

ANNUAL SURVEY ON INFOCOMM MEDIA MANPOWER 2019



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PART I: SURVEY COVERAGE AND METHODOLOGY

1. INTRODUCTION

This is the third cycle of Annual Survey on Infocomm Media (ICM) Manpower conducted since the formation of IMDA in October 2016. This survey's predecessor is the Annual Survey on Infocomm (ICT) Manpower, which had been conducted for 17 cycles since 1999.

Definition of Infocomm Media Professional¹

An Infocomm Professional is a person engaged primarily in infocomm-related work, including infocomm data analytics, either in an IT or telecommunication equipment and/or services provider, or user organisation (such as in a bank). The scope of work may include the development, distribution, implementation, support, operation, sales or marketing of telecommunication, computer hardware/software, IT services or multimedia contents. Examples include software developer, software product manager and computer system administrator.

A Media Professional is a person with specific media content job roles employed in a company across sectors including relevant media ones. Media content job roles cover development, production, operation, distribution, sales and/or marketing of media content. Examples include producer, writer, games developer, and production crew.

He/she must be employed by a Singapore-based enterprise on a full time/part-time/casual/temporary basis either as a permanent or direct contract staff to work in Singapore or overseas.

2. SURVEY OBJECTIVES

The objective of the Survey is to assess the profile of Infocomm Media Professionals in Singapore as at 1st June 2018.

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

3. METHODOLOGY

The survey covers both private sector enterprises and agencies from the public sector. The sample for private sector enterprises, 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 April 2019 to July 2019.

4. NOTES ON THE DATA

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

PART II: SURVEY FINDINGS

1. OVERVIEW

(A) Infocomm Media Professionals

- An Infocomm Media Professional refers to a person engaged in infocomm-related work or a person with specific media content job roles employed in a company across sectors.
- The number of Infocomm Media Professionals employed was 220,800 in 2018. Together with 20,000 Infocomm Media job vacancies, the total demand² of Infocomm Media Professionals was 240,800 in 2018. Demand for Infocomm Media Professionals is projected to grow by another 68,000³ in the next three years (2019 – 2021).

Singapore Residents formed majority of Infocomm Media Professionals

- Infocomm Media Professionals constituted predominantly Singapore Residents⁴ (71%), males (70%) and those who were at least tertiary educated⁵ (89%).

(B) Infocomm Professionals

- The number of Infocomm Professionals employed grew by 4.3% from 189,400 in 2017 to reach 197,500 in 2018. Together with 18,700 Infocomm job vacancies, total demand of Infocomm Professionals increased by 6.7% to reach 216,200 in 2018. Enterprises have projected the demand for Infocomm Professionals to grow by another 61,600 in the next three years (2019 – 2021).

² Total demand refers to the sum of employed manpower and vacancies.

³ This projected figure is calculated based on manpower expectations of the enterprises driven by business and economic sentiments, and some variance would be expected at different stages of the business cycle.

⁴ Singapore residents comprise of Singapore Citizens and Permanent Residents.

⁵ Tertiary educated Infocomm media manpower refers to manpower having at least diploma qualifications.

Technical IT Specialists accounted for more than 2 in 3 Infocomm jobs in 2018

- Technical IT Specialists in the following areas - IT Development, Network & Infrastructure, Data Analytics/Artificial Intelligence, Cyber-Security, Infocomm Research and Development and in Emerging roles - were most in demand and expected to grow by about 49,400 in the next three years (2019-2021).

i. IT Development roles

- a. IT Development roles include Software & Applications Manager; Software/Application Developer (excluding website, games, mobile & social media); Multimedia Developer (including website, games, mobile & social media); User Interface (UI) User Experience (UX) Designer; Enterprise/Systems Architect; IT Business Analyst, Systems Analyst, IT Business Process Engineers; Database Administrator; IT Service Manager/IT Project Manager; IT/Software Product Manager and IT Testing/Quality Assurance Specialist/IT Auditor.
- b. Accounted for 45% of the total demand for Infocomm Professionals, with the Software/Application Developer job role being the most in demand.
- c. As at 1st Jun 2018, about 88,000 professionals were employed in IT Development roles and 8,600 roles remained vacant.
- d. Enterprises have projected the demand for IT Development roles to grow by 33,300 in the next three years (2019 – 2021).**

ii. Network & Infrastructure-related job roles

- a. Network & Infrastructure-related roles include Network & Communications Manager/IT Infrastructure Manager; Network, Servers & Computer Systems Administrator; Network Engineer/Telecommunications Engineer and Virtualisation Specialist/Cloud Operations Specialist.
- b. Accounted for 17% of the total demand for Infocomm Professionals.
- c. As at 1st Jun 2018, about 32,100 professionals were employed in such roles and 4,300 roles remained vacant.
- d. Enterprises have projected the demand for Networks & Infrastructure-related roles to grow by another 6,700 in the next three years (2019 – 2021).**

iii. Other Critical Emerging Tech Specialists

- a. Other Critical Emerging Tech Specialist roles include Data Analyst/Data Scientist; Machine Learning/Artificial Intelligence (AI) Engineer; IT/Cyber-Security Engineer/Specialist; IT/Cyber-Security Operations Analyst/Engineer; Infocomm R&D; Internet of things (IoT) Engineer (sensors, devices, gateways); Embedded Systems/Firmware Developers and IoT Solution Architect/IoT Architect.
- b. Accounted for 8% of total demand for Infocomm Professionals.
- c. As at 1st Jun 2018, about 16,400 professionals were employed in such roles and an additional 1,800 roles remained vacant.
- d. Enterprises have projected the demand to grow by another 9,300 headcounts in the next three years (2019 – 2021).**

(C) Media Professionals

- The number of Media Professionals employed grew by 12.7% from 20,700 in 2017 to 23,300 in 2018. Together with 1,300 media job vacancies, total demand for Media Professionals was 24,600 in 2018. Enterprises have projected the demand for Media Professionals to grow by another 6,400 in the next 3 years (2019 – 2021).

i. Creative Media-related roles

- a. Creative Media-related roles include Writer; Producer; Director; Journalist; Online Content Creator, Game Producer/Game Designer/Game Director; Games Developer; Game Quality Assurance Specialist; Visual Graphics Designer; Art Director and Set Designer; Production Crew and Post Production Specialist.
- b. Accounted for 52% of the total demand for Media Professionals.
- c. As at 1st Jun 2018, about 12,300 professionals were employed in Creative Media-related roles and 400 roles remained vacant.
- d. Enterprises have projected the demand for Creative Media-related roles to grow by another 4,500 in the next three years (2019 – 2021).**

ii. Business roles

- a. Business roles include Advertising Account Executive/Manager; Content Commissioner and Content Acquisition; Customer Insights Specialist; Marketing and Publicity of Media Content Executive/Manager and Sales and Distribution of Media Content Executive/Manager.
- b. Accounted for 34% of total demand for Media Professionals.
- c. As at 1st Jun 2018, about 7,700 professionals were employed in such roles and an additional 600 roles remained vacant.
- d. Enterprises have projected demand to increase by another 1,400 headcounts in the next three years (2019 – 2021).**

