Impact Study on the Information & Communications (I&C) Workforce in Singapore

Published: October 2022

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Preface

The Information & Communications (I&C) landscape has been undergoing changes arising from digitalisation, automation and exponential development in technology. These trends have and will continue to impact the I&C workforce, which refers to ICT and Media roles, as new roles are created, existing job roles evolve, and others see a decline in demand. Hence, this study was conducted in with the aim to explore the impact of such trends on the current workforce with a focus on the most impacted segments of the workforce and to build a future-ready workforce equipped with the right capabilities and skills to adapt to a constantly evolving environment.

In this report, you will find a breakdown of job roles in 3 categories:

- **High-impact roles** which might face displacement or convergence in the next 3-5 years, and adjacent job options to transit to which can leverage existing skills;
- **Medium-impact roles** which might face redesign and require picking up of additional skills; and
- **Low-impact roles** which might face minimal changes.

A note on the methodology and findings

This study aims to provide a view of key technologies and megatrends' impact on jobs and skills by aggregating insights from multiple stakeholders with diverse profiles and perspectives. However, the study and findings were taken at a point in time and will need to be contextualised depending on the time this report is read. Further, organisations and individuals will need to contextualise the report findings to their business, operations and job roles respectively. There are also other considerations which need to be taken into account during the conduct of this impact study, as outlined below.

Firstly, this study acknowledges that the **journey and timeline to technology adoption may be affected by a number of factors:**

- Factors within the control of organisations include operating models, business priorities, legacy processes, system infrastructure etc. The extent and pace of technology adoption will vary across organisations depending on their technology strategies, size and scale of operations. Certain organisations may choose to move at par with or even beyond industry pace, some may choose to be fast followers, while others may adopt a wait-and-see approach.
- Other factors beyond the control of organisations include, but are not limited to, customer preferences, technology commercialisation, technical feasibility, availability of proof of concepts, regulatory hurdles or other unforeseen circumstances.

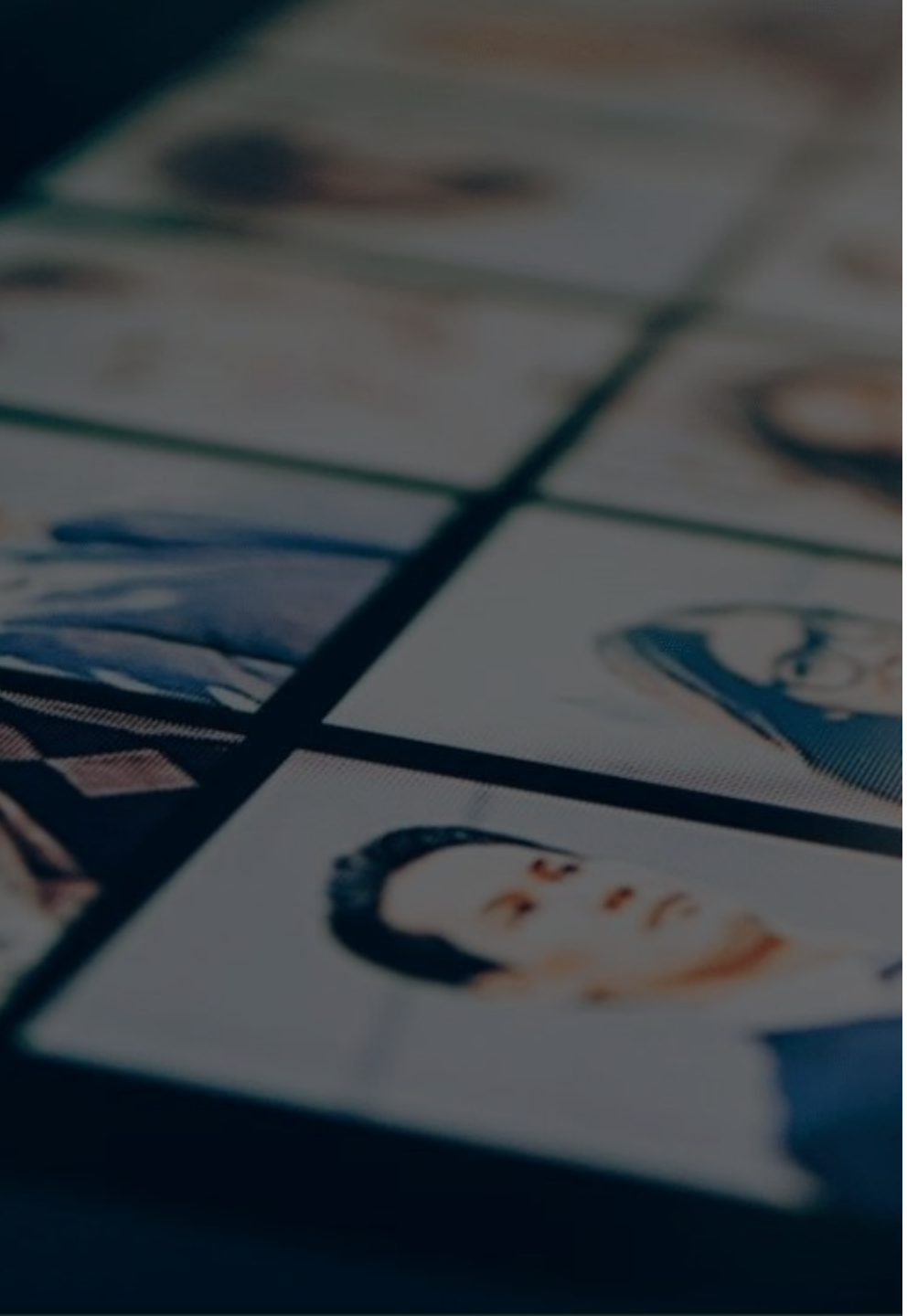
This study also acknowledges **that the impact on jobs and skills may depend on a number of other factors:**

- Some organisations, especially small-medium enterprises, may choose not to build or manage the technology solutions in-house. As such the identified jobs and talent capabilities may initially be outsourced or hired on contract-basis, thus minimising the impact on the existing staff.
- Depending on their people strategies, the potential outcomes for impacted jobs i.e. displacement, convergence, redesign or incremental change, and impact on skills may be quite different across organisations.

The results of EY's work, including the assumptions and qualifications made in preparing the report, are set out in EY's report dated December 2020 ("Report"). You should read the Report in its entirety including any disclaimers and attachments. A reference to the Report includes any part of the Report. No further work has been undertaken by EY since the date of the Report to update it. No reliance may be placed upon the Report or any of its contents. A Recipient must make and rely on their own enquiries in relation to the issues to which the Report relates, the contents of the Report and all matters arising from or relating to or in any way connected with the Report or its contents.

List of abbreviations used in this report

Abbreviation	Term	Abbreviation	Term
AI	Artificial Intelligence	**OTT Media**	Over-the-Top Media
AIOps	Artificial Intelligence for IT operations	**PMET**	Professionals, Managers, Executives and Technicians
CCP	Career Conversion Programmes	**PnT**	Place-and-Train Programmes
CET	Continuing Education and Training	**PSC**	Public Service Content
CPP	Capability Partnership Programme	**ROI**	Return on Investment
DevOps	Development and Operations	**RPA**	Robotic Process Automation
EY	Ernst & Young Advisory Pte. Ltd.	**SAMMP**	Singapore Association of Motion Picture Professionals
FGD	Focus Group Discussion	**SEP**	Self- Employed Persons Programme
I&C	Information & Communications	**SFC**	SkillsFuture Credit
ICT	Infocomm Technology	**SFw**	Skills Framework
IHL	Institutes of Higher Learning	**SME**	Small and Medium Enterprise
IMDA	Infocomm Media Development Authority	**SOAR**	Security Orchestration, Automation and Response software
IoT	Internet of Things	**SRE**	Site Reliability Engineering
ML	Machine Learning	**SSG**	SkillsFuture Singapore
MOE	Ministry of Education	**SysOps**	Systems and Operations
MOM	Ministry of Manpower	**UI/UX**	User Interface / User Experience
NFV	Network Function Virtualisation	**TP**	Training Providers
NLP	Natural Language Processing	**WSG**	Workforce Singapore
OJT	On-the-job Training		
OT	Operational Technology		



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Executive Summary
The impact of emerging technology and megatrends on the Singapore I&C workforce

Much attention has been given to the impact of technology on people and our societies and is often particularly interested in the consequence of technological advancement in the area of manpower. How will technology impact the workforce going forward?

With this backdrop, the study aims to seek answers around:

- What impact emerging technology and other predominate trends will bring to Singapore's I&C workforce in terms of job tasks and skills
- What job implications that job holders might face due to the impact, and
- What the government, organisations and job holders can do to embrace changes and prevail over potential disruptions

KEY FINDINGS FROM THE JOB ROLE IMPACT ANALYSIS

Impact summary for ICT Job Roles

The study examined a total of 100 ICT job roles, of which 19 will likely experience displacement or convergence with another job role (high-impact); 44 will evolve to take on new or additional tasks beyond what is currently done (medium-impact), and 37 will undergo minimal changes in job tasks (low-impact).

High-impact job roles: These roles are mostly impacted by technology such as Cloud and AI as well as the IT ecosystem's evolvement towards Site Reliability Engineering (SRE) and Development and Operations (DevOps). As a result, their tasks can be outsourced to service providers, automated by technology or subsumed under other functions. Some examples are: Infrastructure Engineers, Infrastructure Support Engineers and Quality engineers.

Medium-Impact job roles: These roles are impacted by the same group of trends, i.e. Cloud, AI and evolving IT ecosystem, but to a less extent. For e.g. technology can provide significant assistance in allowing job holders to take on new and additional tasks, or shift their job focus to higher value-added activities. Some examples are: Database Support Engineers, Product Managers and Software engineers.

Low-Impact job roles: These roles will likely continue to perform their tasks as they are today, though some upskilling might be required due to technological advancement. Some examples are: Systems and Operations (SysOps) Engineers, Enterprise Architects and Security Engineers.

Impact summary for Media Job Roles

The study examined a total of 112 Media job roles, of which 10 will likely experience displacement or convergence with another job role (high-impact); 45 will evolve to take on new or additional tasks beyond what is currently done (medium-impact), and 57 will undergo minimal changes in job tasks (low-impact).

High-impact job roles: These roles are mostly impacted by technology such as AI & Analytics and Robotics, as well as the shift in media consumption patterns towards audience-paced media consumption, as evident from the rise of OTT Media. As a result, some tasks that do not require creative inputs such as meta-data cataloguing and subtitling will be automated by technology. Moreover, with the rapid shift in media consumption patterns towards OTT Media platforms, operational roles in linear media converge with on-demand media operation roles. Some examples are: Digital Asset Managers, Linear Media Operators and Programme, Planning & Scheduling Executives.

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Medium-Impact job roles: These roles are impacted by the same group of trends, i.e. AI & Analytics and Robotics, as well as the shift in media consumption patterns, but to a less extent. E.g. technology can perform some repetitive job tasks to enable job holders to take on new and additional tasks or shift their job focus to higher value-added activities such as overseeing technology automation. In addition, technology will augment job tasks and provide insights for job holders to make well-informed decisions aligned to customers' consumption patterns/preferences. Some examples are: Localisation Managers, Video Editors and Game Producers.

Low-Impact job roles: These roles will likely continue to perform their tasks as they are today as these roles remain highly strategic and creative in nature, requiring a high level of human intervention. Technology will merely supplement job tasks for job holders to focus on their core tasks. Some examples are: Film Directors, 3D Artists and Lead Game Technical Artists.

In addition, there are a few key themes that collectively reflect the impact of emerging technology and megatrends on the I&C workforce in Singapore.

