070 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | D-060 -2 | D-060 -3 | D-060 -4 | D-060 -5 | D-041 -2 | D-041 -3 | D-041 -4 | D-041 -5 | D-051 -2 | D-051 -3 | D-051 -4 | D-051 -5 | D-070 -2 | D-070 -3 | D-070 -4 | D-070 -5 |
| L8 | *- No Level -* | | | | | | | | | | | | | | | | |
| L7 | Database Manager | | | | | | | | | | | | | | | | |
| L6 | Database Administrator | | | | | | | | | | | | | | | | |
| L5 | *- No Level -* | **Prerequisite to Level 6 Database Administrator is Level 5 ICT Computer System or ICT Network System or Application System Development** | | | | | | | | | | | | | | | |
| L4 | *- No Level -* | | | | | | | | | | | | | | | | |
| L3 | *- No Level -* | | | | | | | | | | | | | | | | |
| L2 | *- No Level -* | | | | | | | | | | | | | | | | |
| L1 | *- No Level -* | | | | | | | | | | | | | | | | |

| SUB SECTOR/ LEVEL | DIGITAL CREATIVE | MULTIMEDIA PRODUCTION | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MULTIMEDIA CREATIVE | | ANIMATION & VISUAL | | | AUDIO | | VIDEO | | AUTHORING | |
| | | D-120-4 | D-120-5 | D-111-2 | D-110-2 | D-112-3 | D-100 -2 | D-100-3 | D-090-2 | D-090-3 | D-080-2 | D-080-3 |
| L8 | *- No Level -* | | | | | | | | | | | |
| L7 | Digital Creative Project Manager | | | | | | | | | | | |
| L6 | Digital Creative Director | | | | | | | | | | | |
| L5 | Art Director | | | | | | | | | | | |
| L5 | Animation Director | | | | | | | | | | | |
| L5 | Storyboard Director | | | | | | | | | | | |
| L5 | Audio Director | | | | | | | | | | | |
| L5 | Video Director | | | | | | | | | | | |
| L5 | Interactive Media Director | | | | | | | | | | | |
| L4 | Lead Background Artist | | | | | | | | | | | |
| L4 | Layout Artist | | | | | | | | | | | |
| L4 | Lead Animator | | | | | | | | | | | |
| L4 | Storyboard Artist | | | | | | | | | | | |
| L4 | Audio Senior Technician | | | | | | | | | | | |
| L4 | Video Senior Technician | | | | | | | | | | | |
| L4 | Interactive Media Designer | | | | | | | | | | | |
| L3 | Graphic Artist | | | | | | | | | | | |
| L3 | Audio Technician | | | | | | | | | | | |
| L3 | Video Technician | | | | | | | | | | | |
| L2 | Graphic Junior Artist | | | | | | | | | | | |
| L2 | Audio Assistant Technician | | | | | | | | | | | |
| L2 | Video Assistant Technician | | | | | | | | | | | |
| L1 | *- No Level -* | | | | | | | | | | | |

## 5.4 ENTRY POINTS/CAREER PATH

### (i) Entry Level at Level 2

**Subsector: ICT System and Digital Creative**

The entry Level for the ICT Systems and Digital Creative subsector starts at Level 2 (Assistant Technician and Junior Artist) because the job scope requires routine work and at this Level, they can make their decisions according to their Level of autonomy. It does not start at Level 1, which is the same as the existing ICT job titles because it is considered that even at the most basic entry Level for the ICT sector, they must be able to make decisions when they encounter problems or when work conditions are not routine.

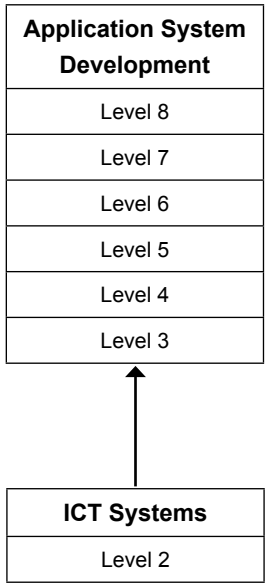
| ICT Systems |
|---|
| Level 8 |
| Level 7 |
| Level 6 |
| Level 5 |
| Level 4 |
| Level 3 |
| Level 2 |
| No Level 1 |

| Digital Creative |
|---|
| Level 8 |
| Level 7 |
| Level 6 |
| Level 5 |
| Level 4 |
| Level 3 |
| Level 2 |
| No Level 1 |

### (ii) Entry Level at Level 3

**Subsector: Application System Development**

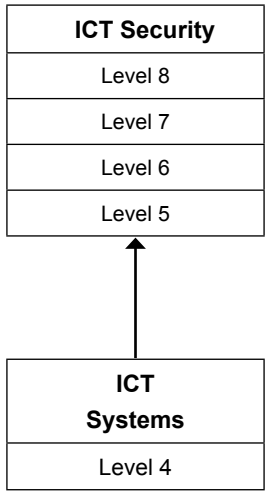
For the Application System Development subsector, the entry Level is at Level 3 (Junior Programmer) because a higher level of problem solving skills and supervisory skills is required. It does not start at Level 2 because it requires the worker to have a higher comprehension level and supervisory skills. Those from the ICT Systems subsector, Level 2 can proceed to Level 3, Application System Development because the basic skills and knowledge of ICT systems as an ICT System Assistant Technician can be the basis as a Junior Programmer.




### (iii) Entry Level at Level 5

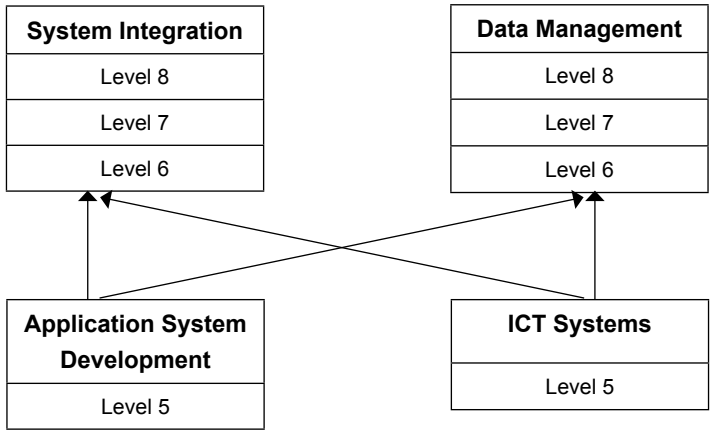
**Subsector: ICT Security**

Those entering the ICT Security subsector should be from Level 4, ICT Systems. The rationale for this is; without the competency of skills and knowledge of an ICT Systems Senior Technician, they will not be able to manage the ICT security of the system efficiently without the know-how of the structure of ICT Systems.



### (iv) Entry Level at Level 6

**Subsector: System Integration and Data Management**




To enter System Integration, Level 6, it is a prerequisite to be from the Application System Development or ICT Systems subsector at Level 5. The rationale for this prerequisite is; in order to conduct system integration seamlessly, they must have extensive comprehension and skills in either of the two subsectors stated above. System Integration does not start at lower levels because the lowest management level in System Integration project management is at the executive level (i.e. System Integration Project Executive).

It is a prerequisite that to enter Level 6, Data Management, they must be from Level 5, Application System Development or ICT Systems because either the Analyst Programmers or Technologists have sufficient knowledge and skills from their respective areas to become a Database Administrator (Data Management) at Level 6. The Data Management subsector does not start at lower Levels because currently in the industry, the Database Administrator (Data Management) must be from an Analyst programmer or ICT Systems technologist background.

## 5.5 OCCUPATIONAL DEFINITION

Under the ICT sector, job titles are identified and defined. Each of the job title is given a job definition as specified. The definition for all job titles is as in Annex 4.

## 5.6 CRITICAL JOB TITLE

The critical job titles have been determined based on the analysis conducted with the panel experts. It can be seen in Figure 5.11, a total of **36 job titles** are considered to be critical compared to the **17 non critical** job titles.

Most of the critical job titles are from the Digital Creative sector, under the Audio, Video and Interactive Media area with a total of 12 job titles. The reason for this is that there is still an expanding need for skilled personnel in these areas including the 2 top most levels of the Digital Creative subsector, which are the Digital Creative Director and Digital Creative Project Manager. ICT System and ICT System Security Technologists from Level 5 to Level 8 are also considered critical because many organisations require skilled personnel to provide efficient ICT infrastructure and services in Malaysia. Programmers specialised in Multimedia, Server and Database programmings are critical job titles because currently there is a shortage in the local workforce.

As Malaysia is moving towards a knowledge based economy, Database (Data Management) Administrators and Database Managers are critical in order to manage the ever expanding use of data. System Integration Project Executives, Managers and Directors are also critical in the implementation of efficient System Integration Projects.

## (i) CRITICAL JOB TITLES

### (a) SUBSECTOR: DIGITAL CREATIVE

| No. | Job Title | Level |
|---|---|---|
| 1 | Audio Assistant Technician | L2 |
| 2 | Video Assistant Technician | L2 |
| 3 | Audio Technician | L3 |
| 4 | Video Technician | L3 |
| 5 | Audio Senior Technician | L4 |
| 6 | Video Senior Technician | L4 |
| 7 | Interactive Media Designer | L4 |
| 8 | Audio Director | L5 |
| 9 | Video Director | L5 |
| 10 | Interactive Media Director | L5 |
| 11 | Digital Creative Director | L6 |
| 12 | Digital Creative Project Manager | L7 |

### (b) SUBSECTOR: DATA MANAGEMENT

| No. | Job Title | Level |
|---|---|---|
| 1 | Database Administrator (Data Management) | L6 |
| 2 | Database Manager | L7 |

### (c) SUBSECTOR: ICT SECURITY

| No. | Job Title | Level |
|---|---|---|
| 1 | ICT System Security Technologist | L5 |
| 2 | ICT System Security Principal Technologist | L6 |
| 3 | ICT System Security Specialist | L7 |

## (d) SUBSECTOR: ICT SYSTEM

| No. | Job Title | Level |
|---|---|---|
| 1 | ICT Computer System Technologist | L5 |
| 2 | ICT Network System Technologist | L5 |
| 3 | ICT Computer System Principal Technologist | L6 |
| 4 | ICT Network System Principal Technologist | L6 |
| 5 | ICT System Specialist | L7 |
| 6 | ICT System Principal Specialist | L8 |

## (e) SUBSECTOR: SYSTEM INTEGRATION

| No. | Job Title | Level |
|---|---|---|
| 1 | System Integration Project Executive | L6 |
| 2 | System Integration Project Manager | L7 |
| 3 | System Integration Project Director | L8 |

