ANNUAL SURVEY ON INFOCOMM
MANPOWER FOR 2013

IDA
SINGAPORE

Infocomm Development Authority of Singapore
10 Pasir Panjang Road
#10-01 Mapletree Business City
Singapore 117438
Republic of Singapore
Tel: (65) 6211-0888
Fax: (65) 6211-2222
Website: www.ida.gov.sg

CONTENTS

TABLES

CHARTS

ANNEX

PART I: SURVEY COVERAGE AND METHODOLOGY

1. INTRODUCTION

Infocomm manpower surveys have been carried out by IDA annually since 1999. This is the 15th in the series.

An infocomm manpower[1] is a person engaged primarily in infocomm-related work either in an IT or telecommunication equipment and/or services provider, or end-user organisation. He/She must be employed by the Singapore-based organisation on a full-time/part-time basis either as a permanent or direct contract staff to work in Singapore or to station overseas.

The work of the person may include the development, distribution, implementation, support, operation, sales or marketing of telecommunication, computer hardware/software, IT services or multimedia contents.

2. SURVEY OBJECTIVES

The objective of the Survey is to assess the infocomm manpower pool and its profile in Singapore as at **1 Jun 2013**.

3. METHODOLOGY

The sample, covering all industrial sectors, was selected from the Establishment Sampling Frame maintained by the Department of Statistics. The sample was stratified by the Singapore Standard Industrial Classification (SSIC). Data collection (via self-administered questionnaires by mail/email/Internet submission) and processing for the Survey was carried out from Nov 2013 to Apr 2014.

4. NOTES ON DATA

Past years' data are included for comparison purposes where available. Due to the rounding of figures to the nearest whole number, the sum of individual figures may not add up to the total or 100%.

---

1 Respondents were requested to exclude infocomm manpower hired through third-party recruitment agencies to avoid possible double counting errors as recruitment agencies are also part of the survey sample coverage.

PART II: SURVEY FINDINGS

1. SUMMARY

- The number of infocomm manpower grew by 1.7% to reach 146,700 as at Jun 2013[2]. Together with 14,500 infocomm job vacancies, total demand of infocomm manpower increased by 2.7% to reach 161,200 in 2013.

- *Technical specialist job roles, which include IT Development*[3] *; Networks & Systems; Data Analytics, IT security and Infocomm researchers and developers (R&D),* accounted for 6 in 10 jobs demanded.

  i. IT Development roles accounted for 42.5% of the total demand for infocomm professionals, with software development job roles most demanded. As at 1 Jun 2013, about 62,700 professionals were employed in IT Development roles and an additional 5,800 roles were vacant.

  ii. The next most demanded group of professionals were those working in *Network & Systems*[4] related job roles. They accounted for 16.6% of the total demand for infocomm professionals. As at 1 Jun 2013, about 24,300 professionals were employed in such roles and an additional 2,400 roles were vacant.

  iii. *Other Tech specialists such as Data scientists, IT Security specialists and Infocomm R&D* accounted for 3.8% of total demand for infocomm professionals and 5.1% of total job vacancies.

- Infocomm manpower were predominantly Singapore Residents[5] (74%); male (71%); tertiary educated[6] (85%) and below the age of 40 years old (68%).

---

[2] Data is accurate as at 1 Jun 2013 (unless otherwise specified).

[3] Development roles include Software & application manager; software/application developer; Website, mobile & social media software/app developer; Multimedia & computer games developer; IT business analyst, systems analyst, IT business process engineers; Enterprise / Systems Architect; Database administrator; IT service manager/IT project manager.

[4] Networks & Systems roles include Network & communications manager/IT infrastructure manager; Network, servers & computer systems administrator; Network engineer/Telecommunications engineer; Virtualization specialist/cloud operations specialist.

[5] Singapore residents comprise Singapore Citizens and Permanent Residents.

[6] Tertiary educated infocomm manpower refers to manpower having at least diploma qualifications.

2. EMPLOYMENT

2.1. Infocomm Demand

Growing demand for infocomm professionals

Total demand of infocomm manpower increased by 4,200 or 2.7% to reach 161,200 in 2013 (Chart 2.1).

The number of employed infocomm manpower grew by 1.7% to reach 146,700 in 2013. Vacancies also increased, growing to about 14,500, which was 14.2% higher than the previous year.