I&C professionals need to be more agile with expertise in a broader set of areas given the evolving ecosystem

Agile has rapidly gained popularity amongst ICT job roles both as a methodology and mindset, resulting in a major shift in the way how various ICT job roles work together, leading to a new IT ecosystem. This ecosystem encourages continuous improvement, breaks down silo team structures and promotes collaborations across functions/teams. For example, Software Development is abandoning the waterfall approach for DevOps and quality control, while assurance is embedded early in the design phase of the product. In the Media space, Media job roles are also increasingly required to manage end-to-end production cycles to obtain greater efficiency.

As a result, it has become crucial for I&C professionals to pick up new skills to broaden their knowledge and capability base to handle their job tasks and stay relevant.

Emerging technology will reduce repetitive tasks, allowing job holders to work on higher value-added tasks

> ***"Organisations are slowly evolving, and the demarcation has to become greyer to support a more holistic service. We need to train up the people and inspire them to learn new skills.***

As technology, such as AI, automates manual and repetitive tasks of the I&C workforce, job holders will gain greater freedom to take on job tasks that are more strategic and rely on human judgement and experience.

For example,

- ICT job roles will work alongside technology to **manage the automation process**, review and curate technology-generated results and drive the implementation of digital tools.
- Media job roles will move towards **data-driven content creation** and leverage **data analytics** to understand audience demand for various genres, **guiding production decisions** to produce series that resonate with the audiences.

Executive Summary
The impact of emerging technology and megatrends on the Singapore I&C workforce

ICT job roles will work closely with business functions to achieve business success

Technology has become the powerhouse of business success for many organisations. For example, there is an increasing number of organisations leveraging AI for decision making as the technology provides unparalleled capacities in analysing data, generating insights and predictive models.

> *"There will be more need for people who are strong in talking business and technical at the same time, this is especially true when IT function can be decentralised.*

However, for technology to truly support businesses and maximise its full value, ICT job roles must gain deeper knowledge in their respective business/ sector domains to better understand the needs of their business counterparts and provide solutions that are contextualised to the business purpose.

The shift in media consumption pattern results in an increasing focus on customer centricity in delivering curated media content

A shift in media consumption patterns towards audience-paced media consumption, reflected by the popularity of OTT Media platforms, has impacted job tasks across various media job roles. For instance, job holders in Media Business Management and Content Production will now need to tap into AI & Analytics to gain in-depth insights into fast-changing consumer preferences to create and distribute content.

The rise of OTT Media platforms has also resulted in a paradigm shift in roles within the linear media space, as their job tasks will increasingly move into the on-demand space in the next 3-5 years.

Moreover, there has been a shift in gaming patterns towards cloud gaming and games-as-a-service. Technical Artists and Quality Assurance Testers will need to expand their job tasks to encompass both software and gaming support to ensure a seamless cloud gaming experience.

The study sees a higher level of technology adoption across ICT job roles than Media job roles

The study also investigated the adoption rate of emerging technology in Singapore's I&C workforce. By doing so, these findings allow for a gauge of how technology might impact these job roles. For example, if the adoption rate of a particular technology is generally low across organisations in Singapore, its impact on the workforce might not be imminent and will take a few more years to be fully materialised.

Overall, it is observed that the adoption rate of technology is high in ICT job roles, led by Cloud Computing (~90%), Security (~80%) and AI & Analytics (~70%)[1]. Technology adoption is relatively lower in Media job roles, with Cloud Computing (~60%), Security (~40%) and Immersive Technology (~40%) being the top three adopted technologies[2]. These observations help us identify the particular technologies that might bring a major impact to the ICT and Media job roles in the next 3 to 5 years, and they also shed light on technological areas where more can be done to increase technology adoption in the future.

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Skills shortage is one of the main challenges that organisations face when adopting technology

The study examined potential challenges that organisations might encounter when adopting

technology. The challenges differ across the I&C workforce. However, three factors are shared by both:

- There is a lack of skills locally: many organisations face difficulties in hiring local talent already equipped with the needed skills to implement and develop technology solutions (e.g. Data & AI, Cyber Security)
- Return on Investment (ROI) is not justified or attractive for the technology adoption, and
- The technology adoption is not aligned with the business strategy

While the latter two hurdles are very often organisation-specific, the study aims to address the first one by taking a closer look at the skills gaps among the current I&C workforce and search for effective solutions.

KEY FINDINGS FROM THE SKILLS ANALYSIS

As Cloud computing and AI have become two major technology pillars across organisations, it is without a doubt that the demand for ICT job roles with new skills will continue to rise.

Our insights also suggest that ICT job roles will need to possess AI-related skills such as Artificial Intelligence Application and Data Design to be able to make sense of data and turn them into actionable ROI decisions. As for soft skills, especially with the rise of new models/ approaches (e.g. SRE) to increase team collaborations and productivity, this results in a reshaping of the job functions within organisations. Hence, skills such as Communication, Transdisciplinary Thinking, Collaboration and Business Agility continue to play an important role in ICT job roles.

In the next 3 to 5 years, Media job roles will continue to hone existing media skills, especially skills in creativity to drive novel media content internationally. Moreover, in line with the direction of driving further technology adoption, Media job roles will also need to pick up digital skills to maximise the value that technology can bring going forward. For instance, skills such as Data Analytics, Artificial Intelligence Application and Data Visualisation are skills that Media job roles need to place continued emphasis on.

HOW TO MOVE FORWARD

Equipped with insights into technology adoption, the impact of emerging technology and megatrends on job tasks and skills, this study aims to propose measures that will address obstacles that organisations/individuals might face and help to build a more future-ready I&C workforce.

> ***"The cultural mindset shift is important for making technological progress. People should shift from a fixed mindset to growth mindset and be curious to find out how the technologies work.***

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The impact of emerging technology and megatrends on the Singapore I&C workforce

Government

Industry participants have shared that while there are a great number of manpower initiatives and training programmes for the I&C workforce, going forward, it may help to shift focus to activities such as raising awareness, enhancing user experience, monitoring and measuring outcomes to improve the efficiency and effectiveness of these initiatives and programmes.

The government can play an important role in addressing the challenges facing the I&C workforce.

Firstly, the government can lead the effort to develop or enhance a One-stop-shop government-hosted platform to address the lack of awareness on training programmes and government support currently available. Secondly, the government can facilitate development and set up an open-sourced learning ecosystem through an industry-wide shared recognition mechanism to allow professional development/skills credentialing platform for employers, IHLs, training providers and individuals. Lastly, the government can work with employers to help reskill job roles at risk to possible mobility options/channel high-impact job roles or career switchers to hiring organisations or sectors.

Organisations

Given the pace of technology development, employers should take a proactive approach to ensure that their organisations are ready for what is to come and look at how they can adopt relevant technologies, redesign jobs, and upskill employees in common areas like AI, Automation and Agile methodology to leverage their benefits early.

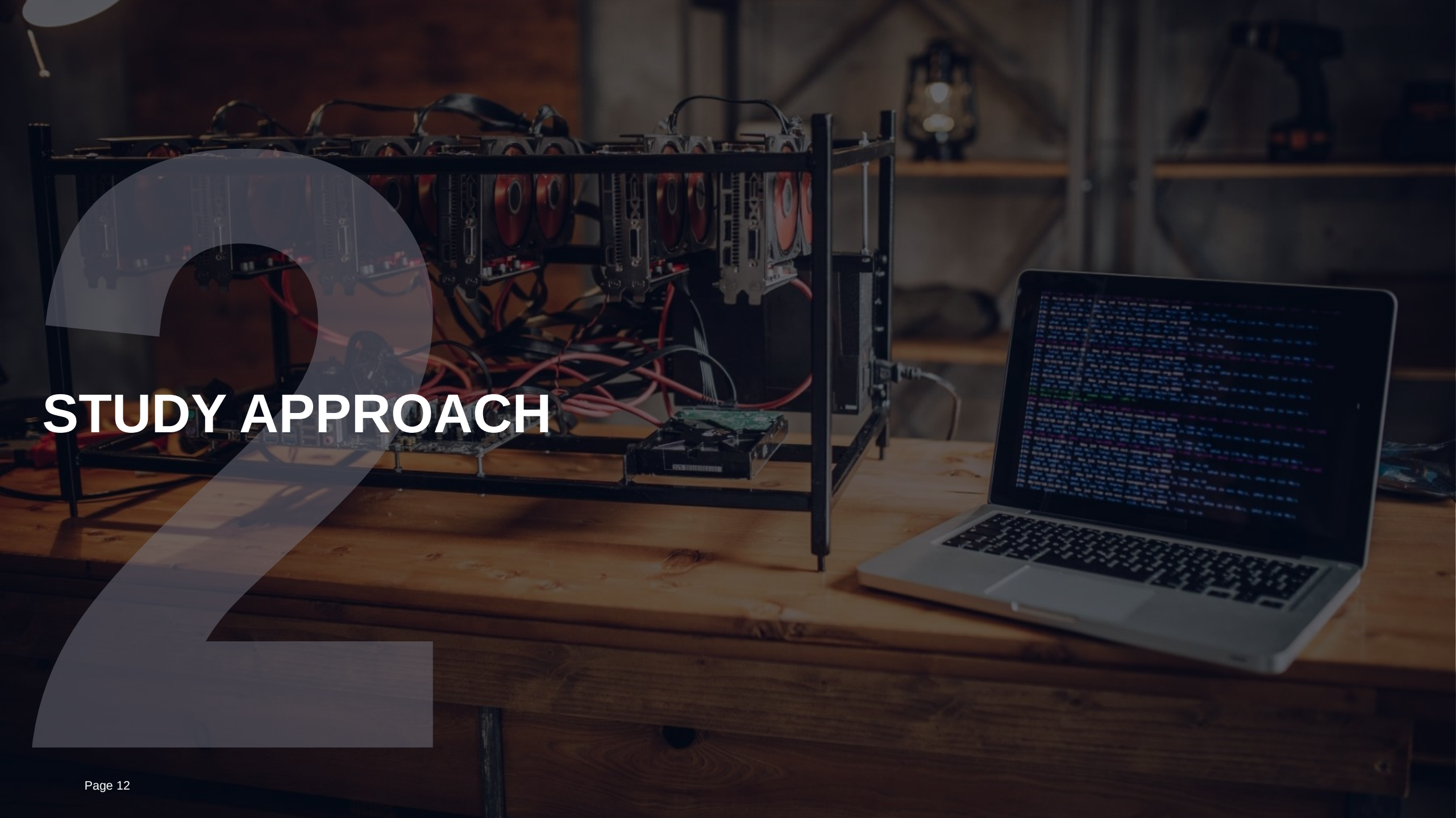
Organisations should periodically assess the existing digital capabilities, determine the future state, and assess the impact on job roles and skills to devise talent management strategies. They should also review existing talent management strategies to identify potential gaps and areas for improvement.