## (f) SUBSECTOR: APPLICATION SYSTEM DEVELOPMENT

| No. | Job Title | Level |
|---|---|---|
| 1 | Multimedia Programmer | L4 |
| 2 | Server Programmer | L4 |
| 3 | Database Programmer | L4 |
| 4 | Multimedia Analyst Programmer | L5 |
| 5 | Server Analyst Programmer | L5 |
| 6 | Database Senior Programmer | L5 |
| 7 | System Analyst | L6 |
| 8 | Database Administrator (Application System Development) | L6 |
| 9 | Application Development Specialist | L7 |
| 10 | Application Development Principal Specialist | L8 |

## (ii) NON-CRITICAL JOB TITLES

### (a) SUBSECTOR: DIGITAL CREATIVE

| No. | Job Title | Level |
|---|---|---|
| 1 | Graphic Junior Artist | L2 |
| 2 | Graphic Artist | L3 |
| 3 | Lead Background Artist | L4 |
| 4 | Layout Artist | L4 |
| 5 | Lead Animator | L4 |
| 6 | Storyboard Artist | L4 |
| 7 | Art Director | L5 |
| 8 | Animation Director | L5 |
| 9 | Storyboard Director | L5 |

### (b) SUBSECTOR: ICT SYSTEM

| No. | Job Title | Level |
|---|---|---|
| 1 | ICT System Assistant Technician | L2 |
| 2 | ICT System Technician | L3 |
| 3 | ICT System Senior Technician | L4 |

### (c) SUBSECTOR: APPLICATION SYSTEM DEVELOPMENT

| No. | Job Title | Level |
|---|---|---|
| 1 | Junior Programmer | L3 |
| 2 | Web Based/WAP Programmer | L4 |
| 3 | Desktop Programmer | L4 |
| 4 | Web Based/WAP Analyst Programmer | L5 |
| 5 | Desktop Analyst Programmer | L5 |

| SUBSECTOR | | | LEVEL | | | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | NL | L1 | L2 | L3 | L4 | L5 | L6 | L7 | L8 | |
| **1** | **Digital Creative** | ***Critical*** | | 0 | 2 | 2 | 3 | 3 | 1 | 1 | 0 | 12 |
| | | ***Non-Critical*** | | 0 | 1 | 1 | 4 | 3 | 0 | 0 | 0 | 9 |
| **2** | **Data Management** | ***Critical*** | | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 2 |
| | | ***Non-Critical*** | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **3** | **ICT Security** | ***Critical*** | | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 3 |
| | | ***Non-Critical*** | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **4** | **ICT System** | ***Critical*** | | 0 | 0 | 0 | 0 | 2 | 2 | 1 | 1 | 6 |
| | | ***Non-Critical*** | | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 3 |
| **5** | **System Integration** | ***Critical*** | | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 3 |
| | | ***Non-Critical*** | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **6** | **Application System Development** | ***Critical*** | | 0 | 0 | 0 | 3 | 3 | 2 | 1 | 1 | 10 |
| | | ***Non-Critical*** | | 0 | 0 | 1 | 2 | 2 | 0 | 0 | 0 | 5 |
| | | | **Critical** | | | | | | | | | **36** |
| | | | **Non-Critical** | | | | | | | | | **17** |
| **Total** | | | | 0 | 4 | 5 | 13 | 14 | 8 | 6 | 3 | **53** |

Figure 5.11: Critical and Non-Critical Schedule

# 6. CONCLUSION AND RECOMMENDATION

As a result of the ICT Sector Occupational Analysis conducted together with expert panel members from various ICT subsectors and organisations, a total of 53 job titles and 6 main subsectors have been identified.

Referring to Malaysia's economical plans and vision for the coming years, such as the IMP 3 and RMK 9, a framework of the ICT workforce has been identified. It is hoped that the result of this Occupational Analysis will be able to fulfill the future plans by training Malaysians to be skilled workers in the delivery of advanced information, communication and multimedia services towards improving the quality of life of Malaysians and at boosting Malaysia's global competitiveness.

Malaysia has made significant strides in increasing the information and knowledge content in all economic activities. This will enable all Malaysians to take advantage of advancements in ICT to improve efficiency and productivity, thus contributing to the increased overall competitiveness of the economy. Additional measures must also be undertaken to enhance human resource development to provide adequate skilled and knowledgeable manpower to support the knowledge-based economy.

Information and communication technology is an industry with a great potential. Endowed with strong government support and a substantial human resource, this industry could expand by the tight corporation between government, ICT companies and education centres.

# 7. REFERENCES


1. What is the MYICMS 886 Strategy. Maxis. https://mdp.maxis.com.my/pdf/MyICMS886%20booklet.pdf
2. Ninth Malaysian Plan (2006-2010).Bernama.2006 http://web5.bernama.com/events/rmk9/speechEng.html
3. IMP3 Third Industrial Master Plan (2006–2020).Ministry of International Trade and Industry Malaysia.2006. http://webevents.bernama.com/events/imp3/
4. E-NOSS. Jabatan Pembangunan Kemahiran.2008 http://www.nvtc.gov.my/enoss/index.html
5. www.idc.com.my
6. www.matrade.gov.my
7. www.msctc.com.my
8. www.outsourcingmalaysia.org.my
9. www.unescorp.org
10. www.mohr.gov.my/eNOSS
11. www.Wikipedia.com
12. www.pikom.com.my

# ANNEX 1: IMPLEMENTATION SCHEDULE-OCCUPATIONAL ANALYSIS OF ICT SECTOR

# ANNEX 2: LIST OF PANEL EXPERTS AND FACILITATORS OF THE INFORMATION AND COMMUNICATION TECHNOLOGY OCCUPATIONAL ANALYSIS DEVELOPMENT

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MANAGER
TELEKOM MALAYSIA

**TIEW BIAW SING**
DIRECTOR
SHE RESOURCES SDN. BHD.

**PN. HAJAH ROSNA BINTI AMIR**
IT DEPARTMENT DIRECTOR
MALAYSIAN AGRICULTURAL RESEARCH AND DEVELOPMENT INSTITUTE

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**EN. NOOR FAHMY NOORMAL**
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**EN. SHAHIR BIN ASHAARI**
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**EN. MOHD NIZAM MOHD SALLEH**
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NETWORK ENGINEER
TM NET

**EN. KUSAINI BIN DAKIM**
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# FACILITATORS

**DR. AMIRON BIN ISMAIL**
CHAIRMAN
PRITEC ACADEMY

**PN. EVARINA BT. AMIRON**
MANAGING DIRECTOR
PRITEC ACADEMY

**FAHISZAM BIN SAAD**
MANAGER OF BUSINESS DEVELOPMENT
PRITEC ACADEMY

# ANNEX 3: JOB TITLES AND HIERARCHY IN INFORMATION AND COMMUNICATION TECHNOLOGY SECTOR

## 1) DIGITAL CREATIVE

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| L8 | *No Level* | | | | | | |
| L7 | Digital Creative Project Manager * | | | | | | |
| L6 | Digital Creative Director * | | | | | | |
| L5 | Art Director | | Animation Director | Storyboard Director | Audio Director* | Video Director* | Interactive Media Director* |
| L4 | Lead Background Artist | Layout artist | Lead Animator | Storyboard Artist | Audio Senior Technician* | Video Senior Technician* | Interactive Media Designer* |
| L3 | Graphic Artist | | | | Audio Technician* | Video Technician* | *No Level* |
| L2 | Graphic Junior Artist | | | | Audio Assistant Technician* | Video Assistant Technician* | *No Level* |
| L1 | *No Level* | | | | | | |

**Note: (i) Prerequisite to Level 4 Interactive Media Designer is Level 3 Graphic Artist or Audio Technician or Video Technician**

**(ii) *Critical Job Titles**

## 2) DATA MANAGEMENT

| | |
|---|---|
| L8 | *No Level* |
| L7 | Database Manager * |
| L6 | Database Administrator (Data Management) * |
| L5 | *No Level* |
| L4 | *No Level* |
| L3 | *No Level* |
| L2 | *No Level* |
| L1 | *No Level* |

**Note: (i) Prerequisite to Level 6 Database Administrator is Level 5 ICT Computer System or ICT Network System or Application Development**

**(ii) *Critical Job Titles**

## 3) ICT SECURITY

| | |
|---|---|
| L8 | *No Level* |
| L7 | ICT System Security Specialist * |
| L6 | ICT System Security Principal Technologist * |
| L5 | ICT System Security Technologist * |
| L4 | *No Level* |
| L3 | *No Level* |
| L2 | *No Level* |
| L1 | *No Level* |

**Note: (i) Prerequisite to Level 5 ICT System Security is Level 4 ICT Computer System or ICT Network System**

**(ii) *Critical Job Titles**

## 4) ICT SYSTEM

| | | |
|---|---|---|
| L8 | ICT System Principal Specialist * | |
| L7 | ICT System Specialist * | |
| L6 | ICT Computer System Principal Technologist* | ICT Network System Principal Technologist* |
| L5 | ICT Computer System Technologist* | ICT Network System Technologist* |
| L4 | ICT System Senior Technician | |
| L3 | ICT System Technician | |
| L2 | ICT System Assistant Technician | |
| L1 | *No Level* | |

**Note: (i) *Critical Job Titles**

## 5) SYSTEM INTEGRATION

| | |
|---|---|
| L8 | System Integration Project Director * |
| L7 | System Integration Project Manager * |
| L6 | System Integration Project Executive * |
| L5 | *No Level* |
| L4 | *No Level* |
| L3 | *No Level* |
| L2 | *No Level* |
| L1 | *No Level* |

**Note: (i) Prerequisite Level 6 is Level 5 ICT Computer System or ICT Network System or Application Development**

**(ii) *Critical Job Titles**

## 6) APPLICATION SYSTEM DEVELOPMENT

| | | | | | |
|---|---|---|---|---|---|
| L8 | Application Development Principal Specialist* | | | | |
| L7 | Application Development Specialist* | | | | |
| L6 | System Analyst* | | | | Database Administrator (Application System Development)* |
| L5 | Multimedia* Analyst Programmer | Web Based/ WAP Analyst Programmer | Server Analyst Programmer* | Desktop Analyst Programmer | Database Senior Programmer* |
| L4 | Multimedia* Programmer | Web Based/ WAP Programmer | Server Programmer* | Desktop Programmer | Database Programmer* |
| L3 | Junior Programmer | | | | |
| L2 | *No Level* | | | | |
| L1 | *No Level* | | | | |

**Note: (i) Prerequisite to Level 3 Junior Programmer is Level 2 ICT system**
**(ii) *Critical Job Titles**

# ANNEX 4: OCCUPATIONAL DEFINITIONS IN THE INFORMATION AND COMMUNICATION TECHNOLOGY SECTOR

# DIGITAL CREATIVE
## LEVEL 2
## GRAPHIC JUNIOR ARTIST

A GRAPHIC JUNIOR ARTIST IS DESIGNATED TO ASSIST ON DESIGNING BACKGROUND AND CHARACTER SKETCHING, CREATING ANIMATED SEQUENCE, COLOURING ON CHARACTER AND BACKGROUND, TRACING ANIMATION SEQUENCE, TO CREATE PROMOTIONAL DESIGN FOR ANIMATION PRODUCT, PERFORM SCANNING ANIMATION DRAWING AND EXECUTE SUBTITLE CONTENT FOR ANIMATION PRODUCTION.