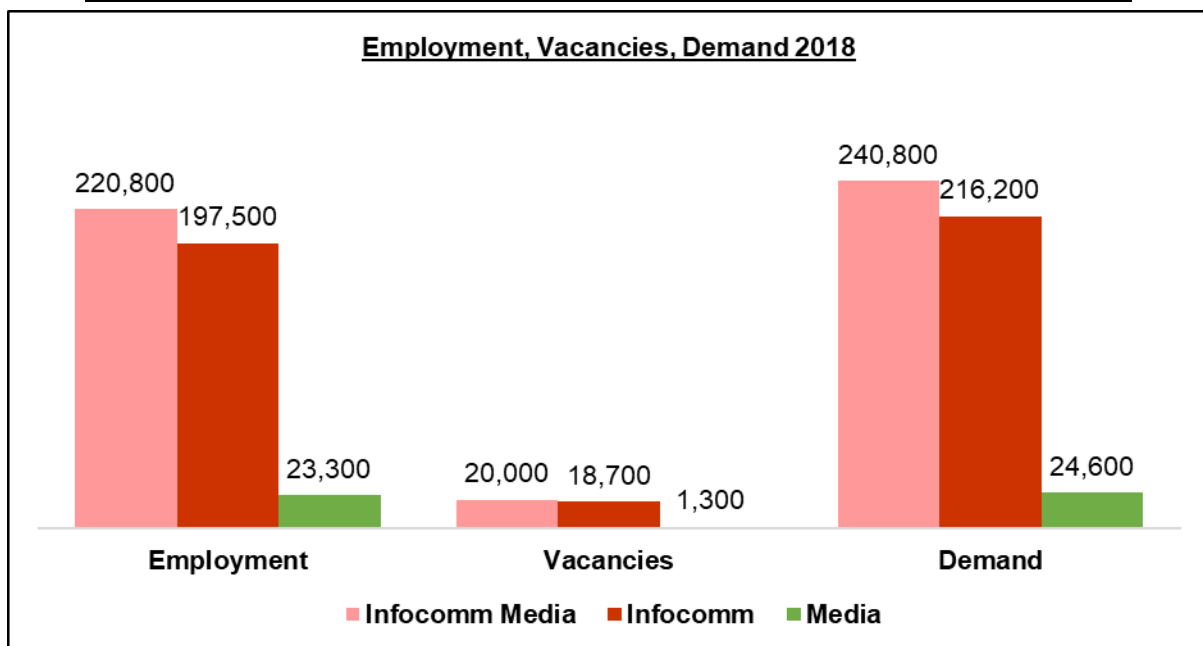
2. EMPLOYMENT

A. AN OVERVIEW OF 2018 INFOCOMM MEDIA MANPOWER DEMAND

Infocomm Professionals made up 89% of Infocomm Media employment

Total employment for Infocomm Media Professionals was 220,800, of which Infocomm Professionals made up 89% of Infocomm Media manpower. Together with 20,000 Infocomm Media job vacancies, the total demand for Infocomm Media Professionals was 240,800 in 2018 ([Chart 1](#)).

Chart 1: Infocomm Media Professionals demand, employment and vacancies, 2018

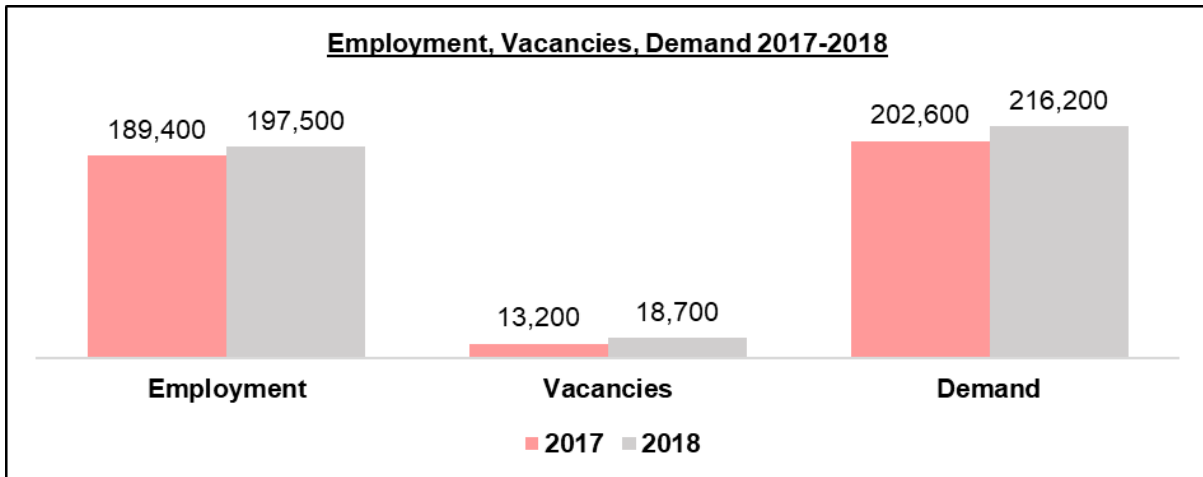


Notes:

- 1) Total Infocomm Media Professionals refers to the sum of Infocomm Professionals and Media Professionals.
- 2) Total Infocomm Media demand refers to the sum of employed Infocomm Media Professionals and vacancies. (Demand = Employment + Vacancies)

Total demand for Infocomm Professionals increased by 13,600 or 6.7% to 216,200 in 2018 ([Chart 2](#)). The growth in demand was supported by employment which grew by 4.3% from 189,400 in 2017 to 197,500 in 2018. Vacancies also increased, by about 5,500, to 18,700 in 2018.