IHLs and Training Providers

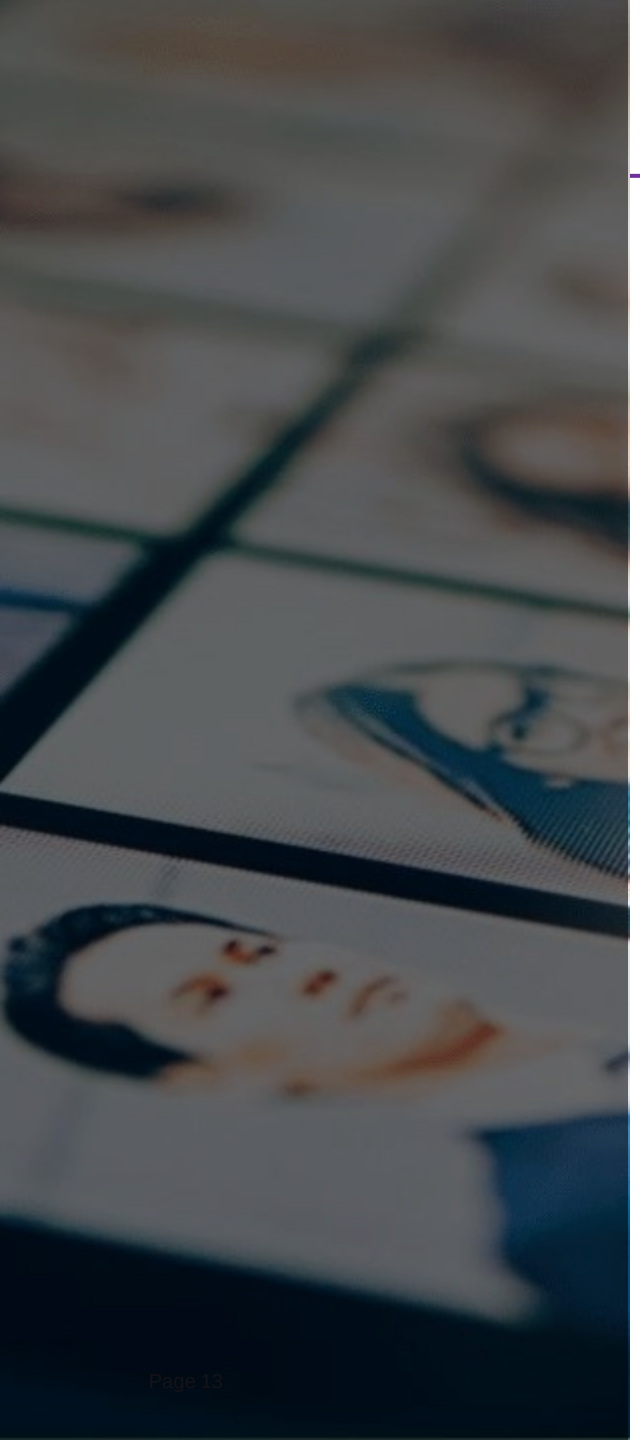
Industry participants often see skills gaps between what is required by job roles and what fresh graduates bring with them when joining the I&C workforce. To solve this issue, there is a need for IHLs and Training Providers to work closely with organisations to guide curriculum design so as to increase speed to market and relevancy. IHLs should also help students to better understand their career opportunities and prepare themselves for their professional journey through various avenues such as career coaching, network events and hands-on business projects.

Individuals

Lastly, I&C professionals themselves should embrace changes and adopt a mindset shift. A shift in mindset is necessary for businesses to transform digitally in order to meet the changing needs of the workforce. There should also be a continued ‘hunger’ for knowledge, in order to ensure that the ‘supply’ of skills matches the current and future ‘demands’ of the ICT and Media job roles.



2 STUDY APPROACH



Study Methodology

The overall objective of the study is to explore the impact of **technology and megatrends** on the current ICT and Media job roles, with a focus on the **most impacted segments,** to build a future-ready workforce equipped with the **right capabilities and skills** to adapt to a constantly evolving environment.

IMPACT ANALYSIS

To assess the impact of technology and megatrends on the **functional job tasks** for Singapore's ICT and Media job roles between now and 2025

SKILLS ANALYSIS

To identify the **skillsets** required to perform future ICT and Media job roles, as well as identify adjacent job roles for high-impact job roles to transit to based on their skills

A view of the in-scope functional track

Information & Communications (I&C) job roles refer to ICT and Media job roles. Leveraging the Skills Framework for ICT[1] and Skills Framework for Media[2], the study focused on the functional tracks as depicted below. For the purpose of this study, the corporate functions within I&C Companies include support functions such as Human Resource, Legal, Finance and Tax.

ICT Functional Tracks

- Data and Artificial Intelligence
- Infrastructure
- Software and Applications
- Strategy and Governance
- Operations and Support
- Cyber Security
- Sales and Marketing

Media Functional Tracks

- Game Production
- Game Design
- Game Technical Development
- Quality Assurance
- Content Production and Management
- Visual Graphics
- Production Technical Services
- Content Post-Production
- Media Technology and Operations
- Media Business Management

Corporate Functions within I&C Companies

- Human Resource
- Legal
- Finance
- Tax

Guiding principles for identifying in-scope organisations

The guiding principles for identifying participating organisations are as follows:

- Organisations with operations in **minimally two functional** tracks
- **Local and foreign technology solution providers** with a presence in Singapore
- **Large and small broadcast, film, video and game companies** with a presence in Singapore
- Additional organisations that are technology disruptors or IHLs

[1] SSG, WSG and IMDA, “Skills Framework For Infocomm Technology”, 2020
[2] SSG, WSG and Enterprise Singapore, “Skills Framework for Media”, 2018

Stakeholder engagement for the study

SENIOR LEADERSHIP INTERVIEWS

These sessions were conducted to understand:

- Digital agenda and vision for their organisations
- Emerging technologies and megatrends
- Impact of these trends on ICT and Media job roles and skills in general
- Talent gaps and ways to build a future-ready workforce

FOCUS GROUP DISCUSSIONS (FGD)

These sessions were conducted to understand:

- Impact of trends on job roles and tasks
- Types of skills required to perform new job tasks
- High-impact roles and possible roles to move into
- New ICT and Media job roles and skills

22 Senior Leadership Interviews conducted

Inputs from **C-Suites** (CEOs, CTOs, CIOs, CHROs) & Business Leads

Joined by Individuals who **perform identified job functions** of their organisations

Joined by **IHLs & Associations**

38 Stakeholders engaged for **Senior Leadership** Interviews

30 **Focus Group Discussions** with **151 participants**

**Note: Some participants have attended more than one FGD*

3 TRENDS STUDIED

Technologies that will impact the I&C workforce in the next 3 to 5 years

Technology trends identified from EY's desktop research and thought leadership:

Technology	Descriptions
 Artificial Intelligence and Analytics	**Artificial Intelligence** technology is able to simulate human intelligence to replace tasks. **Advanced Analytics** will provide key insights and trends from Big Data.
 Robotics	**Robotics** is able to automate laborious manual and high-volume repetitive tasks or complex data handling actions.
 Blockchain	**Blockchain** enables secure, tamper-proof digital records technology augmenting current workflows. Provides an innovative way to distribute, share and protect information that underlies the infrastructure for IoT networks.
 5G & Internet of Things	**IoT** enables a seamless transfer of data over a network without requiring human-to-human or human-to-computer interaction. 5G networks will go a long way towards improving the performance and reliability of connected devices.
 Immersive Technology	**Immersive Technology** replaces or expands the physical world by the creation of 360 virtual space, allowing users to look in any direction and see virtual content. This covers both VR which shuts out real life spaces and AR, which superimposes a layer of digital content over the physical world.
 Security	**Security** covers the defense of digital information and IT assets against internal and external, malicious and accidental threats. This defense includes detection, prevention and response to threats through the use of security policies, software tools and IT services.
 Cloud Computing	**Cloud computing** refers to the practice of using a network of remote servers hosted on the internet to store, manage and process data instead of using a local server.

Megatrends that will impact the I&C workforce in the next 3-5 years

Megatrends identified from EY's desktop research and thought leadership:

Megatrends	Descriptions
Covid-19	As businesses are switching to remote working solutions, there is a growing need for "IT resilience" which will likely lead to new technological investments accelerating the technology adoption in many organisations.
Evolving IT Ecosystems	There is an increasing number of organisations that are moving towards DevOps/ Site Reliability Engineering (SRE) models to increase team collaborations and productivities, resulting in a reshaping of the job functions within organisations.
Shift In Media Consumption Patterns	As audiences increasingly consume more on-demand and online media content, this has led to media consumption shifting to Over-the-Top (OTT) Media and social media platforms from linear broadcast.

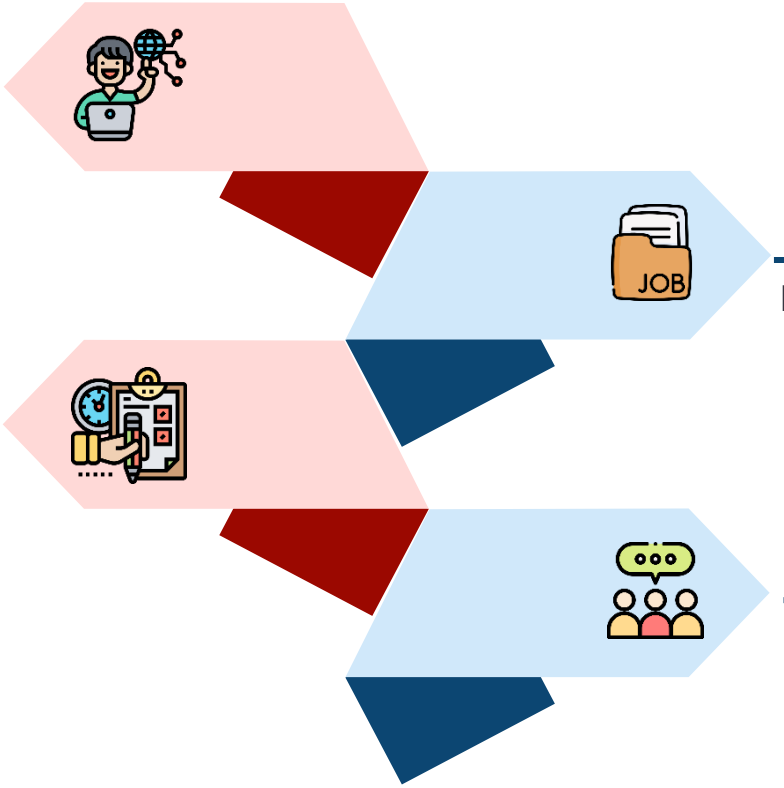
4 IMPACT ANALYSIS SUMMARY

Key factors in considering level of impact on different job roles and adjacent roles to transit to

1 Assessing impact levels

Adoption level of the technology

Is it widely implemented by companies?



Number of job tasks impacted

Is it a large/small number of tasks impacted?

Criticality of the task impacted

Is it a core task for this job role?

Industry participants' inputs

What are the views from the industry?

2 Assessing possible job roles to transit to

Number of transferable key skills → **Overlap of critical knowledge** → **Extent of upskilling/reskilling required**

Level of impact on ICT job roles

Around 20% of ICT roles will experience high impact which might lead to displacement or convergence in the next 3-5 years

IMPACT	HIGH	MEDIUM	LOW
DEGREE OF CHANGE IN JOB TASKS	A **significant** proportion of the job tasks will be **changed**	A **small** proportion of the job tasks will be **changed**	Job tasks will change **incrementally,** with a dependence on human interventions
EXPECTED OUTCOMES	The job role will undergo **displacement** or **convergence**	The job role will require **redesign**	**Minimal changes** to the job tasks
	19 ICT roles	**38** ICT roles	**43** ICT roles