**In particular the person will:**

1. Assist on designing background and character sketching.
2. Assist on creating animated sequence.
3. Create promotional design for animation product.
4. Assist and perform colouring on character and background.
5. Scan animation drawing.
6. Assist on tracing animation sequence.
7. Execute subtitle content for animation production.

# DIGITAL CREATIVE
## LEVEL 2
## AUDIO ASSISTANT TECHNICIAN

AN AUDIO ASSISTANT TECHNICIAN IS DESIGNATED TO PROVIDE THE EFFICIENT RUNNING OF AUDIO VISUAL EQUIPMENT, STUDIO ASSISTANCE ACTIVITIES, HOUSEKEEPING AND TROUBLESHOOTING ASSISTANCE ON SITE OR REMOTELY IN THE OPERATION AND UTILIZATION OF A WIDE RANGE OF AUDIOVISUAL AND MULTIMEDIA EQUIPMENT.

HE/SHE WILL ALSO ASSIST THE AUDIO TECHNICIAN IN AUDIO RECORDING ACTIVITIES AND PROVIDE TECHNICAL ASSISTANCE TO ARTISTS AND STAFF.

**In particular the person will:**

1. Ensure the efficient running of audio visual equipment and solves problems as they arise.
2. Provide troubleshooting assistance on site or remotely in the operation and utilization of a wide range of audiovisual and multimedia equipment.
3. Prepare and reconfigure equipment to ensure that the equipment meets the demands of the job including sound reinforcement at performances, microphones for performers and ensembles and set up loudspeaker systems for stage and provide appropriate.
4. Assist Audio Technician in audio recording activities using Studio Suite equipment and studio management software or equivalent.
5. Provide technical assistance to artists and staff for department events; set up stage and seating; operate lighting; operate sound playback and sound reinforcement.
6. Perform basic audio visual wiring techniques and able to use basic hand and power tools.
7. Perform studio assistance activities including CD duplication, CD labeling, media storage and housekeeping.
8. Comply with standard and operating procedure for studio management and activities.
9. Work closely with the sound team.

# DIGITAL CREATIVE
## LEVEL 2
## VIDEO ASSISTANT TECHNICIAN

A VIDEO ASSISTANT TECHNICIAN IS DESIGNATED TO PERFORM INSTALLATION AND MAINTENANCE OF VIDEO AND COMPUTER, AS WELL AS PROCURING PARTS AND COMPLETING NECESSARY DOCUMENTATION ASSOCIATED WITH THESE PROJECTS AND ASSIGNMENTS. ADDITIONALLY, VIDEO ASSISTANT TECHNICIAN PROVIDES TECHNICAL ASSISTANCE FOR SET-UP, OPERATION AND MAINTENANCE OF THE VIDEO EQUIPMENT.

**In particular the person will:**

1. Provide technical assistance regarding video productions, archiving, video transfers, equipment and software use, scheduling and troubleshooting of all analog and digital equipment.
2. Perform routine Studio maintenance as required and daily maintenance and troubleshooting to ensure reliability of services and delivery of video systems (VTC, room systems, distribution, LAN-based, ISDN Video systems).
3. Maintain and upkeep video equipment.
4. Setup for proper operation of A/V podiums and video equipments.
5. Assist in booking and scheduling for technical needs of all events.
6. Operate video, audio and lighting equipment in video production projects and provides assistance to users of the multi-media center.
7. Comply and understand equipment instructions including video equipment, recorders, projectors, com-cat, lighting board, cameras, stereo equipment, off-line editing system and various other equipment.

# DIGITAL CREATIVE
## LEVEL 3
## GRAPHIC ARTIST

A GRAPHIC ARTIST IS DESIGNATED TO PERFORM BACKGROUND AND CHARACTER SKETCHING, TO CREATE 3D MODELING FOR CHARACTER AND BACKGROUND, LIGHTING AND SHADOW, 3D ANIMATED SEQUENCE AND SPECIAL EFFECT FOR 3D SHOTS.

**In particular the person will:**

1. Perform background and character sketching.
2. Create 3D character and background modelling.
3. Create 3D animated sequence.
4. Perform rendering on animation character, background according to production requirement.
5. Create lighting and shadow elements for 3D object.
6. Create special effect for 3D shots.

# DIGITAL CREATIVE
## LEVEL 3
## AUDIO TECHNICIAN

AN AUDIO TECHNICIAN ASSEMBLES, OPERATES, MAINTAINS AND REPAIRS TECHNICAL EQUIPMENT USED TO RECORD, AMPLIFY, ENHANCE, MIX OR REPRODUCE SOUND, TO PERFORM AUDIO RECORDING ACTIVITIES IN A STUDIO OR ON A LOCATION IN A VARIETY OF MEDIA AND MATERIALS. AUDIO TECHNICIANS WORK WITHIN A SOUND TEAM, WHICH AIMS TO INTERPRET THE PRODUCTION AND ARTISTIC REQUIREMENTS OF THE AUDIO DIRECTOR.

**In particular the person will:**

1. Operate and troubleshoot technical amplification and recording equipment.
2. Test and evaluate the performance of audio equipment; make adjustments to recording equipment as required.
3. Coordinate and provide audio-related services for a variety of performances and events; set up and operate equipment.
4. Apply technical knowledge of sound recording equipment and studio suite software to create the required artistic effect in a variety of environments.
5. Perform recording sound, in a studio or on location, onto digital audio tape or hard disk recorders.
6. Ensure that health and safety requirements for the recording environment are met.
7. Work closely with the sound team.
8. Maintain sound equipment.
9. Assist Audio Senior Technician in post-production sound, where recorded sound is balanced, mixed, edited and any extra sound effects added in.

# DIGITAL CREATIVE
## LEVEL 3
## VIDEO TECHNICIAN

A VIDEO TECHNICIAN IS DESIGNATED TO PERFORM SKILLED INSTALLATION, MAINTENANCE, REPAIR, SUPERVISION AND DISTRIBUTION OF VIDEO EQUIPMENT; PERFORM TECHNICAL DUTIES RELATED TO THE DELIVERY OF VIDEO MEDIA, TELECONFERENCES AND RECORD VIDEO CABLECASTS AND SATELLITE PROGRAMS FOR INSTRUCTIONAL PURPOSES; WORK FROM SCHEMATICS, TECHNICAL MANUALS AND OTHER RELATED RESOURCES TO PERFORM REPAIRS; CALIBRATE EQUIPMENT; PERFORM ROUTINE SAFETY INSPECTIONS.

**In particular the person will:**

1. Supervise daily maintenance and troubleshooting to ensure reliability of services and delivery of video systems & supervise in any video production activity including scheduling, monitoring, editing and archiving.

2. Perform streaming media delivery including any streaming software, Pod casting, digital video editing using related video editing tools.

3. Execute activities regarding overall system architecture, detailed line and rack elevation drawings and to/from cable list in video activities.

4. Support staff in projects by checking out equipment and providing instruction, guidance and technical support.

5. Perform a variety of administrative tasks, maintaining reservations and equipment check-out request monitors studio to maintain technical standards and operating procedure.

# DIGITAL CREATIVE
## LEVEL 4
## LEAD BACKGROUND ARTIST

A LEAD BACKGROUND ARTIST IS DESIGNATED TO PROVIDE DRAWING GUIDE, PROPS LIST FOR BACKGROUND ARTIST ACCORDING TO ART DIRECTORS' REQUIREMENT, TO EVALUATE PRE-PRODUCTION PROPS AND BACKGROUND DRAWING, TO ENFORCE THE ARTISTIC AND VISUAL STYLE OF THE PROJECT ACCORDING TO PRODUCTION REQUIREMENT AND PERFORM SUPERVISORY FUNCTION.

**In particular the person will:**

1. Provide drawing guide for background artist according to Art directors' requirement.
2. Perform supervisory function.
3. Provide props list to background artist based on Art directors' requirement.
4. Evaluate pre-production props and background drawing.
5. Enforce the artistic and visual style of the project.

# DIGITAL CREATIVE
## LEVEL 4
## LAYOUT ARTIST

A LAYOUT ARTIST IS DESIGNATED TO CREATE MASTER SHOTS, MOOD OF THE SCENE, CHARACTER ELEMENTS WITHIN A SHOT, REFERENCE DRAWING FOR ANIMATORS, TO PROVIDE A STAGE FOR ANIMATORS TO ANIMATE CHARACTERS AND EFFECT AND PERFORM SUPERVISORY FUNCTION.

**In particular the person will:**

1. Provide a stage in which the animators will animate their characters and effects.
2. Create master shot and mood of the environment or scene.
3. Create a reference drawing for the animators according to production requirement.
4. Translate storyboard into a format and size that can be utilised by the animator.
5. Create character elements within a shot.
6. Perform supervisory function.

# DIGITAL CREATIVE
## LEVEL 4
## LEAD ANIMATOR

A LEAD ANIMATOR IS DESIGNATED TO VERIFY 2D AND 3D ANIMATION SCENES, SPECIAL EFFECT, COLOUR, SHADOW, TEXTURES, MODELLING AND ANIMATED SEQUENCE, ASSIST IN QUALITY CONTROL, RESEARCH AND DEVELOPMENT (R&D), TO EXECUTE FILING SYSTEM AND TO PERFORM SUPERVISORY FUNCTION.

**In particular the person will:**

1. Provide guide in terms of software technicality.
2. Monitor animator workflow.
3. Verify 2D and 3D animation scene.
4. Verify special effect, colour, shadow, textures, modelling and animated sequence.
5. Assist in quality control for animated scenes, background, effect and other technical aspect of animation.
6. Execute filing system and naming convention according to title, sequence, scene and etc.
7. Assist research and development activities (R&D).
8. Perform supervisory function.