Chart 2.1: Infocomm Manpower Demand, Employment and Vacancies, 2011- 2013

	2011	2012	2013
Employed	142,900	144,300	146,700
Vacancies	11,900	12,700	14,500
Total Demand	154,800	157,000	161,200
No. of Jobs added	(2,600)	2,200	4,200
% Change (YOY) Employed	1.1%	1.0%	1.7%
% Change (YOY) Vacancies	-26%	7%	14.2%
% Change (YOY) Demand	-1.7%	1.4%	2.7%

Vacancies Employed ━━ No. of jobs added
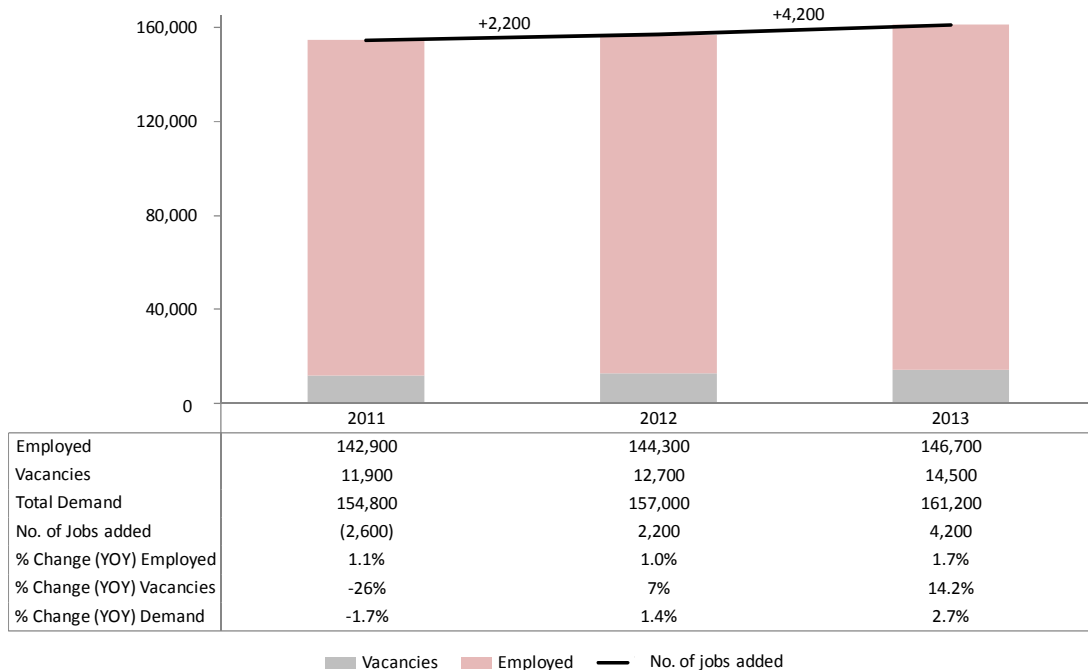
2.2. Job Category

Technical Specialist job roles such as *IT Development*; *Networks & Systems; Data Analytics, IT security and Infocomm R&D* accounted for 6 in 10 jobs demanded

IT Development roles accounted for 42.5% of the total demand[7] for infocomm professionals (Chart 2.2), with software development job roles most demanded (Chart 2.3). As at 1 Jun 2013, about 62,700 development professionals were employed and an additional 5,800 roles were vacant (Chart 2.2)

Chart 2.2: Infocomm Manpower Demand as at June 2013

---

[7] Total infocomm demand refers to the sum of employed infocomm manpower and vacancies.

The next most demanded group of professionals were those working in *Network & Systems* related job roles. They accounted for 16.6% of the total demand for infocomm professionals. As at 1 Jun 2013, about 24,300 professionals were employed in such roles and an additional 2,400 roles were vacant (Chart 2.2).