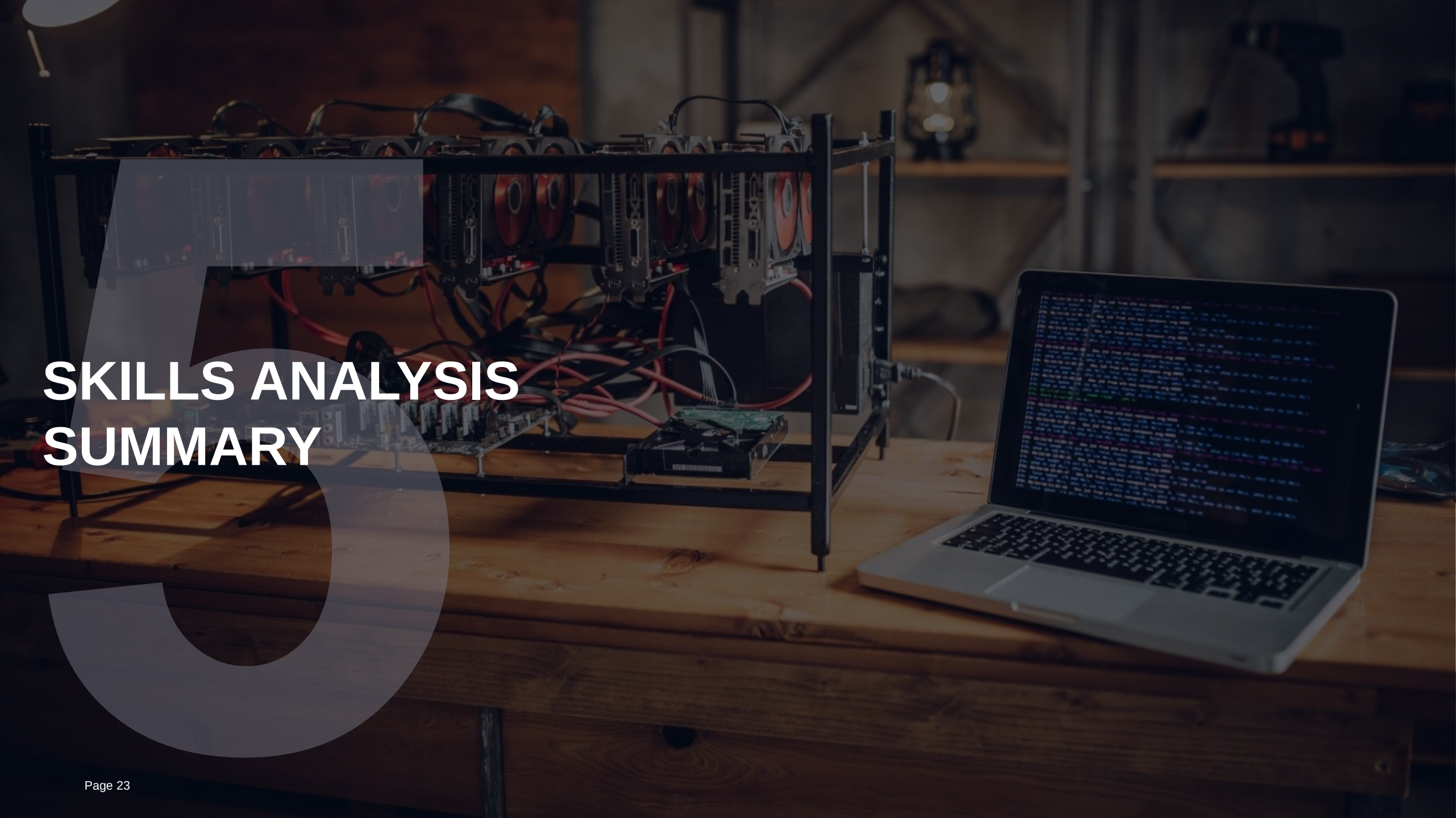
'***Time horizon of impact is independent across the degree of change in job tasks***

Level of impact on Media job roles

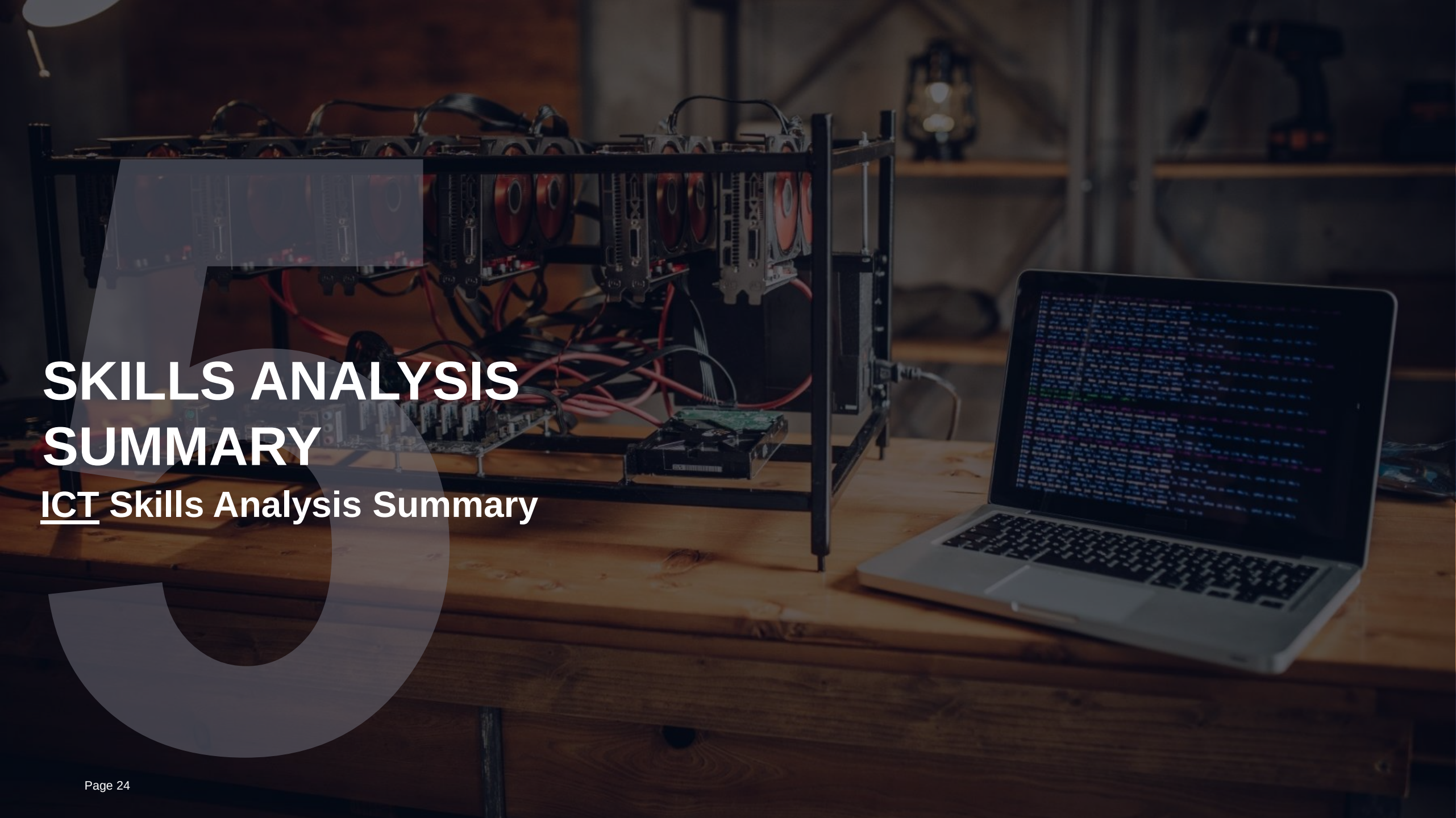
Only about 9% of Media job roles face displacement/convergence in the next 3-5 years, while about 40% face some redesign to their job tasks

IMPACT	HIGH	MEDIUM	LOW
DEGREE OF CHANGE IN JOB TASKS	A **significant** proportion of the job tasks will be **changed**	A **small** proportion of the job tasks will be **changed**	Job tasks will change **incrementally,** with a dependence on human interventions
EXPECTED OUTCOMES	The job role will undergo **displacement** or **convergence**	The job role will require **redesign**	**Minimal changes** to the job tasks
	10 Media roles	**45** Media roles	**57** Media roles

'***Time horizon of impact is independent across the degree of change in job tasks***



5 SKILLS ANALYSIS SUMMARY



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SKILLS ANALYSIS SUMMARY

ICT Skills Analysis Summary

High-impact ICT job roles

are mainly in Infrastructure and Operations & Support. They can transit into adjacent job roles with skills top-ups

FUNCTIONAL TRACKS	EXAMPLES OF HIGH-IMPACT ROLES	SKILLS TOP UP REQUIRED	POSSIBLE JOB ROLES TO TRANSIT INTO
Infrastructure	▪ Infrastructure Engineer ▪ Network Engineer	▪ Application Development ▪ Continuous Integration and Continuous Deployment ▪ 5G-related skills (e.g. radio frequency engineering / network slicing)	▪ SysOps Engineer ▪ Automation and Orchestration Engineer
Strategy & Governance	▪ Quality Assurance Engineer/ Manager ▪ Quality Engineer/ Manager	▪ Audit and Compliance ▪ Agile Coaching ▪ Applications Integration	▪ IT Auditor/ Audit Manager ▪ Business Analyst ▪ Project Manager/ Program Manager
Operations & Support	▪ Infrastructure Support Engineer ▪ Systems Support Engineer ▪ Applications Support Engineer ▪ Ops Centre Support Engineer	▪ Agile Methodology ▪ Agile Software Development ▪ Cloud Computing ▪ Continuous Integration and Continuous Deployment	▪ DevOps/ SysOps Engineer ▪ Scrum Master/ Project Manager
Cyber Security	▪ Associate Security Analyst ▪ Security Operations Analyst	▪ Cyber Risk Management ▪ Security Architecture ▪ Security Governance	▪ Incident Investigator ▪ Security Engineer

Medium-impact ICT job roles

skills in AI Application, Cloud Computing and DevOps are needed as more businesses move towards AI/ Cloud-based applications and agile development

FUNCTIONAL TRACKS	EXAMPLES OF MEDIUM-IMPACT ROLES
Operations & Support	▪ Database Support Engineer ▪ Data Centre Operations Engineer
Infrastructure	▪ Infrastructure Architect ▪ Radio Frequency Engineer
Strategy & Governance	▪ Project Manager ▪ Program Director
Cyber Security	▪ Cyber Risk Analyst/ Manager
Software & Applications	▪ Software/ DevOps Engineer ▪ Embedded Systems Engineer
Data & AI	▪ Data Analyst/ Scientist ▪ Data/ AI Engineer

EXAMPLES OF ADDITIONAL TECHNICAL SKILLS & COMPETENCIES REQUIRED

- AI Application
- Agile Software Development
- Business Agility
- Cloud Computing
- Customer Behaviour Analysis
- Continuous Integration and Continuous Deployment
- Data Analytics
- Data Governance
- Security Assessment and Testing
- Security Architecture
- Stakeholder Management

EXAMPLES OF ADDITIONAL CRITICAL CORE SKILLS REQUIRED

- Communication
- Problem Solving
- Transdisciplinary Thinking

Low-impact ICT job roles

like Enterprise Architects and SysOps Engineer are mainly involved in designing, managing and solutioning, making them least impacted by technology. More soft skills needed to be responsive to technology and business changes