# DIGITAL CREATIVE
## LEVEL 4
## STORYBOARD ARTIST

A STORYBOARD ARTIST IS DESIGNATED TO CREATE ANGLE SHOT, THUMBNAILS DRAWING, SCENE, TO DETERMINE PRODUCTION SCENE SUCH AS STAGE, PLAN AND PACES ACCORDING TO PRODUCTION SPECIFICATION, TO VISUALISE THE SCRIPT AND TO PERFORM SUPERVISORY FUNCTION.

**In particular the person will:**

1. Create angle shot for all scene in the storyboard.
2. Create thumbnails drawing of the script.
3. Apply artistic and visual style on the production storyboard.
4. Perform supervisory function.
5. Produce sequences of still drawing and painting.
6. Translate the script to visual form.
7. Determine production scene by scene such as stage, plan and paces.
8. Create scene on storyboard according to production specification.
9. Perform supervisory function.

# DIGITAL CREATIVE
## LEVEL 4
## AUDIO SENIOR TECHNICIAN

AN AUDIO SENIOR TECHNICIAN IS DESIGNATED TO PERFORM VOICE-OVER PROCESS AND RECORDING SESSION, SCHEDULING IN PRODUCTION AND FINAL MIX IN POST-PRODUCTION, HANDLE MODERN STUDIO EQUIPMENT, SOFTWARE, MIDDLEWARE VIDEO GAME AUDIO TOOLS. PROVIDE SOUND EFFECTS, ENVIRONMENTAL FOLEY, AUDIO CUES, VOICE OVER, MUSIC PRODUCTION, MIXING AND GENERAL TECHNICAL SUPPORT FOR PRODUCTION.

HE/SHE WILL ALSO ASSIST IN THE DESIGN, IMPLEMENTATION, TESTING, AND MAINTENANCE OF AUDIO SYSTEM FEATURES AND ASSIST PERSONNEL ENGAGED IN THE PRODUCTION OF PROGRAMS AND OPERATION OF PRODUCTION EQUIPMENT.

**In particular the person will:**

1. Handle modern studio equipment, software, and middleware video game audio tools.
2. Perform voice-over process and recording session.
3. Perform recording, scheduling in production and final mix in post-production.
4. Responsible for general technical support for production: confers with the producer/director, project manager, or audio director as to the needs of the production and makes sure those requirements.
5. Provide sound effects, environmental Foley, audio cues, voice over, music, production, creation and mixing.
6. Assist in the design, implementation, testing, and maintenance of audio system features.
7. Determine the type of equipment to meet the needs of the production and has equipment ready as required.
8. Assist personnel engaged in the production of programs and operation of production equipment and in establishing standards for sound quality, assuring these standards are followed in production and broadcasting.
9. Perform supervisory functions.

# DIGITAL CREATIVE
## LEVEL 4
## VIDEO SENIOR TECHNICIAN

A VIDEO SENIOR TECHNICIAN IS DESIGNATED TO MONITOR, DEVELOP, EVALUATE, PROVIDE, PRODUCE AND COLLABORATE WITH VIDEO PRODUCTION TEAM ON PRODUCING VIDEO CONTENTS ACCORDING TO CLIENT REQUIREMENTS.

**In particular the person will:**

1. Monitor ingest & encode/digitise video assets/content in a timely fashion.
2. Develop descriptive text around video offerings and associate images to the video content.
3. Evaluate current equipment and make recommendations for upgrades and update technology.
4. Organise, manage and edit video recordings, graphics and audio files according to the specifications provided.
5. Provide planning and video capture preparation for all services.
6. Produce video projects using video production software and equipment.
7. Collaborate with the Creative Director and production team on production and development of graphics and other materials, including audio, video and animation.
8. Use authoring tools to complete programming projects, CDs, DVDs and other emerging distribution technologies.
9. Perform supervisory functions.

# DIGITAL CREATIVE
## LEVEL 4
## INTERACTIVE MEDIA DESIGNER

AN INTERACTIVE MEDIA DESIGNER IS DESIGNATED TO PREPARE, PROVIDE, ORGANIZE, COLLABORATE, RESEARCH, EVALUATE, SUPERVISE AND IMPLEMENT INTERACTIVE MEDIA PROJECT ACTIVITIES ACCORDING TO WORKFLOW SYSTEMS AND PROCEDURES.

**In particular the person will:**

1. Research, analyze and evaluate requests for new or improved creative concept with emphasis on architecture, business need and benefit for various interactive media projects.
2. Evaluate functionality and quality control of the product.
3. Supervise interactive media project to meet all project timelines and deliverables.
4. Prepare maintenance and customer support functions for interactive media products.
5. Work collaboratively with other media services staff to produce media materials, using analog and digital production equipment and software.
6. Organize appropriate filing, naming conventions and media storage management.
7. Deliever rich media content, interactive information data, entertainment messages that are required by the digital media industry including Internet interface design, navigational design, usability and site architecture.
8. Perform supervisory function.

# DIGITAL CREATIVE
## LEVEL 5
## ART DIRECTOR

AN ART DIRECTOR IS DESIGNATED TO MANAGE ART DIRECTION FOR PRE-PRODUCTION, PRODUCTION AND POST-PRODUCTION, DETERMINE CHARACTER LIST, PROPS, VISUAL EFFECT, ARTISTIC AND VISUAL STYLE, LAYOUT CONTINUITY, BACKGROUND AND LAYOUT, EXECUTE RESEARCH & DEVELOPMENT ACTIVITIES AND PREPARE PROCUREMENT FOR ART DIRECTION TEAM. HE/SHE WILL ALSO MANAGE THE ART DIRECTION TEAM AND LIAISE WITH OTHER PRODUCTION TEAMS.

**In particular the person will:**

1. Identify character list according to episode.
2. Identify new props and effect during layout stage.
3. Responsible for the artistic and visual style of the project.
4. Determine layout continuity.
5. Liaise with other production team.
6. Approve pre-production, production, post-production background and layout.
7. Manage art direction team.
8. Execute research and development activities (R&D).
9. Prepare art direction team procurement.

# DIGITAL CREATIVE
## LEVEL 5
## ANIMATION DIRECTOR

AN ANIMATION DIRECTOR IS DESIGNATED TO MANAGE ANIMATION TEAM, TO GUIDE ARTISTIC AND VISUAL STYLE OF THE ANIMATION, TO PERFORM QUALITY CONTROL OF THE ANIMATION ELEMENT, TO EXECUTE RESEARCH AND DEVELOPMENT ACTIVITIES, TO MONITOR FILING SYSTEM & NAMING CONVENTION AND PREPARE PROCUREMENT FOR ANIMATION TEAM. HE/SHE WILL ALSO MANAGE THE ANIMATION TEAM AND LIAISE WITH OTHER PRODUCTION TEAMS.

**In particular the person will:**

1. Identify animation character according to scene.
2. Provide guide for the artistic and visual style of the animation.
3. Liaise with other production team.
4. Approve 2D and 3D animation for pre-production, production, post-production.
5. Incorporate work process of storyboard team and art direction team.
6. Perform quality control for animated scenes, background, effect and other technical aspect of animation.
7. Monitor filing system and naming convention according to title, sequence, scene and etc.
8. Manage animation team.
9. Execute research and development activities (R&D).
10. Prepare animation team procurement.

# DIGITAL CREATIVE
## LEVEL 5
## STORYBOARD DIRECTOR

A STORYBOARD DIRECTOR IS DESIGNATED TO MANAGE STORYBOARD TEAM, TO PROVIDE ARTISTIC GUIDE AND VISUAL STYLE OF THE STORYBOARD, TO VERIFY ANGLE SHOT AND THUMBNAILS DRAWING, LIAISE WITH OTHER PRODUCTION TEAM, COORDINATE SCENE OF THE STORYBOARD, VERIFY PRODUCTION STORYBOARD AND PREPARE PROCUREMENT FOR STORYBOARD TEAM.

**In particular the person will:**

1. Verify angle shot for all scene in the storyboard.
2. Verify thumbnails drawing of the script.
3. Provide guide for the artistic and visual style of the storyboard.
4. Liaise with other production team.
5. Manage storyboard team.
6. Coordinate scene of the storyboard.
7. Verify storyboard according to production specification.
8. Prepare storyboard team procurement.

# DIGITAL CREATIVE
## LEVEL 5
## AUDIO DIRECTOR

AN AUDIO DIRECTOR IS DESIGNATED TO COORDINATE AND FACILITATE THE DEVELOPMENT OF AUDIO. THE AUDIO DIRECTOR IS RESPONSIBLE FOR THE DESIGN AND CREATION OF SOUND EFFECTS, AUDIO ASSETS VOCALS AND MUSIC. THE AUDIO DIRECTOR WILL ALSO MANAGE INTERNAL & EXTERNAL AUDIO PRODUCTION RESOURCES, AUDIO ASSET MANAGEMENT, PROCESSES, SCHEDULES, COLLABORATE WITH TEAM DIRECTOR STAFF TO DEVELOP PIPELINES AND REVIEW TEAM PROGRESS.

**In particular the person will:**

1. Prepare sound concept, design, planning, audio style guides and initial budgeting in pre-production.
2. Design, implement and organize sound effects, music, audio assets and voice files.
3. Coordinate recording and scheduling in production and final mix in post-production.
4. Manage overall quality control of the audio process for project.
5. Manage internal and external audio production resources and audio asset management.
6. Determine tools/equipment needs and provide recommended solutions.
7. Collaborate with team director staff to develop pipelines, create and manage processes, create schedules, and review team progress.
8. Select, direct, and manage external contractors for audio development, including selecting/directing voice talent, providing critical feedback and sound music, etc.
9. Ensure proper balance among music, dialog, sound effects and implementation of audio assets by coordinating the processing of all audio.
10. Handle materials and various technical issues associated with interactive technologies.

# DIGITAL CREATIVE
## LEVEL 5
## VIDEO DIRECTOR

A VIDEO DIRECTOR IS DESIGNATED TO LEAD, MANAGE, DESIGN, VERIFY, COLLABORATE AND ASSURE VIDEO PRODUCTION AND CONTENT ASSETS ARE ACCORDING TO CLIENT REQUIREMENTS.