Other Tech specialists such as Data scientists, IT Security specialists and Infocomm R&D accounted for 3.8% of total demand for infocomm professionals and 5.1% of total job vacancies (Chart 2.2).
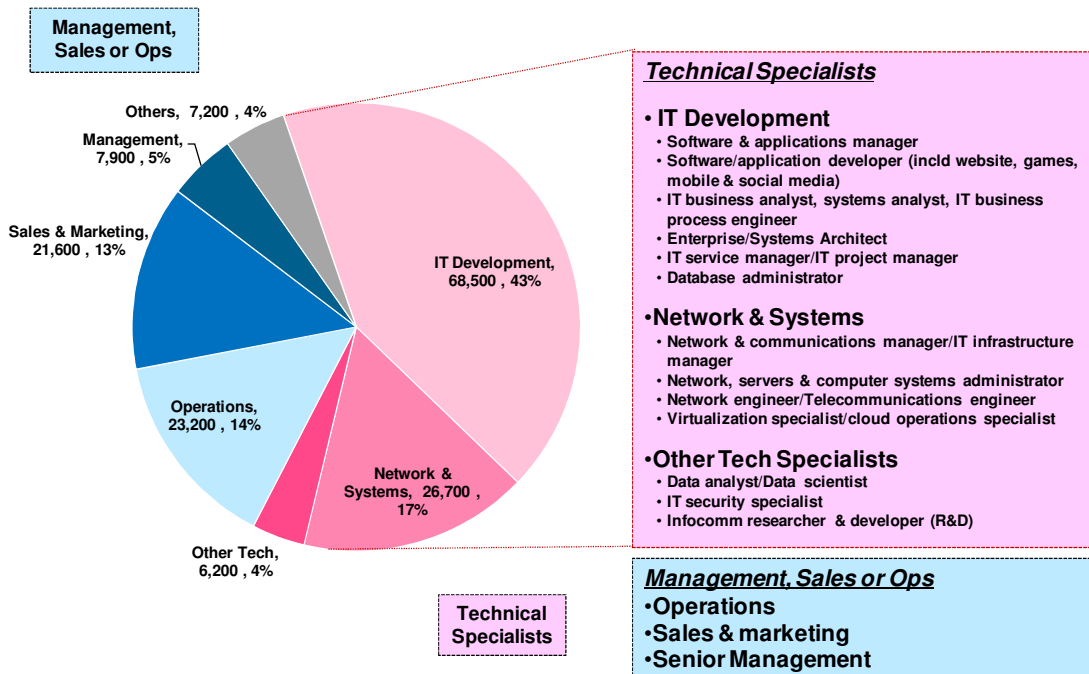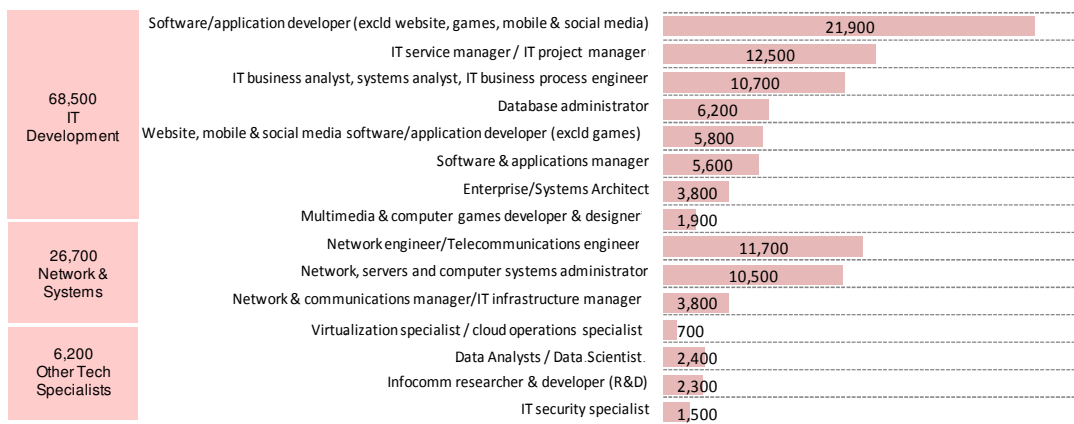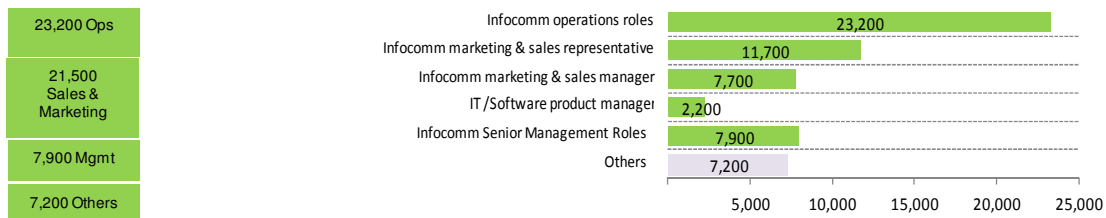
In total, technical specialist job roles such as *IT Development*; *Networks & Systems; Data Analytics, IT security and Infocomm R&D* accounted for more than 60% of the jobs demanded.