Chart 2: Infocomm Professionals demand, employment and vacancies, 2017 – 2018



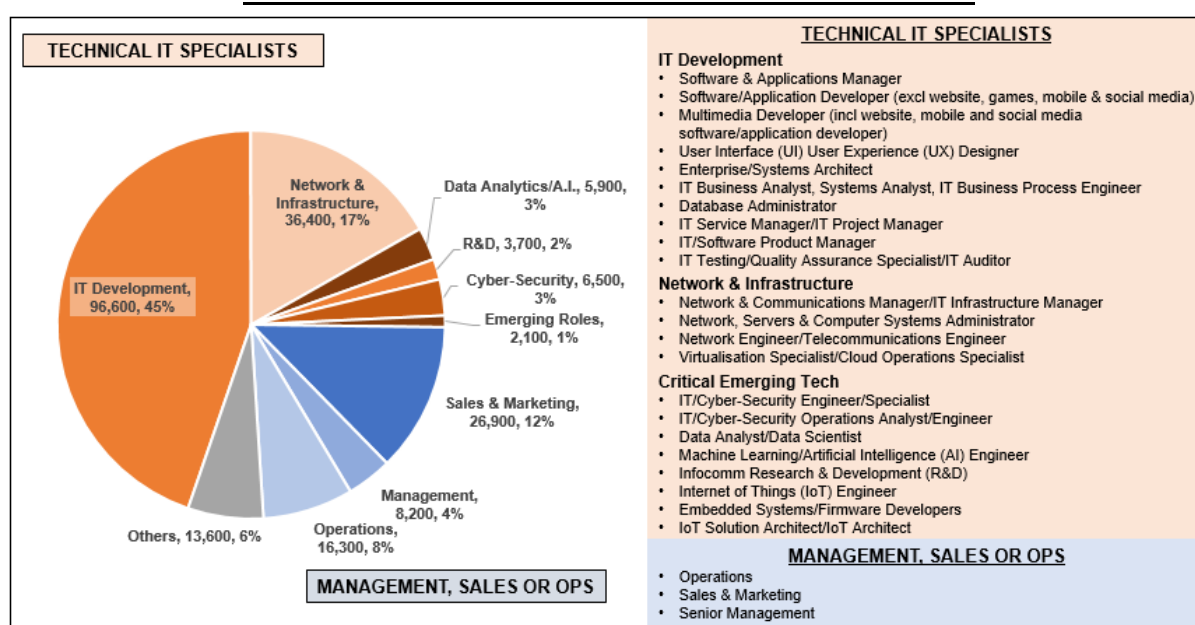
Note: Total Infocomm demand refers to the sum of employed Infocomm Professionals and vacancies (demand = employment + vacancies).

B. AN OVERVIEW OF TECHNICAL IT SPECIALISTS

Demand for Technical IT Specialists are expected to grow by 49,400 in the next 3 years (2019 – 2021)

In total, Technical IT Specialists in areas such as IT Development, Network & Infrastructure, Data Analytics/Artificial Intelligence, Cyber-Security, Infocomm R&D and Internet of Things accounted for 70% or 151,200 of the total Infocomm Professionals in demand in 2018 (Chart 3).

Chart 3: Infocomm Professionals demand as at June 2018



i. IT Development

- a. IT Development roles were the most in demand and accounted for 45% or 96,600 of the total demand for Infocomm Professionals (Chart 3).
- b. As at 1st Jun 2018, about 88,000 professionals were employed in IT Development roles and an additional 8,600 roles remained vacant.
- c. Enterprises have projected the demand for IT Development roles to grow by another 33,300 in the next three years (2019 – 2021) (Chart 4).

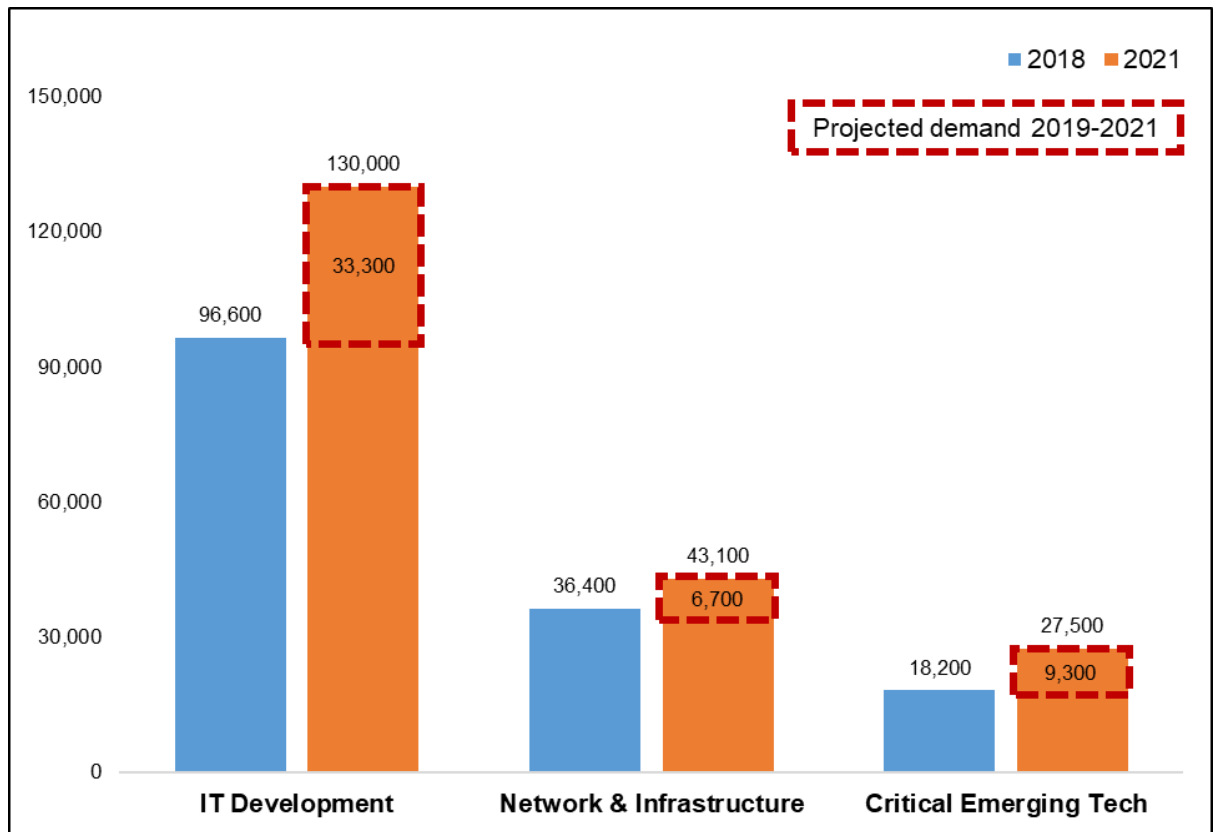
ii. Network & Infrastructure

- a. The next most sought after group of professionals were those working in Network & Infrastructure-related job roles. They accounted for 17% or 36,400 of the total demand for Infocomm Professionals (Chart 3).
- b. As at 1st Jun 2018, about 32,100 professionals were employed in the Network & Infrastructure-related roles and an additional 4,300 positions remained vacant.
- c. Enterprises have projected demand to increase by another 6,700 for these job roles in the next three years (2019 – 2021) (Chart 4).

iii. Other Critical Emerging Tech Specialists

- a. Other Critical Emerging Tech Specialists in areas such as Data Analytics/Artificial Intelligence, Infocomm R&D, Cyber-Security and Internet of Things accounted for 8% or 18,200 of total demand for Infocomm Professionals (Chart 3).
- b. As at 1st Jun 2018, about 16,400 Critical Emerging Tech Specialists were employed and an additional 1,800 positions remained vacant.
- c. Enterprises have projected demand to increase by another 9,300 for these job roles in the next three years (2019 – 2021) (Chart 4).