**In particular the person will:**

1. Lead and manage development and management for video products that will integrate existing websites, interactive properties and new emerging platforms.
2. Collaborate with the Director and internal technology teams on selection and deployment of tools, services and cross-platform integration strategies.
3. Develop requirements and concept for Video design platform.
4. Manage Video Content assets.
5. Design presentations based on brief, current design trends and client goals.
6. Assure proper video and audio signals as well as maintain high standards of aesthetics and use of video effects.
7. Verify high-value video programming content (linear channels, broadcast stations, HDTV, PPV, VOD/SVOD, broadband video).

# DIGITAL CREATIVE
## LEVEL 5
## INTERACTIVE MEDIA DIRECTOR

AN INTERACTIVE MEDIA DIRECTOR IS DESIGNATED TO PREPARE, ADMINISTER, PROVIDE, ORGANISE, COLLABORATE AND EXECUTE INTERACTIVE MEDIA PROJECT MANAGEMENT INCORPORATING CREATIVE CONCEPTS AND IDEAS.

**In particular the person will:**

1. Prepare interactive media product specifications, requirements, budgeting and scope of work based on client's need.
2. Prepare team procurement.
3. Administer information system project methodologies, information architecture and management system.
4. Comply with copyright laws and intellectual property rights and applies to the duplication, production and presentation of media materials.
5. Provide creative and strategic direction for Interactive Media projects including digital contents and creative assets.
6. Organize the tools for interactive media production, development and project management.
7. Collaborate with other interactive-related production team for animation, interactive TV, games, online community.
8. Ensure proper functionality of the product.
9. Execute research and development activities (R&D).

# DIGITAL CREATIVE
## LEVEL 6
## DIGITAL CREATIVE DIRECTOR

A DIGITAL CREATIVE DIRECTOR IS DESIGNATED TO MANAGE PRE-PRODUCTION, PRODUCTION AND POST-PRODUCTION PROCESS, TO ENFORCE STANDARDS AND GUIDELINES, TO ADMINISTER MANPOWER, TO APPROVE SCENES, EFFECTS AND OTHER TECHNICAL ASPECTS OF ANIMATION, COORDINATE RESEARCH AND DEVELOPMENT ACTIVITIES, LIAISE WITH SCRIPT WRITER AND PREPARING PROJECT PROCUREMENT.

**In particular the person will:**

1. Manage pre-production, production and post-production project planning and scheduling.
2. Collaborate with script writers to understand and visualise the script.
3. Conduct briefing to production team and prepare project procurement.
4. Approve pre-production, production and post-production scenes, effects and other technical aspects of animation.
5. Administer manpower according to project requirement.
6. Monitor project inventory.
7. Delegate pre-production, production and post-production task to production team.
8. Enforce standards and guidelines for pre-production, production and post-production.
9. Coordinate research and development activities (R&D).

# DIGITAL CREATIVE
## LEVEL 7
## DIGITAL CREATIVE PROJECT MANAGER

A DIGITAL CREATIVE PROJECT MANAGER IS DESIGNATED TO PLAN PRE-PRODUCTION, PRODUCTION AND POST-PRODUCTION PROCESS, TO PREPARE COSTING, BUDGETING, STANDARD AND GUIDELINES, TO RECRUIT MANPOWER, TO PERFORM FINAL APPROVAL FOR FINAL PRODUCT, RESPONSIBLE TO ORGANISE RESEARCH AND DEVELOPMENT ACTIVITIES.

**In particular the person will:**

1. Prepare pre-production, production and post-production project planning, scheduling, costing and budgeting.
2. Prepare and manage pre-production, production and post-production, project costing, budgeting and procurement.
3. Prepare manpower according to project requirement.
4. Control the creative assets of the project.
5. Prepare standard and guidelines for pre-production, production and post-production.
6. Perform final evaluation and approval for final product.
7. Responsible for client's needs.
8. Organise research and development activities (R&D).

# DATA MANAGEMENT
## LEVEL 6
## DATABASE ADMINISTRATOR
## (DATA MANAGEMENT)

A DATABASE ADMINISTRATOR (DBA) IS DESIGNATED TO ADMINISTER AND MONITOR DATABASE ACTIVITIES, PERFORM BACKUP ACTIVITIES, EXECUTE PERFORMANCE TUNING, IMPLEMENT DATABASE DISASTER RECOVERY PLAN, TROUBLESHOOT DATABASE-RELATED PROBLEM, ANALYSE DATA STORED IN THE DATABASE AND COLLABORATE WITH SYSTEM ADMINISTRATOR FOR HARDWARE AND SOFTWARE CONFIGURATION.

**In particular the person will:**

1. Prepare operational budget & capital budget of the department.
2. Implement installation, configuration and upgrade of DBMS product.
3. Administer and monitor database security.
4. Perform database access control and database performance tuning.
5. Implement database Disaster Recovery Plan.
6. Inspect database log and audit trail.
7. Prepare database system planning and upgrading solutions proposal of the database system.
8. Perform database restoration, recovery and recovery testing.
9. Create database backup script for backup activities.
10. Perform database troubleshooting.
11. Analyse the data stored in the database and make recommendations relating to performance and efficiency of the data storage.
12. Implement and manage database clustering and mirroring.

# DATA MANAGEMENT
## LEVEL 7
## DATABASE MANAGER

A DATABASE MANAGER IS DESIGNATED TO MANAGE BUDGETS, SUPERVISE DATABASE ACTIVITIES, PREPARE BACKUP ACTIVITIES PROCEDURE AND SCHEDULE, PREPARE DATABASE DISASTER RECOVERY PLAN, MONITOR PROGRESS OF TROUBLESHOOTING, VERIFY ANALYSIS OF DATA AND RECOMMENDATIONS MADE BY DATABASE ADMINISTRATOR.

**In particular the person will:**

1. Manage operational & capital budget of the department.
2. Validate the integrity of the database.
3. Manage installation, configuration and upgrade of DBMS products.
4. Prepare database security procedure.
5. Verify database access control.
6. Supervise database performance.
7. Design database Disaster Recovery Plan.
8. Supervise database log and audit trail inspection.
9. Verify database system planning.
10. Verify upgrading solutions proposal of the database system.
11. Prepare database backup activities procedure and schedule.
12. Monitor progress of database troubleshooting.
13. Design and plan database clustering and mirroring.

# ICT SECURITY
## LEVEL 5
## ICT SYSTEM SECURITY TECHNOLOGIST

AN ICT SYSTEM SECURITY TECHNOLOGIST IS DESIGNATED TO UPDATE THE ICT SYSTEM & NETWORK SECURITY DIAGRAM AND DOCUMENTATION, TO MONITOR AND MAINTAIN NETWORK SECURITY INFRASTRUCTURE, LOAD BALANCING SYSTEM, TO EXECUTE ICT SYSTEM SECURITY MAINTENANCE, TO IMPLEMENT SECURITY AUDIT POLICIES AND TO PROVIDE FIRST LAYER SUPPORT SERVICE.

**In particular the person will:**

1. Update the network security diagram.
2. Monitor network security tools which include network security infrastructure, Virtual Private Network, identify service, encryption and security management.
3. Perform testing of network security on work station and server.
4. Maintain ICT System Network & security based on company policies.
5. Update ICT System Network & security documentation.
6. Maintain ICT System Network & security access technologies.
7. Monitor load balancing system on ICT security tools.
8. Execute ICT system security maintenance activities.
9. Implement security audit policies.
10. Install system and network security patch.
11. Provide customer support service on system and network security.

# ICT SECURITY
## LEVEL 6
## ICT SYSTEM SECURITY PRINCIPAL TECHNOLOGIST

AN ICT SYSTEM SECURITY PRINCIPAL TECHNOLOGIST IS DESIGNATED TO DESIGN NETWORK SECURITY ARCHITECTURE, TO CONFIGURE NETWORK SECURITY TOOLS, TO PERFORM NETWORK SECURITY TESTING, TO PREPARE NETWORK SECURITY DOCUMENTATION, TO EXECUTE RESEARCH AND DEVELOPMENT ACTIVITIES, TO PERFORM AUDITING AND LOGGING ON NETWORK SECURITY, TO VERIFY ICT SYSTEM MAINTENANCE, TO IMPLEMENT SECURITY AUDIT POLICIES AND TO PERFORM MANAGERIAL FUNCTION.

**In particular the person will:**

1. Design network security architecture.
2. Configure load balancing system on ICT security tools.
3. Configure network security tools which include security network infrastructure, virtual private network, encryption and security management.
4. Perform testing of network security such as unauthorised intrusion and malicious traffic and also perform managerial function.
5. Maintain ICT System & Network Security based on company policies.
6. Prepare ICT System & Network Security documentation.
7. Responsible for client's needs.
8. Execute research and development activities.
9. Perform auditing and logging on network security tools.
10. Implement ICT System & Network Security access technologies.
11. Implement security audit policies.

# ICT SECURITY
## LEVEL 7
## ICT SYSTEM SECURITY SPECIALIST

AN ICT SYSTEM SECURITY SPECIALIST IS DESIGNATED TO DESIGN SECURITY SYSTEM AND SECURITY POLICIES, TO ENFORCE COMPANY POLICY AND PROCEDURE, TO ORGANIZE RESEARCH AND DEVELOPMENT ACTIVITIES (R&D), MANAGE RESPONSE TEAM, TO PREPARE PROJECT PLANNING, BUDGETING AND HUMAN RESOURCE REQUIREMENT.

**In particular the person will:**

1. Design security system for ICT system security.
2. Design security policies and procedures for local and enterprise network infrastructure.
3. Enforce compliance on rules and regulations stated in system accreditation documentation.
4. Enforce company policy and procedure.
5. Organising research and development activities (R&D).
6. Manage response team including monitoring of overall operational efficiency.
7. Prepare project planning.
8. Prepare project costing and budgeting.
9. Prepare human resource according to project requirement.

# ICT SYSTEM
## LEVEL 2
## ICT SYSTEM ASSISTANT TECHNICIAN

AN ICT SYSTEM ASSISTANT TECHNICIAN IS DESIGNATED TO INSTALL SOFTWARE APPLICATION AND OPERATING SYSTEM, COMPUTER SYSTEM HARDWARE, NETWORK OPERATING SYSTEM, LOW END NETWORKING DEVICE, TO EXECUTE BACKUP JOB, JOB FUNCTION ACCORDING TO STANDARD OPERATING PROCEDURE & PREVENTIVE MAINTENANCE FOR COMPUTER SYSTEM HARDWARE AND SOFTWARE. THE PERSON ALSO IS DESIGNATED TO SETUP NETWORK CABLING AND RECORD INVENTORY.