Chart 2.3: Infocomm Manpower Demand by job roles as at June 2013

Infocomm Specialists Demand (101,400)

68,500 IT Development	Software/application developer (excld website, games, mobile & social media) — 21,900
	IT service manager / IT project manager — 12,500
	IT business analyst, systems analyst, IT business process engineer — 10,700
	Database administrator — 6,200
	Website, mobile & social media software/application developer (excld games) — 5,800
	Software & applications manager — 5,600
	Enterprise/Systems Architect — 3,800
	Multimedia & computer games developer & designer — 1,900
26,700 Network & Systems	Network engineer/Telecommunications engineer — 11,700
	Network, servers and computer systems administrator — 10,500
	Network & communications manager/IT infrastructure manager — 3,800
	Virtualization specialist / cloud operations specialist — 700
6,200 Other Tech Specialists	Data Analysts / Data Scientist — 2,400
	Infocomm researcher & developer (R&D) — 2,300
	IT security specialist — 1,500

Management, Sales or Ops Demand (59,800)

23,200 Ops	Infocomm operations roles — 23,200
21,500 Sales & Marketing	Infocomm marketing & sales representative — 11,700
	Infocomm marketing & sales manager — 7,700
	IT /Software product manager — 2,200
7,900 Mgmt	Infocomm Senior Management Roles — 7,900
7,200 Others	Others — 7,200

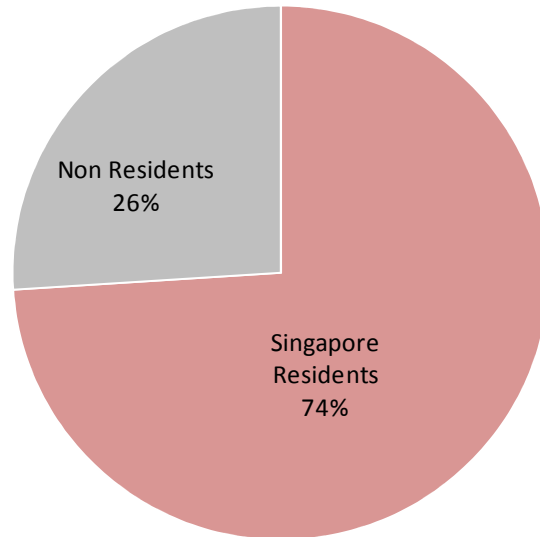5,000   10,000   15,000   20,000   25,000

3.   DEMOGRAPHIC PROFILE

Residents continue to form majority of infocomm manpower

Singapore residents (Singapore citizens and permanent residents) made up about 74% of infocomm manpower in 2013 (Chart 3.1).
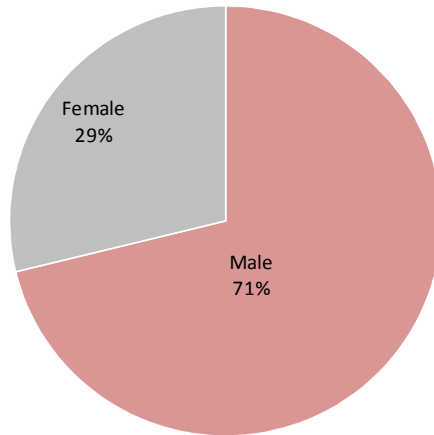
Chart 3.1: Infocomm Manpower by Residential Status, 2013

Males outnumbered females in 2013

The ratio of male to female infocomm manpower was about 2.5, with males outnumbering females in 2013 (Chart 3.2).
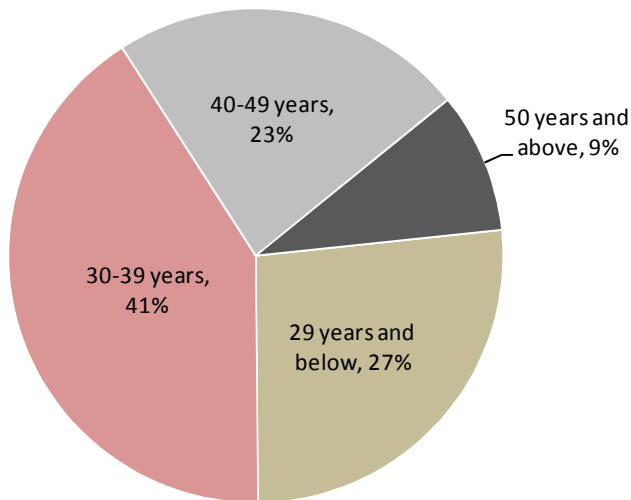
Chart 3.2: Infocomm Manpower by Gender, 2013