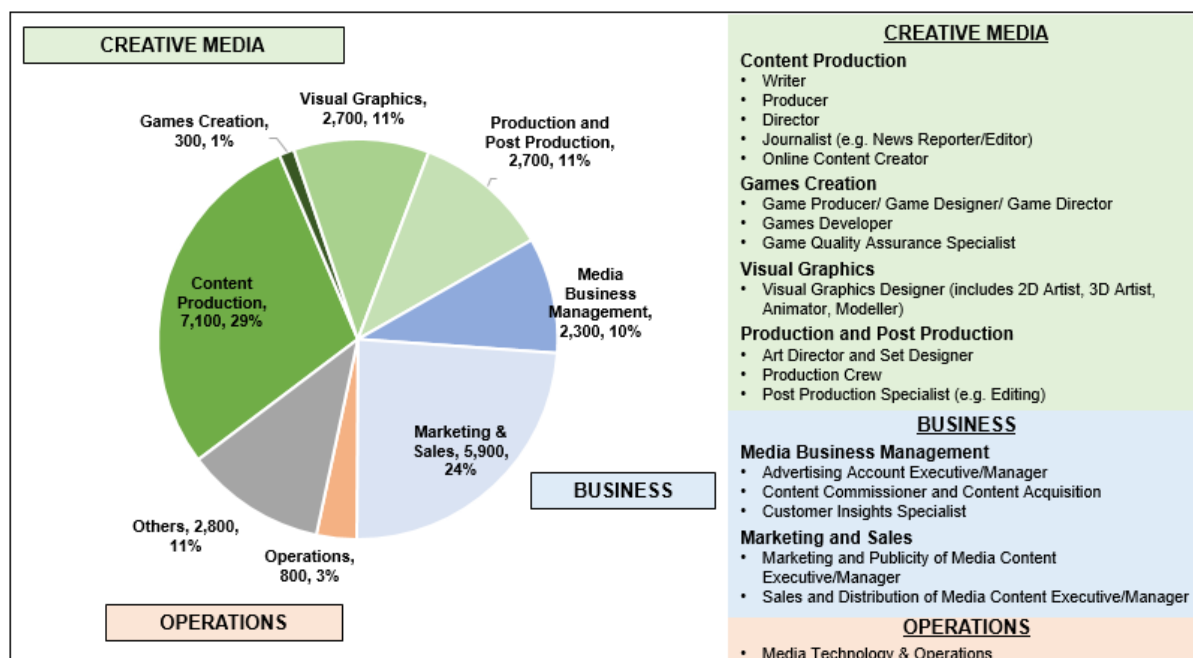
Chart 4: Enterprises' current and projected demand for Infocomm Professionals in next three years (2019-2021)



C. AN OVERVIEW OF MEDIA PROFESSIONALS

The number of Media Professionals employed was 23,300 in 2018. Together with 1,300 Media job vacancies, total demand for Media Professionals was at 24,600 in 2018. (Chart 5)

Chart 5: Media Professionals demand as at June 2018



iv. Creative Media-related roles

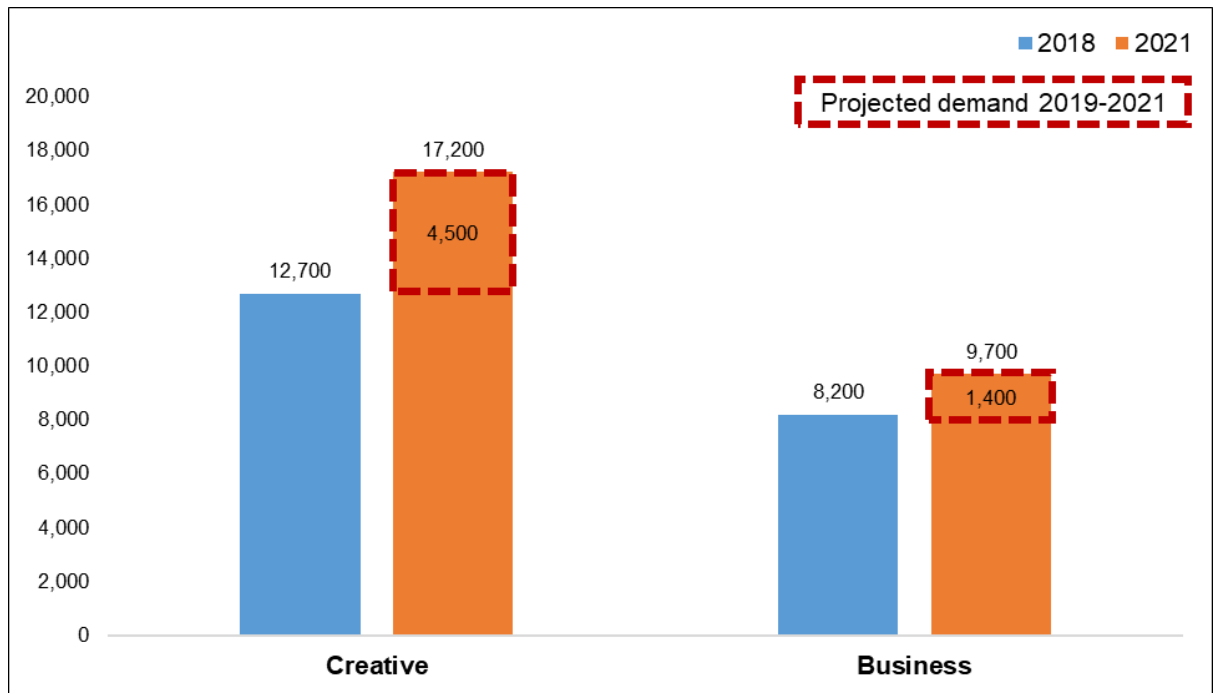
- Accounted for 52% of the total demand for Media Professionals (Chart 5).
- As at 1st Jun 2018, about 12,300 professionals were employed in Creative Media-related roles and 400 roles remained vacant.
- Enterprises have projected the demand for Creative Media Specialists to grow by another 4,500 in the next three years (2019 – 2021) (Chart 6).

v. Business roles

- Accounted for 34% of total demand for Media Professionals (Chart 5).
- As at 1st Jun 2018, about 7,700 professionals were employed in such roles and an additional 600 roles remained vacant.

- c. Enterprises have projected demand to increase by 1,400 headcounts in the next three years (2019 – 2021) (Chart 6).