**In particular the person will:**

1. Install software application and operating system.
2. Install computer system hardware.
3. Install network operating system.
4. Install low end networking device.
5. Setup network cabling.
6. Execute backup job.
7. Execute job function according to SOP.
8. Execute preventive maintenance for computer system hardware and software.
9. Record inventory item.

# ICT SYSTEM
## LEVEL 3
## ICT SYSTEM TECHNICIAN

AN ICT SYSTEM TECHNICIAN IS DESIGNATED TO CONFIGURE SOFTWARE APPLICATION AND OPERATING SYSTEM, NETWORK OPERATING SYSTEM & LOW END NETWORKING DEVICES, TO TROUBLESHOOT COMPUTER SYSTEM HARDWARE & SETUP FIBRE OPTIC NETWORK CABLING. THE PERSON ALSO IS DESIGNATED TO COORDINATE BACKUP JOB, PREVENTIVE MAINTENANCE FOR COMPUTER SYSTEM HARDWARE & SOFTWARE AND INVENTORY ACTIVITIES SUCH AS LICENSING & PERIPHERALS.

**In particular the person will:**

1. Configure software application and operating system.
2. Troubleshoot computer system hardware.
3. Configure network operating system.
4. Configure low end networking devices.
5. Setup fibre optic network cabling.
6. Coordinate backup job.
7. Coordinate preventive maintenance for computer system hardware and software.
8. Coordinate inventory activities such as licensing and peripherals.

# ICT SYSTEM
## LEVEL 4
## ICT SYSTEM SENIOR TECHNICIAN

AN ICT SYSTEM SENIOR TECHNICIAN IS DESIGNATED TO VERIFY INSTALLATION AND CONFIGURATION ACTIVITIES, NETWORK CABLING INSTALLATION & PREVENTIVE MAINTENANCE FOR COMPUTER SYSTEM HARDWARE AND SOFTWARE AND INSTALL AND CONFIGURE BASIC SERVER SERVICES. THE PERSON IS ALSO DESIGNATED TO SUPERVISE BACKUP JOB AND EXECUTE SYSTEM RECOVERY. HE/SHE WILL ALSO PERFORM SUPERVISORY FUNCTIONS AND LIAISE WITH SUPPLIER, CLIENT AND CONTRACTORS.

**In particular the person will:**

1. Verify installation and configuration activities.
2. Install and configure basic server services.
3. Verify network cabling installation.
4. Supervise backup job.
5. Execute system recovery.
6. Control operational expenditure within functional section.
7. Perform supervisory function.
8. Verify preventive maintenance for computer system hardware and software.
9. Prepare inventory report.
10. Liaise with supplier, client and contractors.
11. Provide customer support service.

# ICT SYSTEM
## LEVEL 5
## ICT COMPUTER SYSTEM TECHNOLOGIST

AN ICT COMPUTER SYSTEM TECHNOLOGIST IS DESIGNATED TO INSTALL AND CONFIGURE ADVANCE SERVER SERVICES, SERVER CLUSTERING & SERVER MIRRORING. THE PERSON ALSO IS DESIGNATED TO COORDINATE SYSTEM RECOVERY, PERFORM PREVENTIVE MAINTENANCE FOR HIGH END ICT SYSTEM AND LIAISE WITH CLIENTS ON PRODUCT & SERVICE REQUIREMENT.

**In particular the person will:**

1. Install and configure advance server services.
2. Install high end networking devices.
3. Coordinate system recovery.
4. Implement server clustering.
5. Implement server mirroring.
6. Perform preventive maintenance for high end ICT system.
7. Liaise with clients on product and service requirement.

# ICT SYSTEM
## LEVEL 5
## ICT NETWORK SYSTEM TECHNOLOGIST

AN ICT NETWORK SYSTEM TECHNOLOGIST IS DESIGNATED TO INSTALL AND CONFIGURE, IMPLEMENT AND MONITOR STORAGE AREA NETWORK SERVER, TESTING AND DEPLOYMENT OF LAN/WAN NETWORK PLATFORM, APPLICATIONS & SERVICES, COORDINATE SYSTEM RECOVERY, ADMINISTER TCP/IP LAN'S (VLAN ROUTING, VTP, SPANNING TREE). THE PERSON WILL ALSO ASSIST ICT NETWORK SYSTEM PRINCIPAL TECHNOLOGIST IN NETWORK TROUBLESHOOTING AND ACCURATELY LOGGING CASES AS REQUIRED AND TO PREPARE NETWORK PROPOSAL.

**In particular the person will:**

1. Install and configure advance server services.
2. Implement and monitor storage area network.
3. Liaise with clients on Network product and service requirement.
4. Implement testing and deployment of LAN/WAN network platform, applications & services.
5. Assist ICT Network System Principal Technologist in network troubleshooting and logging cases.
6. Administer TCP/IP LAN's (VLAN routing, VTP, Spanning Tree).
7. Assist Network System Principal Technologist to prepare network proposal.

# ICT SYSTEM
## LEVEL 6
## ICT COMPUTER SYSTEM PRINCIPAL TECHNOLOGIST

AN ICT SYSTEM PRINCIPAL TECHNOLOGIST IS DESIGNATED TO DESIGN AND ADMINISTER STORAGE AREA NETWORK, SERVER CLUSTERING AND SERVER MIRRORING, TO PLAN SYSTEM RECOVERY & STAFF DEVELOPMENT TRAINING. THE PERSON ALSO IS DESIGNATED TO DEVELOP STANDARD OPERATING PROCEDURE FOR ICT SYSTEM MAINTENANCE AND PREPARE & MANAGE PROJECT PLANNING & SCHEDULING.

**In particular the person will:**

1. Manage operation of server system.
2. Configure high end networking devices.
3. Plan system recovery.
4. Design and administer storage area network.
5. Design server clustering and server mirroring.
6. Plan and propose project budgeting and costing.
7. Prepare and manage project planning and scheduling.
8. Develop Standard Operating Procedure for ICT System Maintenance.
9. Plan staff development training.
10. Design and manage Network Management System (NMS).

# ICT SYSTEM
## LEVEL 6
## ICT NETWORK SYSTEM PRINCIPAL TECHNOLOGIST

AN ICT NETWORK SYSTEM PRINCIPAL TECHNOLOGIST IS DESIGNATED TO DEVELOP VOIP NETWORK ARCHITECTURE, AND STANDARD OPERATING PROCEDURE FOR ICT SYSTEM MAINTENANCE, TO CONFIGURE AND MONITOR SOFT SWITCH APPLICATION, HIGH END NETWORKING DEVICES WHICH INCLUDE UNIFIED COMMUNICATION FUNCTION & CONFIGURE AND MANAGE QUALITY OF SERVICE (QOS) IN HIGH END NETWORK DEVICE.

**In particular the person will:**

1. Manage operation of VOIP server system.
2. Configure high end networking devices which include unified communication function.
3. Design VOIP network architecture.
4. Plan and propose project budgeting and costing.
5. Prepare and manage project planning and scheduling.
6. Develop Standard Operating Procedure for ICT System Network Maintenance.
7. Plan staff development training.
8. Design and manage network management system (NMS).
9. Configure and monitor soft switch application.
10. Configure and manage Quality of Service (QoS) in high end network device.

# ICT SYSTEM
## LEVEL 7
## ICT SYSTEM SPECIALIST

AN ICT SYSTEM SPECIALIST IS DESIGNATED TO EXECUTE TECHNICAL PROJECT, TO PROVIDE DAY-TO-DAY MANAGEMENT AND COORDINATION, LEAD THE EXECUTION OF TECHNOLOGY STRATEGY FOR TECHNOLOGY PLATFORMS, PARTNERSHIPS AND EXTERNAL RELATIONSHIPS, ADVISOR TO MANAGEMENT AND STAFF ON ADVANCED TECHNICAL RESEARCH STUDIES AND APPLICATIONS (R&D) AND TO TRANSLATE BROAD VISION PROVIDED BY SENIOR MANAGEMENT FOR CLIENTS AND THE COMPANY INTO EXECUTABLE PLANS FOR ACTION.

**In particular the person will:**

1. Be responsible for the management and successful execution of technical projects and key client deliverables, capacity planning, budgeting, and cost-management.
2. Provide day-to-day management and strategic direction for a technical team.
3. Oversee and coordinate the operational aspects of ongoing technical projects and serve as liaison between project management and planning, project-team, and line management (client services managers).
4. Work under consultative direction toward predetermined long-range goals and objectives, planning and budgeting for long-term technical objectives of the company.
5. Ensure that all resources required to support the projects are identified and tracked to achieve cost, schedule and performance requirements.
6. Translate broad vision provided by senior management for clients and the company into executable plans for action.
7. Provide highly innovative and ingenious technical solutions.
8. Serve as organizational spokesperson on advanced projects and/or programs and helps to maintain an affective image of the organization’s technological capability.

9. Act as advisor to management and staff on advanced technical research studies and applications, and stay abreast of new technologies and trends in online community building, advocacy, communications, and fundraising.
10. Lead the execution of technology strategy for technology platforms, partnerships, and external relationships.
11. Build and manage a top-flight technology team and oversee research and development, as well as project management.
12. Anticipate and react to major technology changes to ensure the maintenance of company leadership in the competitive landscape.

# ICT SYSTEM
## LEVEL 8
## ICT SYSTEM PRINCIPAL SPECIALIST

AN ICT SYSTEM PRINCIPAL SPECIALIST IS DESIGNATED TO DRIVE BUSINESS DIRECTION ACCORDING TO EMERGING TECHNOLOGY, DESIGN AND RECOMMEND THE APPROPRIATE SOLUTION TO SUPPORT THE BUSINESS POLICIES AND DIRECTIONS, SERVES AS THE COMPANY'S TOP TECHNOLOGY ARCHITECT AND RUNS THE ORGANISATION'S ENGINEERING GROUP, TO DEVELOP STRATEGIES TO INCREASE THE COMPANY'S TOP LINE, PROVIDES STRATEGIC AND TACTICAL PLANNING, DEVELOPMENT, EVALUATION, AND COORDINATION OF THE INFORMATION AND TECHNOLOGY SYSTEMS DEVELOPMENT, RESPONSIBLE FOR THE OVERALL STRATEGIC DIRECTION AND MANAGEMENT OF THE ORGANISATION'S IT INFRASTRUCTURE, DEVELOP AND ESTABLISH COMPANY OPERATING PROCEDURES AND POLICIES AND ALSO TO ADVISE SENIOR MANAGEMENT ON STRATEGIC SYSTEMS OR TECHNOLOGY CONVERSIONS AND INTEGRATIONS IN SUPPORT OF BUSINESS GOALS AND OBJECTIVES.