About 7 in 10 infocomm manpower were below 40 years old in 2013

About 7 in 10 infocomm manpower were below the age of 40 (Chart 3.3) in 2013. The largest proportion of infocomm manpower continued to be those aged between 30 to 39 years.
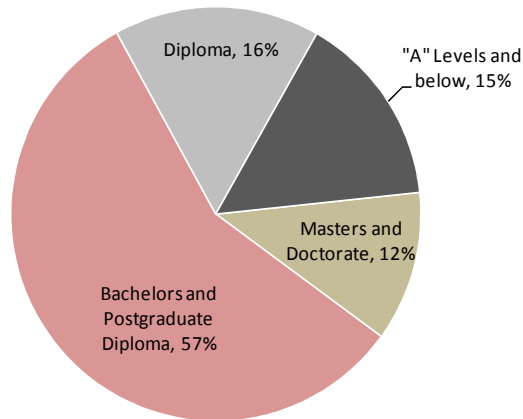
Chart 3.3: Infocomm Manpower by Age, 2013

About 8 in 10 Infocomm manpower had tertiary education in 2013

More than 8 in 10 of the infocomm manpower had tertiary education (i.e., having at least diploma qualifications) in 2013 (Chart 3.4).

Chart 3.4: Infocomm Manpower by Highest Qualification Attained, 2013

More than half of the infocomm manpower with tertiary education had computing related qualifications

Computing, Telecommunications & Digital Media was the dominant discipline of study among infocomm manpower with tertiary education in 2013. More than half of tertiary qualified infocomm manpower held computing related educational qualifications (Chart 3.5).

Chart 3.5: Infocomm Manpower by Discipline of Study as at June 2013
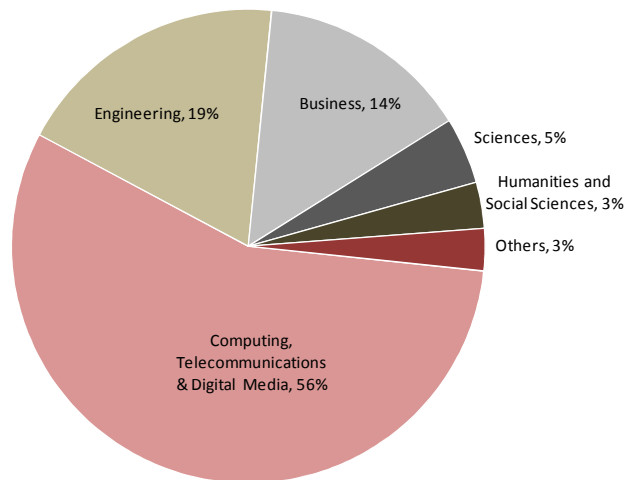
Base: Infocomm manpower with tertiary education

PART III: ANNEX

ANNEX: Infocomm Job Categories

Table A1: Infocomm Manpower Job Categories Descriptions

No.	Job role	Description
1.	Infocomm Senior Management Roles (E.g. CIOs, CTOs, Chief IT security officer, Chief Data Officer).	They are members of the senior management/executive management team in an IT role, and with <u>at least three managers reporting to them</u>. They include the following roles: • Chief Information Officer (CIO) leads the Information Technology (IT) function in providing strategic directions, solutions and policies to support business goals. • Chief Technology Officer (CTO) is responsible for establishing the company's technical vision and leading all aspects of the company's technology development. He is the company's top technology executive, playing an integral role in the company's strategic direction, development, and future growth. • Chief IT Security Officer is responsible for the planning, development and implementation of security strategy and related policies. • Chief Data Officer is responsible for enterprise-wide governance and utilisation of information as an asset via data processing, analysis, data mining information trading and other means.
2.	Software and applications manager	The software and applications manager leads a team of developers on the analysis, development and deployment of business solutions and software applications. The manager will work with other teams to translate the clients' needs to technical specifications required for system development and deployment.
3.	Network and communications manager / IT infrastructure manager	The network and communications manager, and IT infrastructure manager is responsible for performing long-term strategic planning to ensure that network and IT infrastructure capacity meets current and future requirements. They are also responsible for developing, planning, and implementing the overall strategic goals of an organisation's network and communications system, and IT infrastructure.