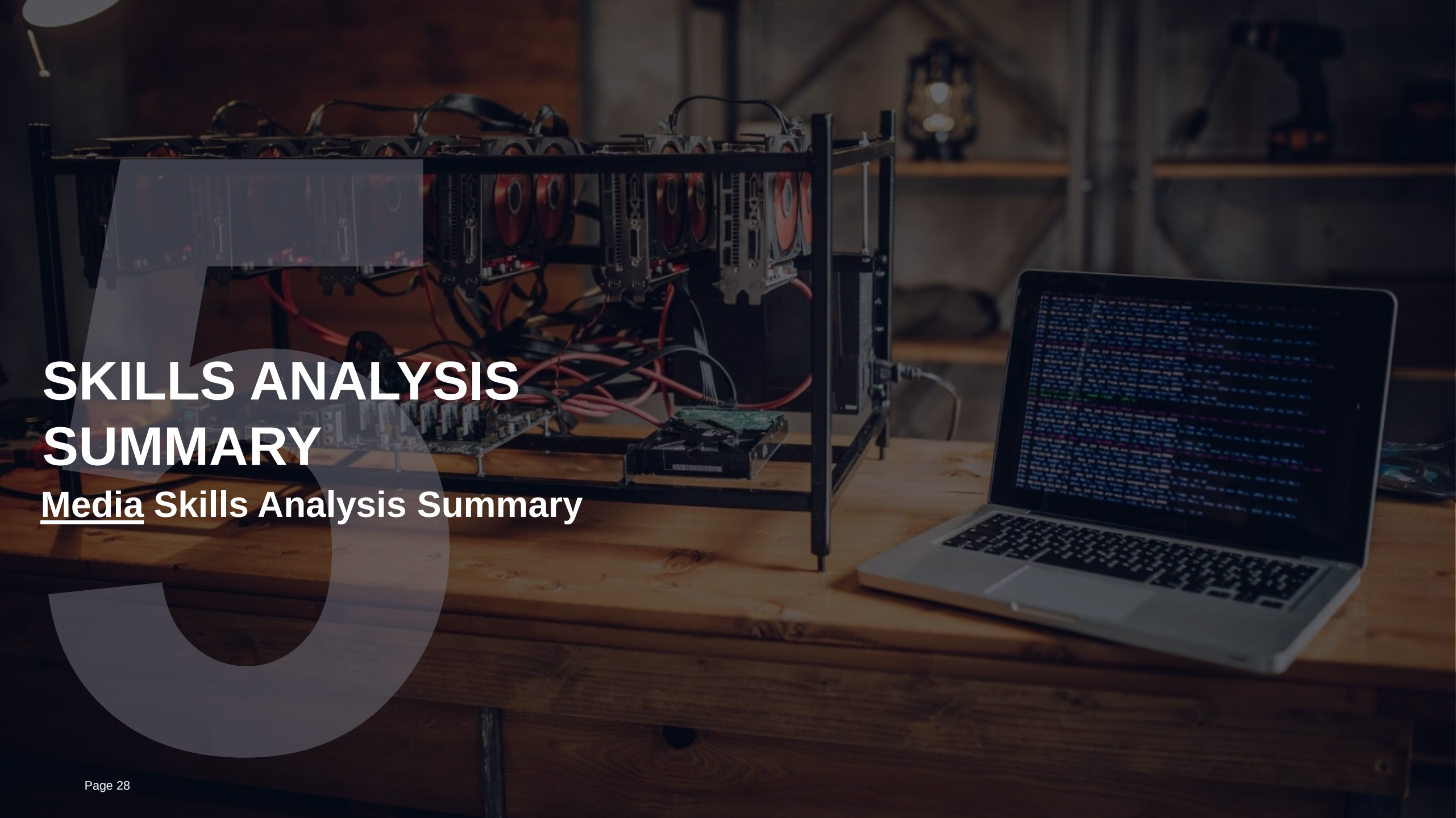
FUNCTIONAL TRACKS	EXAMPLES OF LOW- IMPACT ROLES
Software & Applications	▪ Head of Software Engineering
Infrastructure	▪ SysOps Engineer ▪ Automation and Orchestration Engineer ▪ Infrastructure Engineering Manager
Strategy & Governance	▪ Enterprise/ Solution Architect ▪ Business Analyst ▪ Data Protection Officer
Cyber Security	▪ Vulnerability Assessment and Penetration Testing Analyst ▪ Forensic/ Incident Investigator
Sales & Marketing	▪ Pre-Sales/Business Development/ Customer Success roles ▪ Marketing roles

EXAMPLES OF ADDITIONAL TECHNICAL SKILLS & COMPETENCIES REQUIRED

- AI Application
- Agile Coaching
- Business Agility
- Business Continuity
- Business Risk Management
- Cloud Computing
- Customer Behaviour Analysis
- Crisis Management
- Data Governance
- UI/ UX Design

EXAMPLES OF ADDITIONAL CRITICAL CORE SKILLS REQUIRED

- Communication
- Transdisciplinary Thinking



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SKILLS ANALYSIS SUMMARY

Media Skills Analysis Summary

High-impact Media job roles

are mainly impacted by shifts in media consumption patterns and automation technology. They can transit to other roles like those in on-demand media and post-production

FUNCTIONAL TRACKS	EXAMPLES OF HIGH-IMPACT ROLES	SKILLS TOP UP REQUIRED	POSSIBLE JOB ROLES TO TRANSIT INTO
Media Technology and Operations	▪ Linear Media Operator/Manager ▪ Digital Asset Librarian	▪ Content Delivery Network Operations ▪ Network Administration and Maintenance ▪ Colour Grading ▪ Procurement for Production Operations	▪ On-Demand Media Ops Manager ▪ Post-Production Assistant
Production Technical Services	▪ Vision Mixer/ Switcher	▪ Video Editing ▪ Colour Grading	▪ Video Editor ▪ Post-Production Assistant
Media Business Management	▪ Programme Planning & Scheduling Executive/ Manager	▪ Customisation & Localisation ▪ Content Rating and Compliance	▪ Localisation Executive/Manager ▪ Standards & Practice Executive/Manager
Games	▪ Games QA Tester	▪ User Experience Design ▪ User Experience Interface ▪ Project/Budget Management	▪ Games Designer ▪ Games Producer

Medium-impact Media job roles

impact mainly centers around using technology to improve content production and delivery. Skills to better understand customer preferences are important as the media business move towards a customer-centric model

FUNCTIONAL TRACKS	EXAMPLES OF MEDIUM-IMPACT ROLES
Games	▪ Assistant Producer/ Producer - Games ▪ Game Designer/ Game Director
Content Production and Management	▪ Anchor/ News Reporter ▪ News Producer/ Current Affairs Producer
Production Technical Services	▪ Cameraman/ Clapper/ Loader/ Focus Puller/ Camera Operator
Content Post-Production	▪ Post-production Assistant/ Video Editor/ Post-Production Supervisor ▪ Sound Editor/ Sound Engineer
Media Technology and Operations	▪ Linear Media Infrastructure (Technician, Engineer, Manager) ▪ On-demand Media Technology & Operations
Media Business Management	▪ Standards & Practices ▪ Analytics and Customer Insights ▪ Product Manager

EXAMPLES OF ADDITIONAL TECHNICAL SKILLS & COMPETENCIES REQUIRED

- Business Acumen
- Cloud Computing
- Customer Behaviour Analysis
- Cyber Incident Management
- Cyber Security
- Data Analytics
- Design Thinking Practice
- Gameplay Design
- Stakeholder Management
- User Experience Design

EXAMPLES OF ADDITIONAL CRITICAL CORE SKILLS REQUIRED

- Collaboration
- Global Perspective
- Transdisciplinary Thinking

Low-impact Media job roles

such as those in Content Production and Management require high levels of creativity, judgement and interaction, and are least impacted. However, skills to utilise technology will become more important in the future

FUNCTIONAL TRACKS	EXAMPLES OF LOW-IMPACT ROLES
Games	▪ Technical Artist/Lead Technical Artist ▪ Lead Game Programmer/ Game Technical Director
Content Production and Management	▪ Writer/ Scriptwriter ▪ Producer (Film) / Production Manager ▪ Executive Producer / Editor - News and Current Affairs
Production Technical Services	▪ Set Dresser/ Set Designer/ Art Director/Studio Director ▪ Production Assistant/Floor Manager ▪ Technical Support Operator/ Studio Technical Director
Visual Graphics	▪ 2D and 3D Artist ▪ Animators
Media Technology and Operations	▪ Head Technology and Operations
Media Business Management	▪ Content Acquisition and Commissioning ▪ Community Development ▪ Marketing and Sales - Executive/ Manager/ Head

EXAMPLES OF ADDITIONAL TECHNICAL SKILLS & COMPETENCIES REQUIRED

- Artificial Intelligence Application
- Business Acumen
- Creative Storytelling
- Data Analytics
- Process Improvement and Optimisation
- Project Management
- Storyboarding
- Strategy Planning
- Studio Automation Management
- Vendor Management

EXAMPLES OF ADDITIONAL CRITICAL CORE SKILLS REQUIRED

- Creative Thinking
- Global Perspective
- Transdisciplinary Thinking

6 JOB DASHBOARDS

A note on the job dashboards

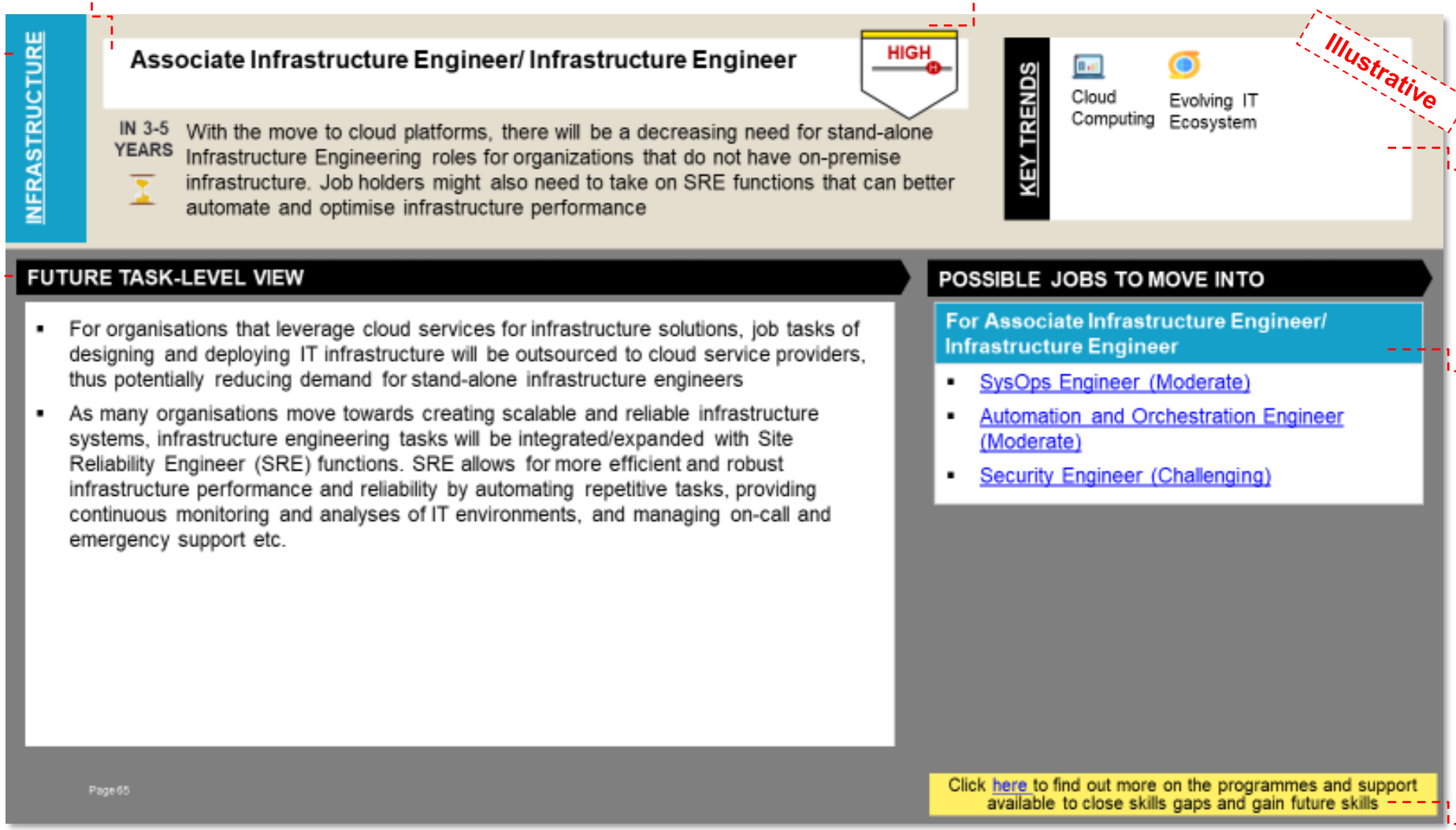
The subsequent pages cover job dashboards for job roles within the I&C workforce.