**In particular the person will:**

1. Identify and drive business direction and management on the organization's IT Infrastructure according to emerging technology.
2. Design and recommend the appropriate solution to support the business policies and directions.
3. Be responsible for ensuring that the company's information technology investments are aligned with its strategic business objectives.
4. Serve as the company's top technology architect and runs the organization's engineering group.
5. Develop strategies to increase the company's top line (revenue).
6. Provide strategic and tactical planning, development, evaluation and coordination of and technology systems development.
7. Oversee the work of the entire IT team, section or department and provide support and mentoring to IT management personnel.
8. Develop and establish company operating procedures and policies.
9. Advise senior management on strategic systems or technology conversions and integrations in support of business goals and objectives.
10. Provide solutions on implementation of ICT system architecture.

# SYSTEM INTEGRATION
## LEVEL 6
## SYSTEM INTEGRATION PROJECT EXECUTIVE

A PROJECT EXECUTIVE IS DESIGNATED TO EXECUTE THE PLANNING OF SYSTEM INTEGRATION, SYSTEM CONTINGENCY PLAN, SYSTEM INTEGRATION PROCESS AND SYSTEM IMPLEMENTATION ACTIVITIES, TO PREPARE PROJECT COSTING AND BUDGET, TESTING DOCUMENT FOR USERS, ARCHITECTURE AND SPECIFICATION STANDARD FOR SYSTEM DEVELOPMENT AND INTEGRATION & SYSTEM IMPLEMENTATION ACTIVITIES. THE PERSON IS ALSO DESIGNATED TO COORDINATE SYSTEM TRAINING TO THE USERS AND FUNCTIONAL & INTEGRATION TESTING.

**In particular the person will:**

1. Execute the planning of system integration.
2. Liaise with user's low level management/operational team.
3. Execute system contingency plan.
4. Prepare project costing and budget.
5. Prepare testing document for users.
6. Execute system integration processes.
7. Prepare architecture and specification standard for system development and integration.
8. Coordinate system training to the users.
9. Prepare system documentation standard guidelines.
10. Coordinate functional and integration testing.
11. Conduct system's feasibility studies.
12. Execute system implementation activities.

# SYSTEM INTEGRATION
## LEVEL 7
## SYSTEM INTEGRATION PROJECT MANAGER

A PROJECT MANAGER IS DESIGNATED TO PREPARE THE PLANNING OF SYSTEM INTEGRATION AND SYSTEM CONTINGENCY PLAN, FUNCTIONAL & INTEGRATION TESTING, AND TO MANAGE PROJECT COSTING & BUDGET HE/SHE WILL ALSO ENFORCE TESTING DOCUMENT AND COORDINATE SYSTEM ARCHITECTURE & SPECIFICATION STANDARD, FEASIBLITY STUDIES AND LIAISE WITH USER'S MIDDLE LEVEL MANAGEMENT TEAM.

**In particular the person will:**

1. Prepare and manage system integration, planning, budget and costing.
2. Liaise with user's middle level management team.
3. Prepare system contingency plan.
4. Enforce testing document for users.
5. Evaluate Service Level Agreement/Guarantee (SLA/SLG) for system integration project.
6. Manage system integration activities.
7. Analyse system and application architecture and specification standard for system development and integration.
8. Organise training to the users.
9. Manage system functional and integration testing.
10. Coordinate system's feasibility studies.

# SYSTEM INTEGRATION
# LEVEL 8
# SYSTEM INTEGRATION PROJECT DIRECTOR

A PROJECT DIRECTOR IS DESIGNATED TO VERIFY THE PLANNING OF SYSTEM INTEGRATION, SYSTEM CONTINGENCY PLAN, SERVICE LEVEL AGREEMENT/ GUARANTEE OF THE SYSTEM AND ARCHITECTURE & SPECIFICATION STANDARD FOR SYSTEM DEVELOPMENT AND INTEGRATION, TO APPROVE PROJECT COSTING AND BUDGET, TESTING DOCUMENTS FOR USERS AND SYSTEM DOCUMENTATION STANDARD GUIDELINES.

**In particular the person will:**

1. Evaluate system integration planning costing, budgeting and costing.
2. Evaluate Service Level Agreement/guarantee of the system.
3. Evaluate architecture and specification standard for system development and integration implementation.
4. Approve system documentation standard guidelines.
5. Analyse system's feasibility and contingency plan in accordance with integration requirement.
6. Provide solution for integrating the application, networking and hardware architecture.
7. Develop company operating procedure and policies.
8. Provides strategic and tactical planning, development, evaluation and coordination of the information and technology systems development.

# APPLICATION SYSTEM DEVELOPMENT
## LEVEL 3
## JUNIOR PROGRAMMER

A JUNIOR PROGRAMMER IS DESIGNATED TO PERFORM CODING AND COMPILING USING BASIC PROGRAMMING LANGUAGE, DEBUGGING ACTIVITIES AND BASIC FUNCTIONAL TESTING, TO PREPARE CODE DOCUMENTATION, FOLLOW CODING CONVENTION, APPLY UNIT VERSION CONTROL & COMPLY WITH COMPANY CONFIDENTIALITY.

**In particular the person will:**

1. Perform coding and compiling using basic programming language.
2. Perform debugging activities.
3. Perform basic functional testing.
4. Prepare code documentation.
5. Follow coding convention.
6. Apply unit version control.
7. Comply with company confidentiality.

# APPLICATION SYSTEM DEVELOPMENT
## LEVEL 4
## SERVER PROGRAMMER

A SERVER PROGRAMMER IS DESIGNATED TO PERFORM CODING AND COMPILING USING HOST-BASED PROGRAMMING LANGUAGE AND SCRIPTING, DEBUGGING ACTIVITIES ON HOST-BASED PROGRAMMING LANGUAGE AND SCRIPTING, UNIT TESTING, UNIT MAINTENANCE AND SUPERVISORY FUNCTION. THE PERSON ALSO IS DESIGNATED TO PREPARE USER MANUAL AND APPLY MODULE VERSION CONTROL.

**In particular the person will:**

1. Perform coding and compiling using host-based programming language and scripting.
2. Perform debugging activities on host-based programming language and scripting.
3. Perform unit testing.
4. Perform unit maintenance.
5. Prepare user manual.
6. Apply module version control.
7. Perform supervisory function.

# APPLICATION SYSTEM DEVELOPMENT
## LEVEL 4
## WEB BASED/WAP PROGRAMMER

A WEB BASED/WAP PROGRAMMER IS DESIGNATED TO PERFORM CODING AND COMPILING USING WEB-BASED & OBJECT ORIENTED PROGRAMMING LANGUAGE AND SCRIPTING, DEBUGGING ACTIVITIES ON WEB-BASED & OBJECT ORIENTED PROGRAMMING LANGUAGE AND SCRIPTING, PERFORM UNIT TESTING, UNIT MAINTENANCE, SUPERVISORY FUNCTION. THE PERSON ALSO IS DESIGNATED TO PREPARE USER MANUAL AND APPLY MODULE VERSION CONTROL.

**In particular the person will:**

1. Perform coding and compiling using web-based & object oriented programming language and scripting.
2. Perform debugging activities on web-based & object oriented programming language and scripting.
3. Perform unit testing.
4. Perform unit maintenance.
5. Prepare user manual.
6. Apply module version control.
7. Perform supervisory function.

# APPLICATION SYSTEM DEVELOPMENT
## LEVEL 4
## MULTIMEDIA PROGRAMMER

A MULTIMEDIA PROGRAMMER IS DESIGNATED TO PERFORM CODING AND COMPILING USING MULTIMEDIA BASED PROGRAMMING LANGUAGE AND SCRIPTING, DEBUGGING ACTIVITIES ON MULTIMEDIA BASED PROGRAMMING LANGUAGE AND SCRIPTING, UNIT TESTING, UNIT MAINTENANCE & SUPERVISORY FUNCTION. THE PERSON ALSO IS DESIGNATED TO PREPARE USER MANUAL AND APPLY MODULE VERSION CONTROL.

**In particular the person will:**

1. Perform coding and compiling using multimedia based programming language and scripting.
2. Perform debugging activities on multimedia based programming language and scripting.
3. Perform unit testing.
4. Perform unit maintenance.
5. Prepare user manual.
6. Apply module version control.
7. Perform supervisory function.

# APPLICATION SYSTEM DEVELOPMENT
## LEVEL 4
## DATABASE PROGRAMMER

A DATABASE PROGRAMMER IS DESIGNATED TO PERFORM SQL CODE TEST USING TESTING DATA PROVIDED AND SQL CODE DEBUGGING, TO DEVELOP THE DATABASE STORED PROCEDURES & CREATE SQL CODE FOR DATABASE AND SYSTEM ACCORDING TO STANDARD AND BEST PRACTICE OUTLINE.

**In particular the person will:**

1. Develop the database stored procedures.
2. Create SQL code for database and system according to standard and best practice outline.
3. Perform SQL code test using testing data was provided.
4. Perform SQL code debugging.
5. Perform supervisory function.

# APPLICATION SYSTEM DEVELOPMENT
## LEVEL 4
## DESKTOP PROGRAMMER

A DESKTOP PROGRAMMER IS DESIGNATED TO PERFORM ADVANCE CODING & COMPILING USING VISUAL AND OBJECT ORIENTED PROGRAMMING LANGUAGE, DEBUGGING ACTIVITIES ON VISUAL AND OBJECT ORIENTED PROGRAMMING LANGUAGE, PERFORM UNIT TESTING, UNIT MAINTENANCE AND SUPERVISORY FUNCTION. THE PERSON ALSO IS DESIGNATED TO PREPARE USER MANUAL AND APPLY MODULE VERSION CONTROL.

**In particular the person will:**

1. Perform coding and compiling using visual and object oriented programming language.
2. Perform debugging activities on visual and object oriented programming language.
3. Perform unit testing.
4. Perform unit maintenance.
5. Prepare user manual.
6. Apply module version control.
7. Perform supervisory function.

# APPLICATION SYSTEM DEVELOPMENT
## LEVEL 5
## DATABASE SENIOR PROGRAMMER

A DATABASE SENIOR PROGRAMMER IS DESIGNATED TO OPTIMIZE THE DATABASE STORED PROCEDURES AND SQL CODE FOR DATABASE AND SYSTEM ACCORDING TO STANDARD AND BEST PRACTICE OUTLINE, TO PERFORM GUIDANCE OF SQL CODING TO DATABASE PROGRAMMER & GUIDE APPLICATION PROGRAMMER IN SQL SCRIPTING.