4.	IT service manager / IT project manager	The IT service manager and IT project manager plan, direct and coordinate information technology projects, and provisioning of IT services.
		Job scope:
		    • consulting with users, to assess computing needs and system requirements and specifying technology to meet those needs
		    • formulating and directing infocomm strategies and plans
		    • directing the selection and installation of infocomm resources and the provision of user training
		    • directing infocomm operations, analysing workflow, establishing priorities, developing standards and setting deadlines
		    • establishing and managing budgets, controlling expenditure and ensuring the efficient use of resources
		    • transitioning new services / projects into operation.

5.	Infocomm marketing and sales manager	The infocomm marketing and sales manager is responsible for meeting sales quota and developing sales strategies that maximises sales opportunities and achieves higher growth. They are also tasked with the critical role of overseeing the generation of sufficient leads to achieve sales goals and ensure desired outcomes. They are responsible for the overall resource management and deployment of the sales teams.
6.	IT / Software product manager	The IT / Software product manager manages software that is built and implemented as a turnkey product. They will develop benchmark against competitors' product offering to improve product features, pricing plan and business processes for new and/ or existing services to ensure market competitiveness.

No.	Job role	Description
7.	Enterprise / Systems architect	They define a high level enterprise-wide IT systems architecture focusing on the mapping of IT capabilities to business needs. Job scope: • designing business, information, application and technology architecture which will address the needs of all departments in an organisation • articulating the solution and strategies to the top management to secure buy-in • planning enterprise systems architecture development • developing IT transition plan and preparing the organisation for any changes that may be associated with the implementation • designing IT governance.
8.	IT business analyst, systems analyst, IT business process engineer	They conduct research, analyse and evaluate client business processes and requirements, information technology requirements, procedures or problems, and develop and implement proposals, recommendations, and plans to improve current or future information systems. Job scope: • consulting with users to formulate and document requirements and with management to ensure agreement on systems principles • identifying and analysing business processes, procedures and work practices • identifying and evaluating inefficiencies and recommending optimal business practices, and system functionality and behaviour • taking responsibility for deploying functional solutions, such as creating, adopting and implementing system test plans • developing functional specifications for use by systems developers • expanding or modifying systems to improve work flow or serve new purposes • coordinating and linking the computer systems within an organisation to increase compatibility.
9.	Network, servers and computer systems administrator	They develop, control, maintain and support the optimal performance and security of information technology systems. Job scope: • maintaining and administering computer networks and related computing environments including computer network, servers, systems software, applications software and all configurations • recommending changes to improve systems and network configurations, and determining hardware or software requirements related to such changes • diagnosing network and system problems • performing data backups and disaster recovery operations • operating master consoles to monitor the performance of servers, computer systems and networks, and to coordinate computer network access and use.
10.	Database administrator	They develop, control, maintain and support the optimal performance and security of databases. Job scope: • developing database architecture, data structures, tables, dictionaries and naming conventions for information systems projects • constructing, modifying, integrating, implementing and testing database management systems • conducting research and providing advice on the selection, application and implementation of database management tools • developing and implementing data administration policy, documentation, standards and models • developing policies and procedures for database access and usage and for the backup and recovery of data • performing the operational establishment and preventive maintenance of backups, recovery procedures, and enforcing security and integrity controls.