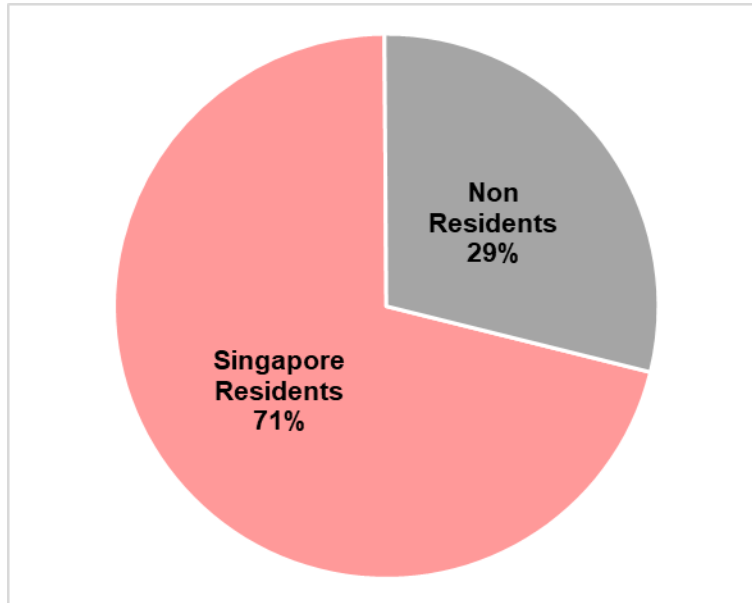
Chart 6: Enterprises' current and projected demand for Media Professionals in next three years (2019-2021)



3. DEMOGRAPHIC PROFILE

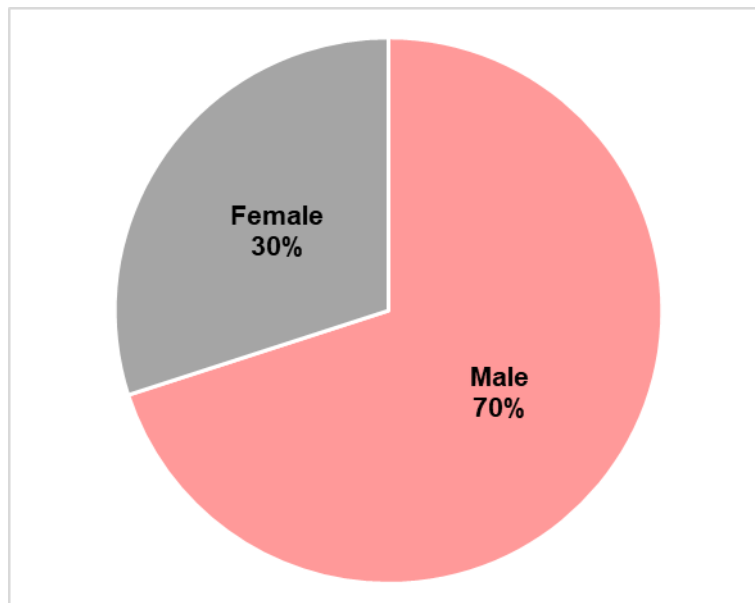
Singapore residents (Singapore citizens and permanent residents) continued to form majority of Infocomm Media Professionals at about 71% in 2018 ([Chart 7](#)).

Chart 7: Infocomm Media Professionals by residential status, 2018



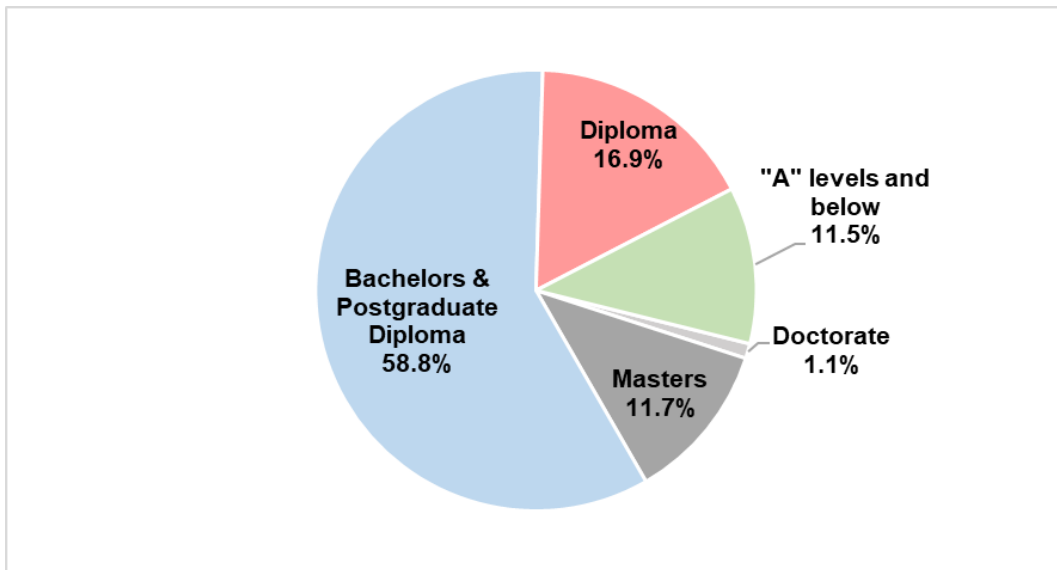
Males continued to outnumber females in 2018 with males making up 70% of Infocomm Media Professionals ([Chart 8](#)).

Chart 8: Infocomm Media Professionals by gender, 2018



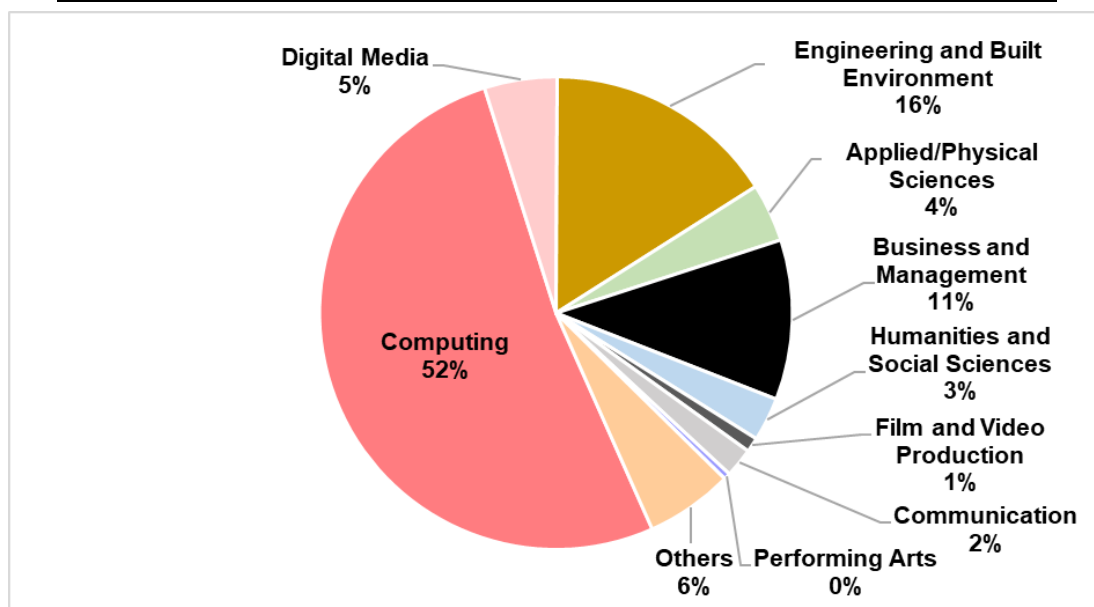
Close to 9 in 10 Infocomm Media Professionals were minimally tertiary educated in 2018 (i.e., had at least diploma qualifications) (Chart 9).