**In particular the person will:**

1. Optimize the database stored procedures.
2. Prepare and create testing data in the database.
3. Optimize SQL code for database and system according to standard and best practice outline.
4. Perform guidance of SQL coding to database programmer.
5. Guide application programmer in SQL scripting.

# APPLICATION SYSTEM DEVELOPMENT
## LEVEL 5
## WEB BASED/WAP ANALYST PROGRAMMER

A WEB BASED/WAP ANALYST PROGRAMMER IS DESIGNATED TO PERFORM ADVANCE CODING AND COMPILING USING WEB BASED AND OBJECT ORIENTED PROGRAMMING LANGUAGE AND SCRIPTING CODING, MODULE TESTING, UNIT INTEGRATION AND MODULE MAINTENANCE, TO PROVIDE GUIDANCE ON WEB BASED & OBJECT ORIENTED PROGRAMMING LANGUAGE AND SCRIPTING CODING & DEBUGGING.

**In particular the person will:**

1. Perform advance coding and compiling using web-based and object oriented programming language and scripting coding.
2. Provide guidance on web-based & object oriented programming language and scripting coding.
3. Provide guidance on debugging web-based and object oriented programming language and scripting.
4. Apply advance debugging technique.
5. Perform module testing and unit integration.
6. Perform module maintenance.
7. Assist in performing system analysis.
8. Implement risk management procedures.
9. Assist in performing system design.
10. Implement system functional specification.
11. Prepare technical documentation.
12. Manage module version control.

# APPLICATION SYSTEM DEVELOPMENT
## LEVEL 5
## SERVER ANALYST PROGRAMMER

A SERVER ANALYST PROGRAMMER IS DESIGNATED TO PERFORM ADVANCE CODING AND COMPILING USING HOST – BASED PROGRAMMING LANGUAGE AND SCRIPTING CODING, MODULE TESTING, UNIT INTEGRATION AND MODULE MAINTENANCE, IMPLEMENT RISK MANAGEMENT PROCEDURES AND SYSTEM FUNCTIONAL SPECIFICATION. THE PERSON WILL ALSO APPLY ADVANCE DEBUGGING TECHNIQUE, PREPARE TECHNICAL DOCUMENTATION, AND MANAGE MODULE VERSION CONTROL.

THE PERSON WILL PROVIDE GUIDANCE ON HOST-BASED PROGRAMMING LANGUAGE AND SCRIPTING CODING AND DEBUGGING. HE/SHE WILL ALSO ASSIST THE SYSTEM ANALYST IN PERFORMING SYSTEM ANALYSIS AND IN PERFORMING SYSTEM DESIGN.

**In particular the person will:**

1. Perform advance coding and compiling using host-based programming language and scripting coding.
2. Provide guidance on host-based programming language and scripting coding.
3. Provide guidance on debugging host-based programming language and scripting coding.
4. Apply advance debugging technique.
5. Perform module testing and unit integration.
6. Perform module maintenance.
7. Assist in performing system analysis.
8. Implement risk management procedures.
9. Assist in performing system design.
10. Implement system functional specification.
11. Prepare technical documentation.
12. Manage module version control.

# APPLICATION SYSTEM DEVELOPMENT
## LEVEL 5
## DESKTOP ANALYST PROGRAMMER

A DESKTOP ANALYST PROGRAMMER IS DESIGNATED TO PERFORM ADVANCE CODING AND COMPILING USING VISUAL AND OBJECT ORIENTED PROGRAMMING LANGUAGE, MODULE TESTING AND UNIT INTEGRATION MODULE MAINTENANCE AND TO PROVIDE GUIDANCE ON VISUAL AND OBJECT ORIENTED PROGRAMMING LANGUAGE CODING AND DEBUGGING.

**In particular the person will:**

1. Perform advance coding and compiling using visual and object oriented programming language.
2. Provide guidance on visual and object oriented programming language coding.
3. Provide guidance on debugging visual and object oriented programming language.
4. Apply advance debugging technique.
5. Perform module testing and unit integration.
6. Perform module maintenance.
7. Assist in performing system analysis and system design.
8. Implement risk management procedures.
9. Implement system functional specification.
10. Prepare technical documentation.
11. Manage module version control.

# APPLICATION SYSTEM DEVELOPMENT
## LEVEL 5
## MULTIMEDIA ANALYST PROGRAMMER

A MULTIMEDIA ANALYST PROGRAMMER IS DESIGNATED TO PERFORM ADVANCE CODING AND COMPILING USING MULTIMEDIA BASED PROGRAMMING LANGUAGE AND SCRIPTING CODING, MODULE TESTING, UNIT INTEGRATION AND MODULE MAINTENANCE, IMPLEMENT RISK MANAGEMENT PROCEDURES, SYSTEM FUNCTIONAL SPECIFICATION AND SYSTEM DEPLOYMENT. THE PERSON WILL ALSO APPLY ADVANCE DEBUGGING TECHNIQUE, PREPARE TECHNICAL DOCUMENTATION, AND MANAGE MODULE VERSION CONTROL.

THE PERSON WILL PROVIDE GUIDANCE ON MULTIMEDIA BASED PROGRAMMING LANGUAGE AND SCRIPTING CODING AND ON DEBUGGING. HE/SHE WILL ALSO ASSIST THE SYSTEM ANALYST IN PERFORMING SYSTEM ANALYSIS AND SYSTEM DESIGN.

**In particular the person will:**

1. Perform advance coding and compiling using multimedia based programming language and scripting coding.
2. Provide guidance on multimedia based programming language and scripting coding.
3. Provide guidance on debugging multimedia based programming language and scripting.
4. Apply advance debugging technique.
5. Perform module testing and unit integration.
6. Perform module maintenance.
7. Assist in performing system analysis.
8. Implement risk management procedures.
9. Assist in performing system design.
10. Implement system functional specification.
11. Prepare technical documentation.
12. Manage module version control.

# APPLICATION SYSTEM DEVELOPMENT
## LEVEL 6
## DATABASE ADMINISTRATOR
## (APPLICATION SYSTEM DEVELOPMENT)

A DATABASE ADMINISTRATOR IS DESIGNATED TO DEVELOP AND MAINTAIN THE SYSTEM DATA MODEL & THE SYSTEM DATA DICTIONARY, TO CREATE AND ADMINISTER THE DATABASE TRIGGERS TABLES AND VIEWS OF THE DATABASE, THE DATABASE INDEX, THE DATABASE REFERENTIAL INTEGRITY, THE DATABASE ACCESS CONTROL & THE DATABASE STORAGE ALLOCATION.

**In particular the person will:**

1. Develop and maintain the system data model.
2. Develop and maintain the system data dictionary.
3. Create and administer tables and views of the database.
4. Create and administer the database index.
5. Create and administer the database referential integrity.
6. Verify and administer the database stored procedures.
7. Create and administer the database triggers.
8. Create and administer the database access control.
9. Create and administer the database storage allocation.
10. Analyse, design and create the development database.
11. Verify testing data in the database.
12. Establish standard and best practices SQL code.
13. Perform interaction and advise application programmer in database objects.

# APPLICATION SYSTEM DEVELOPMENT
## LEVEL 6
## SYSTEM ANALYST

A SYSTEM ANALYST IS DESIGNATED TO PERFORM SYSTEM DESIGN, SYSTEM ANALYSIS, OVERALL SYSTEM TESTING, MODULE INTEGRATION, SYSTEM MAINTENANCE, MANAGE SYSTEM VERSION CONTROL AND DESIGN SYSTEM FUNCTIONAL SPECIFICATION. THE PERSON WILL ALSO ANALYSE AND ENFORCE RISK MANAGEMENT AND PROCEDURES. THE PERSON ALSO IS DESIGNATED TO ANALYSE USER REQUIREMENT, PLAN SYSTEM DEPLOYMENT AND IS RESPONSIBLE FOR ARCHITECTURE OR DESIGN DOCUMENTATION.

**In particular the person will:**

1. Perform overall system testing.
2. Perform module integration.
3. Perform system maintenance.
4. Perform system analysis and system design.
5. Analyse and enforce risk management and procedures.
6. Design system functional specification.
7. Analyse user requirement.
8. Plan system deployment.
9. Responsible for architecture or design documentation.
10. Manage system version control.
11. Perform managerial function.

# APPLICATION SYSTEM DEVELOPMENT
## LEVEL 7
## APPLICATION DEVELOPMENT SPECIALIST

A SPECIALIST IS DESIGNATED TO PREPARE SYSTEM SPECIFICATION, APPLICATION DEVELOPMENT COSTING AND BUDGETING, APPLICATION DEVELOPMENT PLANNING AND SCHEDULING & TO PERFORM FEASIBILITY STUDIES. THE PERSON ALSO IS DESIGNATED TO CONDUCT APPLICATION DEVELOPMENT R&D AND CONSULT IN APPLICATION DEVELOPMENT ACTIVITIES.

**In particular the person will:**

1. Perform feasibility studies.
2. Prepare system specification in accordance with project requirement.
3. Collaborates and manages vendors that supply solutions to enhance the company's product(s).
4. Prepare application development costing and budgeting.
5. Prepare application development planning and scheduling.
6. Conduct application research development activities (R&D).
7. Provide consultation development activities.
8. Design software architecture according to system functionality and purpose.
9. Organise practical application system training for users.

# APPLICATION SYSTEM DEVELOPMENT
## LEVEL 8
## APPLICATION DEVELOPMENT PRINCIPAL SPECIALIST

A PRINCIPAL SPECIALIST IS DESIGNATED TO DETERMINE BUSINESS DIRECTION ACCORDING TO EMERGING TECHNOLOGY, TO SUPPORT THE BUSINESS POLICIES AND DIRECTIONS, TO ENSURE THAT THE COMPANY'S INFORMATIONS TECHNOLOGY INVESTMENTS ARE ALIGNED WITH IT'S STRATEGIC BUSINESS OBJECTIVES, TO RUN THE ORGANISATION'S ENGINEERING GROUP AND TO ENCHANCE THE COMPANY'S TOP LINE.

**In particular the person will:**

1. Identify business direction and management of the Organisations IT Infrastructure according to emerging technology.
2. Design and recommending the appropriate solution to support the business policies and directions.
3. Ensure that the company's information technology investments are aligned with it's strategic business objectives.
4. Develop strategies to increase the company's top line (revenue).
5. Provide solutions on application architecture for application system development and architecture.
6. Provide strategic and technical planning, development, evaluation and coordination of application system development.
7. Serve as the company top software architecture and runs the organisation's software engineering group.