No.	Job role	Description
11.	Software / application developer (excluding website, games, mobile and social media)	They research, analyse and evaluate requirements for existing or new software. They also design, develop, test and maintain software to meet the requirements. Job scope: • researching, analysing and evaluating requirements for software • designing and developing computer software • consulting with engineering staff to evaluate interface between hardware and software • developing and directing software testing and validation procedures • modifying existing software to correct errors, to adapt it to new hardware or to upgrade interfaces and improve performance • directing software programming and development of documentation • assessing, developing, upgrading and documenting maintenance procedures for software • consulting with customers concerning maintenance of software.
12.	Website, mobile and social media software / application developer (excluding games)	They research, analyse and evaluate requirements for existing or new websites, and applications on social media and mobile platforms. They also design, develop, test and maintain websites, and applications on social media and mobile platforms to meet the requirements. Job scope: • researching and identifying the purpose, functionalities and content of the website, and applications on social media and mobile platforms • consulting with customers concerning maintenance of website, and applications on social media and mobile platforms • designing, coding and testing of website, and applications on social media and mobile platforms • assessing, developing, upgrading and documenting maintenance procedures for website, and applications on social media and mobile platforms.
13.	Multimedia and computer games developer & designer	They research, analyse and evaluate requirements for existing or new games and multimedia applications. They also design, develop, test and maintain games and multimedia solutions to meet the requirements. They may also create special effects, animation, or other visual images for use in computer games, movies, music videos and advertisements. Job scope: • researching and identifying the purpose, functionalities and content of games and multimedia applications • consulting with customers concerning maintenance of games and multimedia applications • designing, coding and testing of games and multimedia applications • designing and developing digital animations, imaging, presentations, games, audio and video clips, and internet applications using multimedia software, tools and utilities, interactive graphics and programming languages • assessing, developing, upgrading and documenting maintenance procedures for games and multimedia applications • designing complex graphics and animation to satisfy functional, aesthetic and creative requirements of the design brief • creating simulation of movement by displaying a series of pictures, or frames • creating two-dimensional and three-dimensional images depicting objects in motion or illustrating a process, using computer animation and modelling programmes.

No.	Job role	Description
14.	Network engineer / Telecommunications engineer	They plan, manage and evaluate the technical planning and installation of LANs / WANs, and other telecommunication systems and equipment. They also manage, maintain and support the enterprise network, and other telecommunication systems and equipment, and ensure network availability, security and capacity monitoring. Job scope: • planning and designing communications networks based on wired, fibre optical and wireless communication media, evaluating and monitoring network infrastructure to ensure networks are configured to operate at optimal performance • researching, designing and advising on telecommunications equipment, and radio and television distribution systems, including both cable and over the air • specifying production or installation methods, materials, quality and safety standards and directing production or installation work of telecommunications products and systems • installing, configuring, testing, maintaining and administering new and upgraded networks, and other telecommunication systems and equipment • preparing and maintaining procedures and documentation for network inventory, and recording diagnosis and resolution of network faults, enhancements and modifications to networks, and maintenance instructions • monitoring network traffic, and activity, capacity and usage and recommending improvements to ensure continued integrity and optimal network performance. • providing specialist skills in supporting and troubleshooting network problems and emergencies.
15.	IT security specialist	They specialise in providing security assurance of information technology systems. Job scope: • developing plans to safeguard computer files against accidental or unauthorised modification, destruction, or disclosure and to meet emergency data processing needs • training users and promoting security awareness to ensure system security and to improve server and network efficiency • conferring with users to discuss issues such as computer data access needs, security violations, and programming changes • monitoring current reports of computer viruses to determine when to update virus protection systems • modifying computer security files to incorporate new software, correct errors, or change individual access status • monitoring use of data files and regulate access to safeguard information in computer files • performing risk assessments and executing tests of data processing system to ensure functioning of data processing activities and security measures • encrypting data transmissions and erecting firewalls to conceal confidential information as it is being transmitted and to keep out tainted digital transfers.