Chart 9: Infocomm Media Professionals by highest qualification attained, 2018



Computing was the dominant discipline of study among Infocomm Media Professionals with tertiary education in 2018 (Chart 10).

Chart 10: Infocomm Media Professionals by discipline of study as at June 2018



Base: Infocomm media professionals with tertiary education

PART III: ANNEX

Annex A: Description of Infocomm Media Job Roles (Table 1)

| No. | Job role | Description |
|-----|--|--|
| 1. | CIO/CTO/Chief IT Security Officer/Chief Data Officer | <p>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:</p> <ul style="list-style-type: none"> • 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. | Infocomm Startup Founder | <p>They are the founding members of an information communications firm:</p> <ul style="list-style-type: none"> • registered in Singapore in the past five years; • employs at least 1 full-time-equivalent worker; • majority owned by individual founders (i.e. individual founding members should own more than 50% of the company's shares in total); • involved in the creation of new information communications products/services (i.e. the company developed and owns the intellectual property rights for new products/services, it <u>should not</u> be a reseller/distributor of existing products and services from other companies). |
| 3. | Software & Applications Manager | <p>They are leading 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.</p> |
| 4. | Software/Application Developer (excl. Website, Games, Mobile & Social Media) | <p>They research, analyse and evaluate requirements for existing or new software. They also design, develop, test and maintain software to meet the requirements.</p> <p>Job scope:</p> <ul style="list-style-type: none"> • 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 users concerning maintenance of software. |
| 5. | Multimedia Developer (incl. Website, Mobile & Social Media Software/Application Developer) | <p>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.</p> <p>Job scope:</p> <ul style="list-style-type: none"> • researching and identifying the purpose, functionalities and content of the website, and applications on social media and mobile platforms. • consulting with users 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. |
| 6. | User Interface (UI) User Experience (UX) Designer (e.g. VR & AR designer) | <p>The UI/UX Designer applies subject matter knowledge in the design, development, documentation, debugging and support of the user interface for a variety of applications (including Augmented reality/virtual reality formats) to have best possible engaging user experiences. With clear understanding of business requirements and user needs, he/she articulates, develops and models the end user experience including the visual design of the applications, to make user interaction simple, efficient and consistent. He/she is involved in the development of process flows, wireframes, and prototypes as well as establish upward communication channels to effectively conceptualise and convey high-level design strategies within organisations. He/she assesses and optimises the performance of new and existing features by actively participating in usability testing and user research, and interpreting analytics data.</p> |

| No. | Job role | Description |
|-----|--|---|
| 7. | Enterprise/Systems Architect | <p>They define a high level enterprise-wide IT systems architecture focusing on the mapping of IT capabilities to business needs.</p> <p>Job scope:</p> <ul style="list-style-type: none"> • 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 | <p>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.</p> <p>Job scope:</p> <ul style="list-style-type: none"> • 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. | Database Administrator | <p>They develop, control, maintain and support the optimal performance and security of databases.</p> <p>Job scope:</p> <ul style="list-style-type: none"> • 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. |
| 10. | IT Service Manager/IT Project Manager | <p>They plan, direct and coordinate information technology projects, and provisioning of IT services.</p> <p>Job scope:</p> <ul style="list-style-type: none"> • 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. |
| 11. | IT/Software Product Manager | <p>They manage 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.</p> |

| No. | Job role | Description |
|-----|--|--|
| 12. | IT Testing/Quality Assurance Specialist/IT Auditor | <p>They specialise in quality assurance including games and software testing.</p> <p>Job scope:</p> <ul style="list-style-type: none"> • developing and documenting software testing plans • play-testing games and report on its playability and programme bugs and identifying refinement areas • installing software and hardware and configuring operating system software in preparation for testing • verifying that programmes function according to user requirements, designer's intention 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. |
| 13. | Network & Communications Manager/IT Infrastructure Manager | <p>They are 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.</p> |
| 14. | Network, Servers & Computer Systems Administrator | <p>They develop, control, maintain and support the optimal performance and security of information technology systems.</p> <p>Job scope:</p> <ul style="list-style-type: none"> • 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. |
| 15. | Network Engineer/Telecommunications Engineer | <p>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.</p> <p>Job scope:</p> <ul style="list-style-type: none"> • 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. |
| 16. | Virtualisation Specialist/Cloud Operations Specialist | <p>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.</p> |

| No. | Job role | Description |
|-----|---|---|
| 17. | IT/Cyber Security Engineer/Specialist | <p>They specialise in providing security assurance of information technology systems.</p> <p>Job scope:</p> <ul style="list-style-type: none"> • developing plans to safeguard data and information against accidental or unauthorised modification, destruction, or disclosure • training users and promoting security awareness to ensure system security and to promote good security practices • conferring with users to discuss issues such as computer data access needs, security violations, and access control requirements • 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 • create good security policies so that the organisation can be adequately protected from any cyber security risks • respond to cyber security incidents, assess the damage done and quickly recover from it possess specialised skill sets like penetration testing, malware analysis, forensics |
| 18. | IT/Cyber Security Operations Analyst/Engineer | <p>They perform operational tasks for the processes and subordinate procedures of Security Operational Centres (SOCs).</p> <p>Job scope:</p> <ul style="list-style-type: none"> • monitor the SOC main channel for security events and close or escalate security events where necessary • monitor network traffic and web server logs to watch for any suspicious activities on the network • analyse and respond to security incidents detected in the network |
| 19. | Data Analyst/Data Scientist | <p>They apply computing and statistical research methods to analyse and model complex data to achieve business objectives (performance improvement, optimisation, cost cutting etc). They also conduct simulation and study of solutions, visualisation of large data sets and present them to management for further actions.</p> <p>Job scope:</p> <ul style="list-style-type: none"> • parse and manipulate raw, complex data streams to prepare for loading into an analytical tool • data conditioning - transform data into a usable state using appropriate tools and techniques • data integration, combining different data sets to improve the usability and the quality of the data • evolve and enhance systems and tools for data analysis and visualisation • recommend and implement data models to enable or speed up the analysis of data, and query databases or data structures effectively to retrieve data for analysis • explore data sets to identify and understand patterns, develop hypotheses and verify them based on analysis of data, using statistical, algorithmic and other mathematical techniques for the purpose of describing a problem or predicting an outcome • research new ways for modelling and predicting behaviour of customers, urban systems, machine systems or any other domain • implement a set of techniques within computer code for the analysis of data, using relevant programming languages and processing techniques • work with IT teams to define the analytics environment to deliver relevant solutions for key business needs and growth • interpret and articulate findings in written, verbal, visual form or computer programs, so as to help internal and/or external stakeholders understand the insights from the data • translate data and findings into addressable info that can help businesses interpret sales trends, marketing intelligence, logistics info etc. to make better business decisions. • measure, observe and analyse the effects of implementation of prior analytics insights, and devise methods for the improvement of an analytical model. |