There are two components in this section:

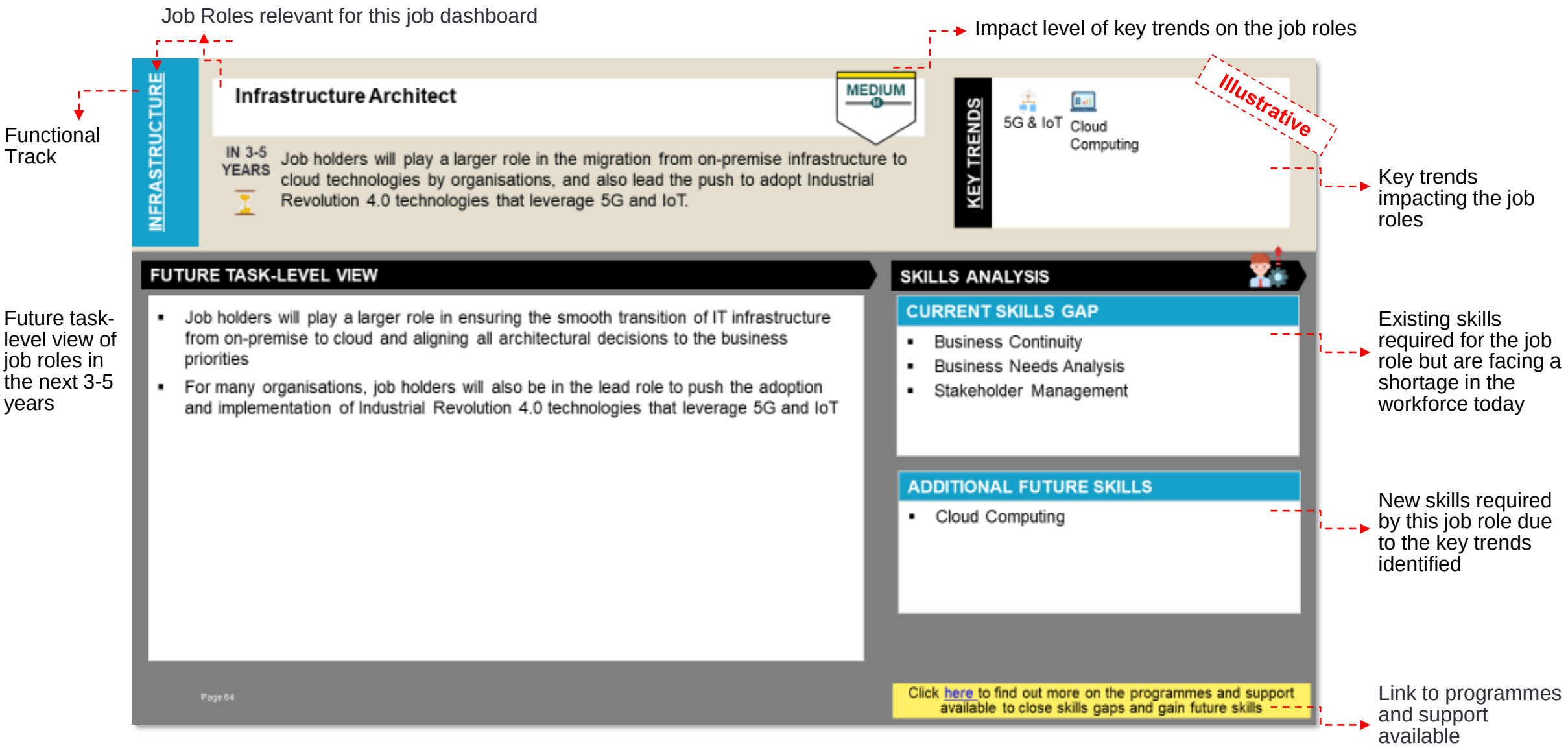
Job dashboards – The job dashboards contain information on the impact assessment on job roles, what are the key trends impacting them, as well as a task-level view of how their current job functions will change in the future. For medium and low-impact roles, the job dashboards will also contain Skills Analysis on what are the prevalent skills gaps identified, as well as what are the additional skills needed for these job roles in the future.

Possible jobs to move into – These are roles that high-impact job roles can potentially transit to arising from the impact on their job functions. They were identified after considering their skills matches and gaps, career levels and future demand/ impact levels of the job roles. Please note that the jobs roles identified, as well as their corresponding skills matches and skills gaps, are non-exhaustive and indicative in nature.

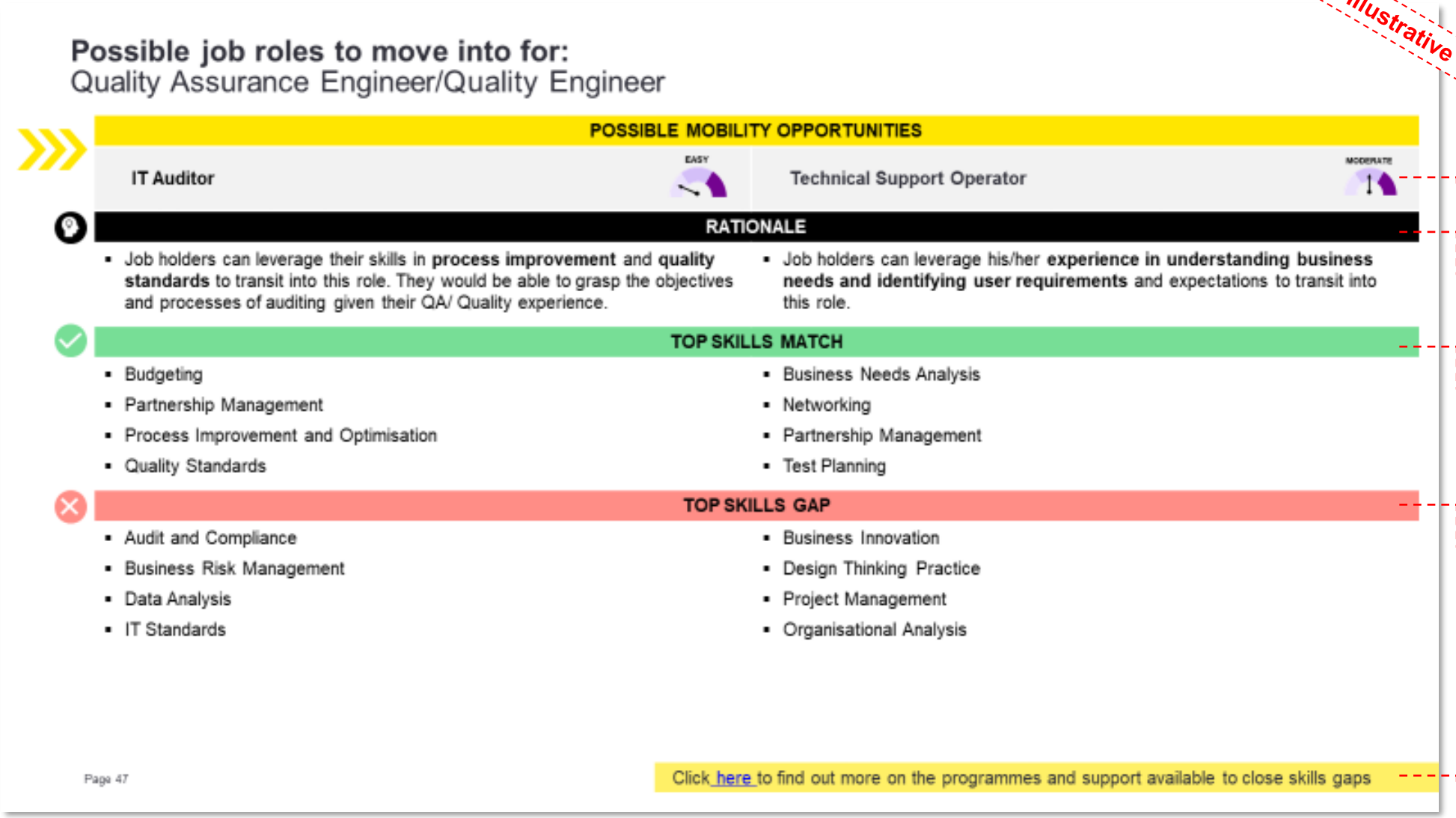
How to read the job dashboards – High-Impact



How to read the job dashboards – Medium and Low-Impact



How to explore the possible jobs to move into for high-impact job roles



Ease of mobility into new job role

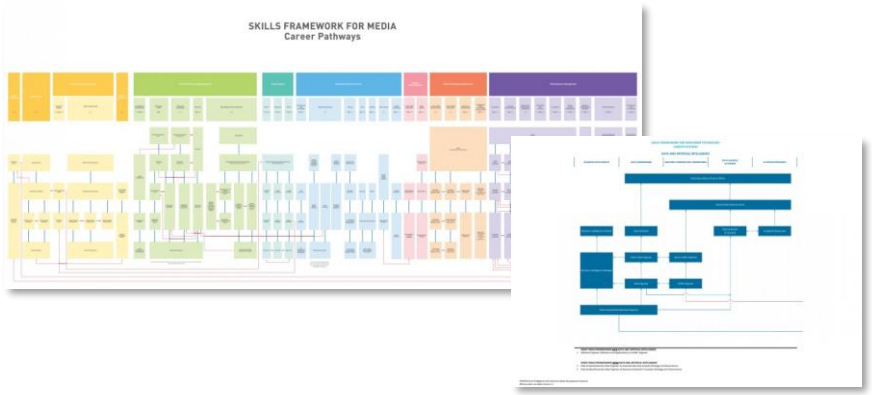
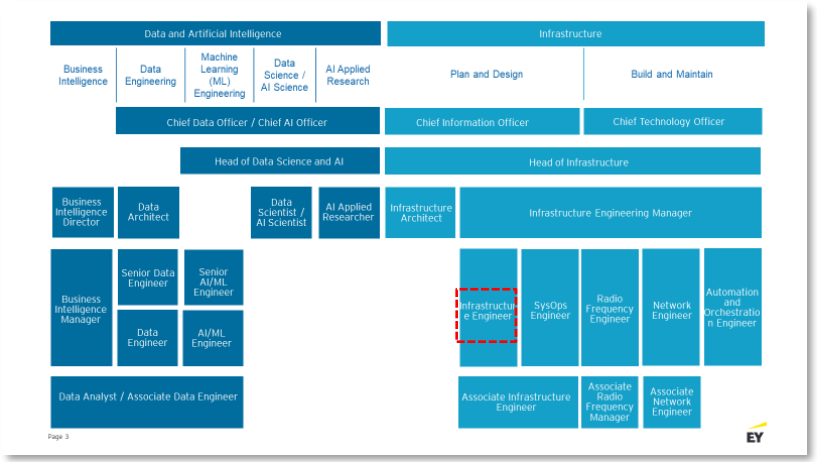
Relevance of current job role to new role

Common skills shared between current job role and new roles

Skills lacking for new job role

Link to programmes and support available

How to navigate the dashboards

Image Reference	Instructions
	In developing these dashboards, the Skills Framework for ICT and Media was referenced. For more information on each job role (complete list of skills, critical work functions and key tasks), please refer to: ▪ Skills Framework for ICT ▪ Skills Framework for Media
	Pages 39 to 42 and Pages 92 to 95 outline the job roles covered in this report, grouped based on functional tracks. Click on each job role to view the specific job dashboards.