No.	Job role	Description
16.	IT testing / quality assurance specialist / IT auditor	They specialise in quality assurance including software testing. Job scope: • developing and documenting software testing plans • installing software and hardware and configuring operating system software in preparation for testing • verifying that programmes function according to user requirements and established guidelines • executing, analysing and documenting results of software application tests and information and telecommunication systems tests • developing and implementing software and information system testing policies, procedures and scripts.
17.	Infocomm trainer / educator	They teach or train people in infocomm skills / courses. Infocomm skills / courses include handling information technology and communications equipment, using software / design applications and Internet-based applications.
18.	Infocomm researcher & developer (R&D)	They plan, direct and coordinate infocomm research and development activities of an enterprise or organisation or of enterprises that provide infocomm related services to other enterprises and organisations. Job scope: • planning, directing and coordinating infocomm research and development activities, in-house or commissioned from external research organisations • to develop new or improved technical processes, products or utilisation of materials.
19.	Infocomm marketing and sales representative	They represent companies to sell various infocomm goods and services to businesses and other organisations and provide specific information as required. Job scope: • soliciting orders and selling goods to retail, industrial, wholesale and other establishments • selling equipment, supplies and related services to business establishments or individuals • obtaining and updating knowledge of market conditions and of employer's and competitors' goods and services • providing prospective customers with information about the characteristics and functions of the products and equipment for sale, and demonstrating its use or qualities • quoting prices and credit terms, recording orders and arranging deliveries • reporting customers' reactions and requirements to suppliers and manufacturers • following up with clients to ensure satisfaction with products purchased.
20.	Virtualisation specialist / cloud operations specialist	They are responsible for the administration of the virtualised environment or cloud environment including the design, installation, operation, deployment, automation, monitoring, troubleshooting, and its support. They also specialise in system storage, network, virtualisation and / or data centre automation solutions.
21.	Data Analyst / Data Scientist	They are responsible in applying research methods to analyse complex situations to achieve business objectives (performance improvement, optimisation, cost cutting etc). They also conduct simulation and study of solutions and present them to management for further actions: • work with IT team in setting up the analytics environment to deliver relevant solutions for key business needs and growth • involve in implementing testing method to ensure statistical models can achieve desired outcome • identify and specific data requirements for new complex reports to meet reporting needs with business users • evaluate new approaches, platforms or statistical methodology to improve robustness of analytics team

		• prepare management reports defining the problem/improvement, documenting the analysis and recommending courses of action to determine best outcomes • analyse data to seek out business insights, and develop business information/trends for decision making.
22. Infocomm operations roles		
22a	Website administration	They maintain, monitor and support the optimal functioning of Internet and Intranet website and web server hardware and software. Job scope: • installing, monitoring and supporting the reliability and usability of Internet and Intranet websites or web server hardware or software • developing and maintaining documentation, policies and instructions, recording operational procedures and system logs • developing, coordinating, implementing and monitoring security measures • analysing and making recommendations to enhance performance, including upgrading and acquiring new systems • liaising with, and providing guidance to, clients and users • modifying web pages • performing web server backup and recovery operations.
22b	Computer systems operator	They support the day-to-day processing, operation and monitoring of information and communications technology systems, including local and wide area networks (LANs and WANs), and hardware, software and related computer equipment to ensure optimal performance and identify any problems. Job scope: • operating and controlling peripheral and related computer equipment • entering commands, using computer terminal, and activating controls on computer and peripheral equipment to integrate and operate equipment • monitoring systems for equipment failure or errors in performance • notifying supervisor or maintenance technicians of equipment malfunctions • responding to programme error messages by finding and correcting problems, escalating the problem to other staff or terminating the programme • reading job set-up instructions to determine equipment to be used, order of use, material such as disks and paper to be loaded, and control settings • retrieving, separating and sorting programme output as needed, and sending data to specified users • loading peripheral equipment, such as printers, with selected materials for operating runs, or oversee loading of peripheral equipment by peripheral equipment operators.
22c	Computer technician (including IT user helpdesk technician)	They provide technical assistance to users, either directly or by telephone, e-mail or other electronic means, including diagnosing and resolving issues and problems with software, hardware, computer peripheral equipment, networks, databases and the Internet, and providing guidance and support in the deployment, installation and maintenance of systems. Job scope: • answering user inquiries regarding software or hardware operation to resolve problems • entering commands and observing system functioning to verify correct operations and detect errors • installing and performing minor repairs to hardware, software, or peripheral equipment, following design or installation specifications • overseeing the daily performance of communications and computer system • setting up equipment for employee use, performing or ensuring proper installation of cables, operating systems, or appropriate software • maintaining records of daily data communication transactions, problems and remedial actions taken, or installation activities • emulating or reproducing technical problems encountered by users

		• consulting user guides, technical manuals and other documents to research and implement solutions.
22d	Computer and related electronic equipment mechanic	They install, repair and maintain telecommunications equipment, data transmission equipment, cables, antennae and conduits and repair, fit and maintain computers. Job scope: • maintaining, troubleshooting, testing and repairing computers, data transmission equipment and computer peripherals • fitting and adjusting computer hardware • installing, maintaining, repairing, and diagnosing malfunctions of microwave, telemetry, multiplexing, satellite and other radio and electromagnetic wave communications systems • providing technical advice and information, and monitoring the performance of complex telecommunications networks and equipment • installing and repairing cabling for computer, radio, telephone and television transmission • joining telecommunications and data cables and sealing sheathes • installing, maintaining and repairing antennae used in communications.