| No. | Job role | Description |
|-----|--|---|
| 20. | Machine Learning/Artificial Intelligence (AI) Engineer | <p>Machine learning engineers are sophisticated programmers who develop machines and systems that can learn and apply knowledge without specific direction. Artificial intelligence is the goal of a machine learning engineer. They are computer programmers, but their focus goes beyond specifically programming machines to perform specific tasks. They create programs that will enable machines to take actions without being specifically directed to perform those tasks. An example of a system a machine learning engineer would work on is a self-driving car.</p> <p>Job scope:</p> <ul style="list-style-type: none"> • 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. • apply machine learning, collaborative filtering, natural language processing, and deep learning methods to massive data sets • create machine learning models in situations where the data is sparse and high-dimensional; write and build modern machine learning data models, including neural networks to preserve and maintain conversational context and intent with a user • build data models and algorithms for entity extraction from unstructured natural language queries • develop normalization algorithms • drive the machine regression / classification and normalization pipeline • develop accurate visual search and recognition systems, leveraging deep learning and machine learning • analyse and improve the efficiency, scalability, and stability of various production systems • assist the implementation and deployment of systems used for natural language input and processing, data collection, machine learning model training, and deployment of machine learning models • deploy production grade Intent classifiers to classify multi-intent natural language queries and conversational input • patent drafting for the development of the technology • familiar with Agile methodology, project management principles and software development lifecycle practices |
| 21. | Infocomm Research & Development (R&D) | <p>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.</p> <p>Job scope:</p> <ul style="list-style-type: none"> • planning, directing and coordinating infocomm research and development activities, in-house or commissioned from external research organisations • develop new or improved technical processes, products or utilisation of materials. |
| 22. | Internet of Things (IoT) Engineer (Sensors, Devices, Gateways) | <p>Job scope:</p> <ul style="list-style-type: none"> • perform the mechanical and electrical design of the IoT sensor, devices, gateways. • collaborate with the software team on the development of the firmware, OS and applications for the IOT sensors, devices and gateways. • develop and interface IoT edge connectivity gateways to sensors, devices, machines, industrial programmable logic controllers and their respective network communications protocol of the IoT applications to a storage platform such as cloud based infrastructure • perform IoT edge connectivity gateways hardware and software integration and testing. • have knowledge on IOT communications protocols, such as Bluetooth/BLE, WiFi, Zigbee, 6LoPAN, LoRA, wirelessHART, |
| 23. | Embedded Systems/Firmware Developers | <p>Job scope:</p> <ul style="list-style-type: none"> • develop firmware/embedded software including requirement definition, design, implementation, testing and documentation. • develop and deploy end-to-end IOT solution which include interfacing the hardware (i.e. smart devices/sensors), gateways with software (platforms and applications) using IOT protocols such as ZigBee, Z-Wave, or BLE, CoAP, MQTT, OMA-LWM2M • develop and manage APIs to interact/interface with various components of IOT solution, e.g. connecting smart devices to the cloud, exposing the data collected to the applications, interfacing legacy system to IOT services, etc. • write, verify and optimize codes sets to control or use IOT devices and/or interface with IOT platform/back-end systems • design, perform validation, prototyping and testing of embedded software or IOT solution • write, verify and optimize codes sets to control or use IOT devices and/or interface with IOT platform/back-end systems • design, perform validation, prototyping and testing of embedded software or IOT solution |

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| 24. | IoT Solution Architect/IoT Architect | <p>Job scope:</p> <ul style="list-style-type: none"> • collaborate with business stakeholders and partners to analyse and determine their top business problems, propose, design or architect an IoT solution that will solve the problem/deliver value to the business, build a business case to justify the ROI, build an IoT solution prototype, select vendors, and finally, deploy the solution, at scale, across the enterprise. • translate client's business requirements into specific IOT system applications, and process designs while developing functional requirements and solutions designs complete with appropriate TCO and ROI assessments. |
| 25. | Writer | <p>Job scope:</p> <ul style="list-style-type: none"> • conceives, writes and edits scripts for content. • develops scripts that match typical industry format, style and quality required for the media platform as well as fulfils potential audience appeal, enhances the suitability and marketability of the content. • collaborates with researchers and may conduct own research. |
| 26. | Producer | <p>Job scope:</p> <ul style="list-style-type: none"> • manages the entire lifecycle of film/broadcast production from the ideation of content to pre-production, production, post-production to finally reaching the audience by distribution. • evaluates ideas and scripts and pitches film proposals for approval. • raises funds and obtains sponsorships and partnerships to support production projects. • develops budgets and monitors costs, creates production schedule and oversees all the cast and crew. • coordinates production operations which may include securing key rights, locations and permissions. |
| 27. | Director | <p>Job scope:</p> <ul style="list-style-type: none"> • brings content concepts and/or ideas to life through the creative vision. • develops an idea into impactful and engaging content by visualising and defining the style and structure of the production. • guides script development and makes key decisions on cast, crew and locations. • directs talent in the enactment of scenes for shooting. • directs the technical aspects of production including camera, lighting and art in a single camera or multiple camera set-up, which may require directing the switching of cameras depending on shot requirements. • works with the editors to achieve the final cut of the production during post-production. |
| 28. | Journalist (e.g. News Reporter/Editor) | <p>Job scope:</p> <ul style="list-style-type: none"> • produces, delivers and presents news and current affairs content for a variety of audience on relevant print, broadcast and digital platforms in an efficient manner and backed by robust research to objectively present the key facts of news stories. • edits news and current affairs content to ensure compliance to editorial guidelines and organisational policies. • manages the daily news agenda, overall line-up of news and current affairs content as well as the flow of a publication or newscast to deliver pertinent newsworthy stories while ensuring consistency across all programmes line-up. |
| 29. | Online Content Creator | <p>Job scope:</p> <ul style="list-style-type: none"> • researches, conceptualises, produces and markets original video content for consumption and distribution on digital platforms. • able to take different job tasks such as cinematography, production, directing and editing to take ownership of the content from beginning to completion of content creation. • connects with his/her fan base who regularly consumes their content on the digital platforms, and convey the narratives behind the brands/content they create and/or represent to the fan base and masses beyond. |