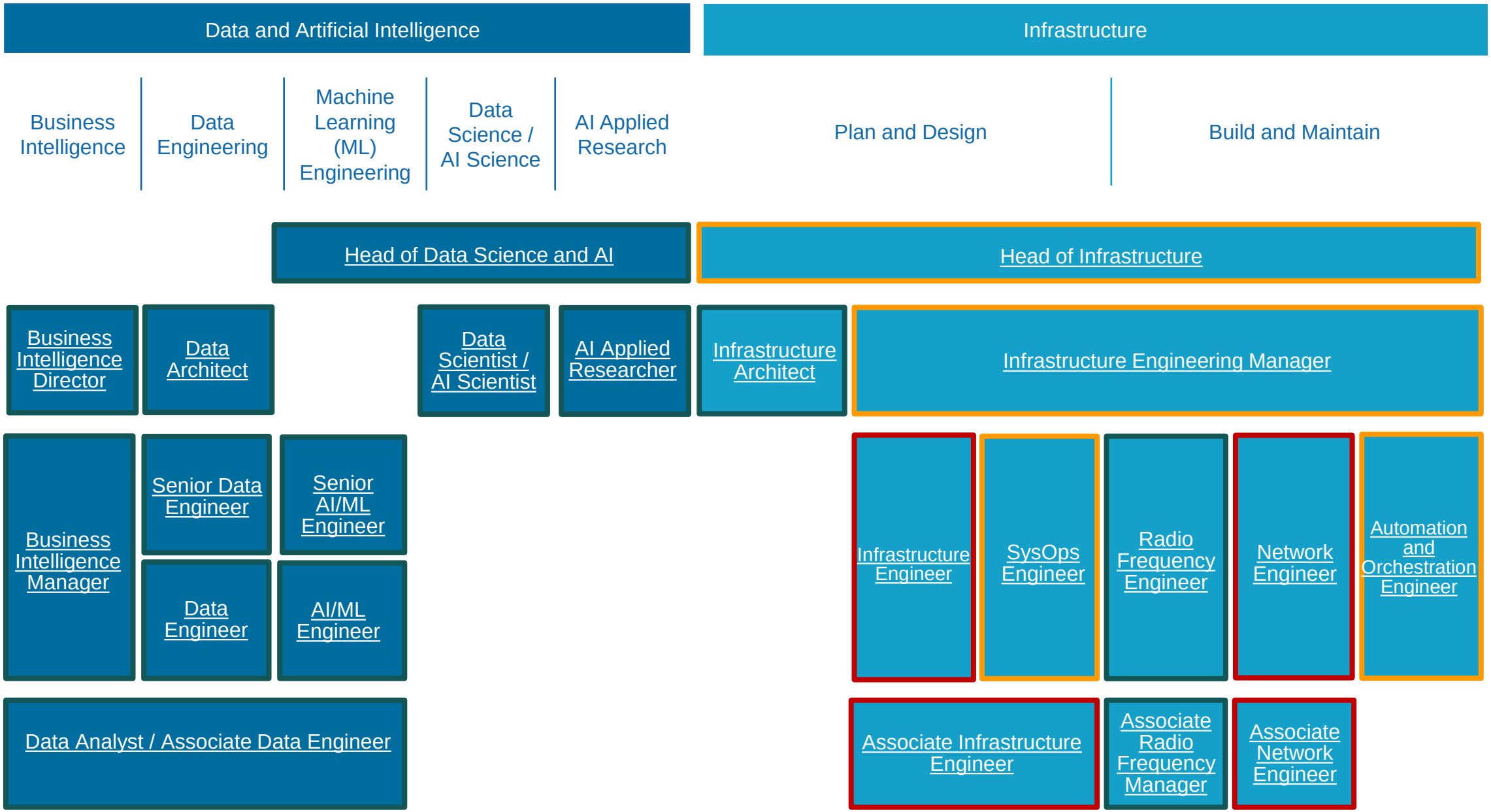
6

JOB DASHBOARDS

ICT Jobs Dashboards

Click on the job role below to view the dashboard:

LEGEND:
High-impact job role
Medium-impact job role
Low-impact job role



Click on the job role below to view the dashboard:

LEGEND:
High-impact job role
Medium-impact job role
Low-impact job role

Software and Applications

Software Engineering

- Head of Software Engineering
- Software Architect
- Software Engineering Manager
- Software Engineer
- DevOps Engineer
- Associate Software Engineer

Embedded Systems Engineering

- Embedded Systems Engineering Manager
- Embedded Systems Engineer
- Associate Embedded Systems Engineer

User Interface Design

- Lead UI Designer
- UI Designer
- Associate UI Designer

Sales and Marketing

Pre-Sales

- Head of Sales
- Pre-Sales Director
- Pre-sales Consultant

Sales

- Sales Director
- Sales Account Manager
- Business Development Manager
- Channel Sales Manager
- Sales Executive

Customer Success

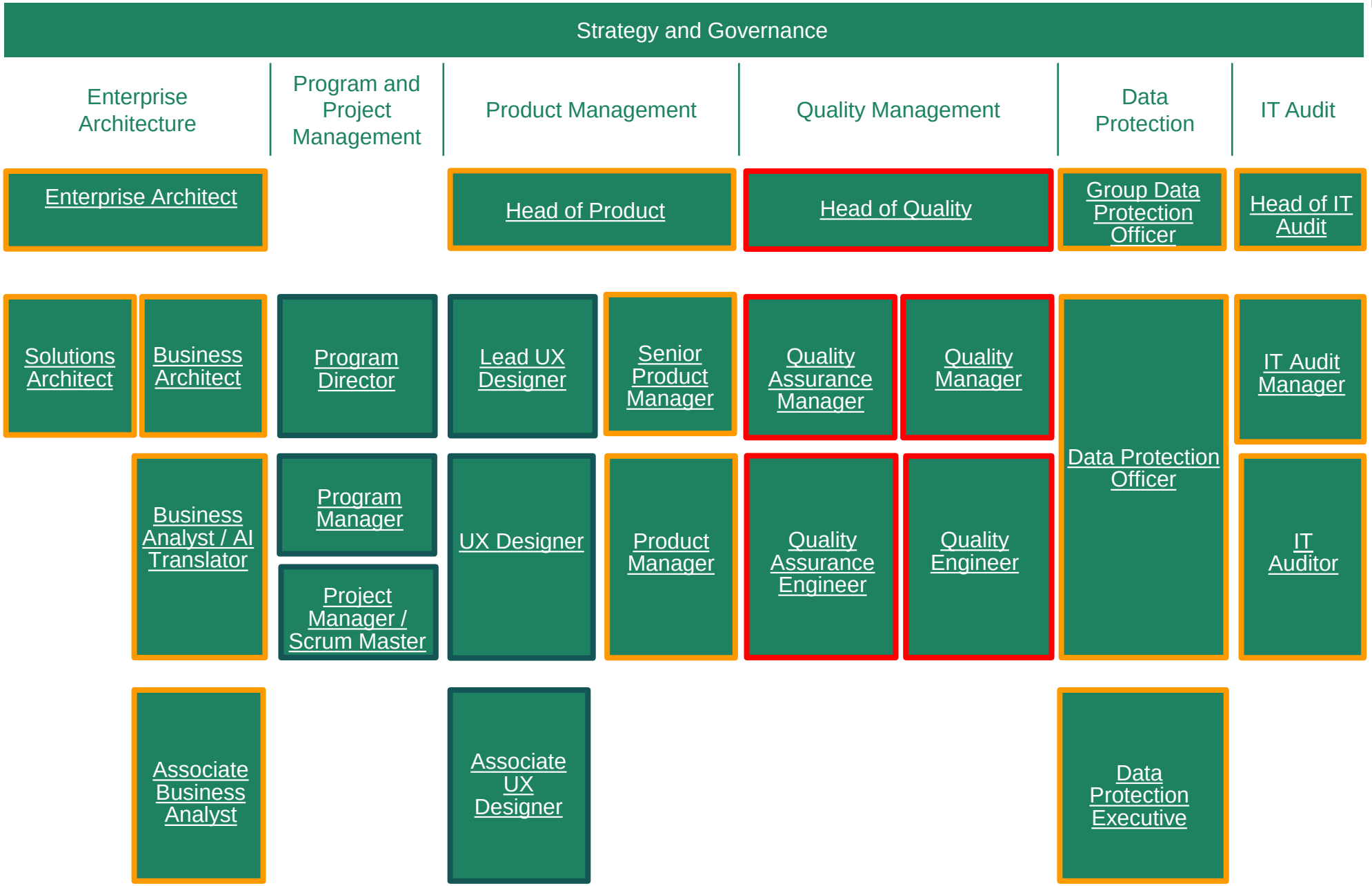
- Customer Success Director
- Customer Success Manager

Marketing

- Marketing Director
- Marketing Manager
- Marketing Executive

Click on the job role below to view the dashboard:

LEGEND:
High-impact job role
Medium-impact job role
Low-impact job role



Click on the job role below to view the dashboard:

LEGEND:
High-impact job role
Medium-impact job role
Low-impact job role

Operations and Support

- Infrastructure Support
- Systems Support
- Database Support
- Data Centre and Operations Centre Support
- Applications Support

Cyber Security

- Governance Risk and Control
- Vulnerability Assessment and Penetration Testing
- Security Operations
- Forensics Investigation
- Incident Response
- Threat Analysis
- Security Design and Engineering

Head of Operations and Support

Operations and Support Manager

Cyber Risk Manager

Vulnerability Assessment and Penetration Testing Manager

Security Operations Manager

Forensic Investigator Manager

Incident Investigation Manager

Threat Analysis Manager

Security Architect

Infrastructure Support Engineer

Systems Support Engineer

Database Support Engineer

Data Centre Operations Engineer

Operations Centre Support Engineer

Applications Support Engineer

Cyber Risk Analyst

Vulnerability Assessment and Penetration Testing Analyst

Security Operations Analyst

Forensic Investigator

Incident Investigator

Senior Security Engineer/ Security Engineer

Associate Infrastructure Support Engineer

Associate Systems Support Engineer

Associate Database Support Engineer

Associate Data Centre Operations Engineer

Associate Operations Centre Support Engineer

Associate Applications Support Engineer

Associate Security Analyst

Quality Assurance Engineer/ Quality Engineer/ Quality Assurance Manager/ Quality Manager/ Head of Quality

HIGH

IN 3-5 YEARS

These roles may not remain as a standalone function. Instead, the job tasks are being subsumed within developers' scope in each project delivery team. AI and RPA can be heavily leveraged to execute QA tests, enabling developers to better focus on coding/ script writing.

KEY TRENDS

- AI & Analytics
- Evolving IT Ecosystem

FUTURE TASK-LEVEL VIEW

- AI and Analytics can perform quality assurance tests by monitoring testing and identifying new bugs or defects which are introduced during the exploration phase. This helps job holders save time on results analysis as AI will be able to sort through the log files, scan the codes, and detect errors within seconds
- In some cases, job holders can expect their job tasks to be subsumed within the development functions of each project delivery team
- AI and Analytics can help uncover weak spots in quality testing processes such as identifying redundant test cases that are not linked to product requirements. This helps job holders to maximize accuracy and coverage of testing

POSSIBLE JOBS TO MOVE INTO

For Quality Assurance Engineer/Quality Engineer

- IT Auditor (Easy)
- Business Analyst (Moderate)
- Project Manager / Scrum Master (Moderate)

For Quality Assurance Manager/Quality Manager/Head of Quality

- IT Audit Manager/Head of IT Audit (Moderate)
- Program Manager/Program Director (Challenging)
- Software Engineering Manager/Head of Software Engineering (Challenging)

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Possible job roles to move into for:
Quality Assurance Engineer/Quality Engineer

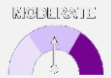
POSSIBLE MOBILITY OPPORTUNITIES		
IT Auditor 	**Technical Support Operator** 	**Project Manager / Scrum Master** 
RATIONALE		
▪ Job holders can leverage their skills in **process improvement** and **quality standards** to transit into this role. They would be able to grasp the objectives and processes of auditing given their QA/ Quality experience.	▪ Job holders can leverage his/her **experience in understanding business needs and identifying user requirements** and expectations to transit into this role.	▪ Job holders can leverage their **process improvement** and **project management** skills to transit into this role. This is especially applicable for those who are strong in managing processes and projects.
TOP SKILLS MATCH		
▪ Budgeting ▪ Partnership Management ▪ Process Improvement and Optimisation ▪ Quality Standards	▪ Business Needs Analysis ▪ Networking ▪ Partnership Management ▪ Test Planning	▪ Business Needs Analysis ▪ Process Improvement and Optimisation ▪ Project Management
TOP SKILLS GAP		
▪ Audit and Compliance ▪ Business Risk Management ▪ Data Analysis ▪ IT Standards	▪ Business Innovation ▪ Design Thinking Practice ▪ Project Management ▪ Organisational Analysis	▪ Agile Coaching ▪ Business Requirements Mapping ▪ Change Management ▪ Contract Management ▪ Solution Architecture

Click here to find out more on the programmes and support available to close skills gaps

Possible job roles to move into for:
Quality Assurance Manager/Quality Manager/Head of Quality

POSSIBLE MOBILITY OPPORTUNITIES

IT Audit Manager / Head of IT Audit



Program Manager / Program Director

RATIONALE

- Both IT audit and Quality Management share similar functions in **checking for compliance with processes and standards**. However, the transition becomes more challenging at a more senior level as they would require higher levels of technical competencies.
- Job holders can leverage **process improvement and project management** skills to transit into this role. However, the transition becomes more challenging at a more senior level as they would require higher levels of technical competencies.