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| 30. | Game Producer/ Game Designer/ Game Director | <p>Job scope:</p> <ul style="list-style-type: none"> manages the end-to-end game development lifecycle from the initial concept phase to publishing of the game. develops a project plan and manages all phases of game development such as concept development, budget development, development operations and marketing strategy of products to achieve the vision of product and defined milestones. liaises with various stakeholders to ensure game development operations run smoothly and the monetisation of the game is effective. creates the overall vision of the game including gameplay, visual style, story, audio assets, cinematics and user experience. establishes the overall game concept, identifies technical requirements, creates concept visuals and implements interface elements, including game rules. designs and balances gameplay and mechanics and infrastructure for game products. |
| 31. | Games Developer | <p>Job scope:</p> <ul style="list-style-type: none"> drives the technical development of games to ensure that the overall vision of the game is realised. establishes the integration and interaction of technical and creative aspects of the games. develops core game features and functionalities in the form of game engines as a platform to enable game development. develops tools and programs to integrate art and sound assets in the game and aid other production workflows. implements gameplay and user interfaces through writing code. develops programs to enable networked gameplay over local and online servers. |
| 32. | Game Quality Assurance Specialist | <p>Job scope:</p> <ul style="list-style-type: none"> defines quality assurance standards for games. tests gameplay to provide feedback on playability, functionality, entertainment value and user experience. performs analysis of gameplay testing to ensure game design objectives and end user expectations are met. reports issues and collaborates with programmers and designers to remove errors and make enhancements. |
| 33. | Visual Graphics Designer (includes 2D Artist, 3D Artist, Animator, Modeller) | <p>Job scope:</p> <ul style="list-style-type: none"> conceives, designs and develops visual graphics including 2D art, 3D art, animation and visual effects to meet the creative requirements of the content for animation films, live-action films as well as games. |
| 34. | Art Director and Set Designer | <p>Job scope:</p> <ul style="list-style-type: none"> drives the realisation of the overall visual aspect of the production through conceptualisation of set design, locations for content based on the script and overall creative vision. analyses the production script and creates sketches and drawings that will be converted into technical drawings or models to prepare the set according to visual requirements. aligns the overall look and feel of the production and ensure that other areas of production such as lighting and sound recording work in conjunction with the set. |
| 35. | Production Crew | <p>Job scope:</p> <ul style="list-style-type: none"> executes the technical and operational aspects required for production including studio management, grip, lighting and sound to ensure all production elements are working in conjunction in the final content vision. sets up and dismantles technical equipment needed for the production. operates technical equipment during production and maintains technical equipment after usage to ensure equipment is always in working condition for next production. |
| 36. | Post Production Specialist (e.g. Editing) | <p>Job scope:</p> <ul style="list-style-type: none"> edits recorded audio and video content to deliver coherent and cohesive final content to meet the creative and technical requirements of production. |

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| 37. | Advertising Account Executive/Manager | <p>Job scope:</p> <ul style="list-style-type: none"> • develops, manages and expands businesses with his/ her portfolio of accounts, and seeks to achieve or over-achieve clients' objectives by monitoring sales forecasts, formulating holistic marketing plans and suggesting enhancements to existing advertising efforts. • oversees all aspects of the project flow, participate in strategy development and ensure smooth progress at every stage and that campaigns are delivered on brief and on time. |
| 38. | Content Commissioner and Content Acquisition | <p>Job scope:</p> <ul style="list-style-type: none"> • identifies and evaluates available content for acquisition based on content strategy and guidelines. • manages the acquisition and licensing of content from content producers or rights holders. • negotiates terms and conditions for acquiring or licensing content. • contributes to pricing decisions for acquired content and devises monetisation strategy for acquired content. • drives effective exploitation and monetisation of acquired content. • leads and executes the organisation's content strategy by commissioning the production of impactful and commercially profitable content. • evaluates content ideas and concepts to advise on creative and commercial viability of the ideas as well as capabilities of production houses to recommend commissioning of production for the suitable proposals based on a sound understanding of cost, quality, delivery date, rights and funding requirements. |
| 39. | Customer Insights Specialist | <p>Job scope:</p> <ul style="list-style-type: none"> • undertakes detailed quantitative analyses of customer databases and external data sources and develops data-driven insights into customers, their behaviours, preferences and patterns. • identifies and communicates initiatives that enhance the positioning and offering of products and services to customers. • performs data gathering, organising, maintenance, analytics, visualisation and reporting to support various insights-driven processes. |
| 40. | Infocomm Marketing & Sales Manager | <p>They are responsible for meeting sales quota and developing sales strategies that maximise sales opportunities and achieve 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.</p> |
| 41. | Infocomm Sales Specialist (includes Pre-/Post- Sales, Channel Sales, Account Management, Business Development) | <p>They represent companies to sell various infocomm goods and services to businesses and other organisations and provide specific information as required.</p> <p>Job scope:</p> <ul style="list-style-type: none"> • 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. |
| 42. | Product/Digital Marketing Specialist | <p>Job scope:</p> <ul style="list-style-type: none"> • plans, develops and implements competitive go-to-market product strategy based on product benefits, features and target market. • defines and implements tactical plans for marketing activity, coordinates the production of marketing communication collaterals in collaboration with internal and external agencies. • evaluates success and cost-effectiveness of all tactical actions and product campaigns. • leads market assessments to identify business opportunities and grow market share. • plans and implements integrated marketing activities across digital channels and within allocated budgets. • creates appealing content and programmes to promote the organisation and its products to build brand awareness and generate sales. • manages digital platforms and makes improvements to the design and usability for users. • assesses campaign effectiveness and generates data-driven commercial insights and reports. |

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| 43. | Marketing and Publicity of Media Content Executive/Manager | Job scope: <ul style="list-style-type: none"> • responsible for enhancing the media content's visibility and raising the public or target audience's awareness and demand of the content across different medium and platform, e.g. online/ social media. • taking consideration of the clients/distributors/partners' needs and requirements as well as markets' preferences, his/her duties includes analysis of market trends, planning and implementation of sales, marketing and product customisation plans/campaigns/activities, overseeing creation and delivery of press and publicity releases as well as marketing collaterals/assets. |
| 44. | Sales and Distribution of Media Content Executive/Manager | Job scope: <ul style="list-style-type: none"> • designs, develops and implements sales programmes to meet the organisation's business objectives. • develops creative integrated sales proposals by packaging content across platforms, which may incorporate on-air or digital components, promotions, advertising sales, sponsorships and other packaged deals to meet customers' objectives. • collaborates in the development of pricing strategies. • collaborates with media operations to execute ad sales and realise monetisation targets. |
| 45. | Infocomm Operations Roles | Infocomm operations roles comprise website administration, computer systems operator, computer technician (including IT user helpdesk technician) and computer and related electronic equipment mechanic. |
| 46. | Media Technology & Operations | Media Technology & Operations roles comprise Linear Media Infrastructure Technician/ Engineer/ Manager, Linear Media Operator/ Senior Operator/ Manager, Media Data Management Specialist, On-Demand Media Technology and Operations. |