TOP SKILLS MATCH

- Business Performance Management
- Partnership Management
- Process Improvement and Optimisation
- Quality Standards
- Agile Coaching^
- Business Needs Analysis*
- Partnership Management
- Process Improvement and Optimisation
- Project Management

TOP SKILLS GAP

- Audit and Compliance
- Data Analysis
- Data Governance
- IT Governance
- IT Standards
- IT Strategy
- Security Governance
- Agile Coaching*
- Business Innovation
- Business Process Re-engineering^
- Contract Management
- Data Visualisation
- Design Thinking Practice
- Organisational Analysis
- Portfolio Management

**Skills match/gap for Program Manager Roles*

^Skills match/gap for Program Director roles

Click here to find out more on the programmes and support available to close skills gaps

Possible job roles to move into for:
Quality Assurance Manager/Quality Manager/Head of Quality

POSSIBLE MOBILITY OPPORTUNITIES

Software Engineering Manager /Head of Software Engineering

RATIONALE

- Job holders can leverage their **programming (e.g. Java) skills** to transit into this role. However, the transition becomes more challenging when it takes place at a more senior level as the more senior positions would require a higher level of technical competencies, with additional skills required in enterprise architecture and IT strategy

TOP SKILLS MATCH

Software Engineering Manager

- Applications Development
- Quality Standards
- Software Design
- Software Testing

Head Of Software Engineering

- Agile Software Development
- Product Management
- Quality Standards

TOP SKILLS GAP

Software Engineering Manager

- Applications Integration
- Applications Support and Enhancement
- Business Negotiation
- Product Management
- Project Feasibility Assessment
- Vendor Management

Head Of Software Engineering

- Applications Integration
- Business Innovation
- Emerging Technology Synthesis
- Enterprise Architecture
- IT Strategy
- Solution Architecture
- Strategy Implementation

Click here to find out more on the programmes and support available to close skills gaps

Project Manager (Scrum Master) / Program Manager/ Program Director

MEDIUM

IN 3-5 YEARS

Job holders will need to adapt to a more agile way of working with changes in business processes and more organisations embarking on digital transformation journeys.

KEY TRENDS

- AI & Analytics
- Evolving IT Ecosystem

FUTURE TASK-LEVEL VIEW

- AI can value add to the organisation's program management framework by helping in resource planning and updating project plans. For instance, AI can track project progress and match the right resources to the right role by integrating with popular communication tools like Microsoft Teams, Slack and JIRA to handle scheduling and send out notification reminders. This reduces administrative tasks for the job holder allowing for better time efficiency
- As more organisations adopt agile methodologies, job holders will increasingly use Agile practices/Scrum process framework to deliver projects and manage leaner teams working across different functions

SKILLS ANALYSIS

CURRENT SKILLS GAP

- Contract Management
- Data Analytics
- Virtual Collaboration

ADDITIONAL FUTURE SKILLS

- Cloud Computing
- IT Governance

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Product Manager/ Senior Product Manager/ Head of Product

LOW

IN 3-5 YEARS

Job holders will focus on enhancing product appeal based on AI-generated insights and using them to develop marketing and pricing strategies.

KEY TRENDS

AI & Analytics

FUTURE TASK-LEVEL VIEW

- AI can generate pricing and benchmark reports by crawling through data on click-through rates, time on page, search history, and product preferences to provide job holders with a more effective decision making process
- Job tasks will shift to using AI-generated insights to guide future product development and propose enhancements and/or improvements.
- Job holders can also use insights generated in developing marketing and pricing strategies

SKILLS ANALYSIS

CURRENT SKILLS GAP

- Data Analytics
- Emerging Technology Synthesis
- Partnership Management

ADDITIONAL FUTURE SKILLS

- Data Visualisation
- Consumer Intelligence Analysis
- Sales Strategy

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Enterprise Architect/ Solutions Architect/ Business Architect

LOW

IN 3-5 YEARS

Job holders will continue to design and coordinate the organization's ICT architecture and solutions with respect to its digital transformation journey, especially with increasing adoption of cloud technology.

KEY TRENDS

Cloud Computing

FUTURE TASK-LEVEL VIEW

- As more organisations adopt cloud technologies, job holders will continue to remain key in migrating the organization's infrastructure and processes to the cloud, and would have close collaboration with stakeholders to coordinate cloud architecture and governance
- Job holders will continue to perform ongoing architecture quality review activities and identify opportunities for improvement of IT assets in line with the needs of the business
- Job holders need to be an expert in the different types of cloud computing technologies: public, private, and hybrid, including IaaS, PaaS, and SaaS

SKILLS ANALYSIS

CURRENT SKILLS GAP

- Business Process Re-engineering

ADDITIONAL FUTURE SKILLS

- Data Governance
- Cloud Computing

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Business Analyst (Artificial Intelligence Translator) / Associate Business Analyst

LOW

IN 3-5 YEARS

Job holders will continue to ensure close collaboration with stakeholders during discussions and have deep understanding of technology trends like AI solutions to provide advice to stakeholders

KEY TRENDS

AI & Analytics

FUTURE TASK-LEVEL VIEW

- Job holders will require a deep understanding of technology trends to be able to provide advice on the adoption of new and/or enhanced technologies, including AI related solutions roadmaps
- Job holders' tasks will continue to remain relevant going forward as they require close collaboration with stakeholders during domain technical and business discussions as well as analysis of business processes and implementation cycle

SKILLS ANALYSIS

CURRENT SKILLS GAP

- Transdisciplinary Thinking

ADDITIONAL FUTURE SKILLS

- User Testing and Usability Testing
- Data Analytics
- Communication
- User Experience Design
- User Interface Design

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Data Protection Executive / Data Protection Officer / Group Data Protection Officer

LOW

IN 3-5 YEARS

Job holders will continue to be subject matter experts in data protection policies and frameworks, while using RPA tools to help in identifying data governance issues and risks.

KEY TRENDS

Robotics

FUTURE TASK-LEVEL VIEW

- Job holders will continue to develop Data Protection Management Programmes (DPMP) to ensure organisations' compliance to the Personal Data Protection Act (PDPA)
- Job holders are still required to formulate strategies and provide advice on data ethics and data governance
- Job holders continue to be involved in Data Protection and Impact Assessments (DPIA) which requires human judgement to identify, assess and address data risks based on the organisation's functions, needs and processes
- RPA tools like Automated Personally Identifiable Information (PII) can help in analysis and tagging of data to allow job holders to more quickly understand and assess what personal data is held and where the data is being stored

SKILLS ANALYSIS

CURRENT SKILLS GAP

- Crisis Management
- Cyber and Data Breach Incident Management
- Sense Making
- Transdisciplinary Thinking

ADDITIONAL FUTURE SKILLS

- NA

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

IT Auditor/ Audit Manager / Head of IT Audit

IN 3-5 YEARS

Job holders will continue to develop and implement IT audit plans, and can use machine learning technology to help in assessing overall state of IT governance, compliance and risks.

KEY TRENDS

AI & Analytics

FUTURE TASK-LEVEL VIEW

- Machine learning can help job holders identify patterns and trends to support risk assessments on whether the controls to protect IT assets are aligned with organisational goals and objectives
- IT Audit functions continue to remain relevant going forward as IT governance, compliance and risks will have to be evaluated and reviewed in view of the changing technological landscape
- The Head of IT Audit is still required to develop the organisation's IT audit strategy and ensure alignment with regulatory standards

SKILLS ANALYSIS

CURRENT SKILLS GAP

- NA

ADDITIONAL FUTURE SKILLS

- Cyber Risk Management

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Data Analyst (Associate Data Engineer)/ Business Intelligence Manager/ Business Intelligence Director

MEDIUM

IN 3-5 YEARS

Job holders will leverage ML in data preparation and analyses, and have to be well-versed in both business and technical domains to analyse and present findings to business leaders and stakeholders. They will also need to pay more attention to the data governance and management aspects of their roles.

KEY TRENDS

AI & Analytics

FUTURE TASK-LEVEL VIEW

- Job holders need to be more familiar and knowledgeable in business domains so that they can select and recommend suitable datasets, tools and technology in accordance with business requirements
- ML will support job holders in data preparation by automating the cleansing and standardisation of data
- NLP will support job holders in drawing insights from unstructured data as it makes it possible for computers to read text, hear and interpret speech and measure sentiment
- In addition, job holders will need to put more focus on data governance and data management to ensure the quality and credibility of the datasets that they use for their analyses

SKILLS ANALYSIS

CURRENT SKILLS GAP

- Communication
- Data Ethics
- Data Visualisation
- Transdisciplinary Thinking

ADDITIONAL FUTURE SKILLS

- Artificial Intelligence Application
- Business Environment Analysis
- Change Management

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Data Engineer/ Senior Data Engineer/ Data Architect/ AI (ML) Engineer/ Senior AI (ML) Engineer

MEDIUM

IN 3-5 YEARS

Job holders will leverage AI in data pipeline building and model testing, and will need to familiarise themselves with cloud solutions to perform their tasks in a cloud-based environment.

KEY TRENDS

- AI & Analytics
- Cloud Computing

FUTURE TASK-LEVEL VIEW

- AI will support job holders in monitoring data loading and automating the processing of data
- With the rise of cloud storage and processing, job holders will need to keep abreast of the latest cloud solutions to perform their tasks such as connecting business systems to cloud-based data sources
- AI will support job holders in AI/ML model evaluation by leveraging data and algorithms to generate test cases, and allowing job holders to focus more on scaling and improving AI/ML models

SKILLS ANALYSIS

CURRENT SKILLS GAP

- Data Ethics
- Data Governance
- Security Architecture
- Transdisciplinary Thinking

ADDITIONAL FUTURE SKILLS

- Cloud Computing
- Creative Thinking
- Problem Solving

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Data (AI) Scientist/ AI Applied Researcher/ Head of Data Science and AI

MEDIUM

IN 3-5 YEARS

Job holders will leverage AI to support data preparation and modelling, and will continue to create deliverables from data models based on their business value.

KEY TRENDS

AI & Analytics

FUTURE TASK-LEVEL VIEW

- AI will support job holders in model development by automating data collection/ preparation and model building/ selection, and accelerating the decision making process
- Job holders will need to familiarize themselves in the respective business domain (e.g. sales and marketing) or sector (e.g. healthcare) in order to incorporate business insights in model development
- Job holders will continue to create reports and deliverables based on results from data models as they remain key in demonstrating the business value of data science/ AI models to stakeholders

SKILLS ANALYSIS

CURRENT SKILLS GAP

- Business Needs Analysis
- Data Ethics
- Data Governance
- Transdisciplinary Thinking

ADDITIONAL FUTURE SKILLS

- Continuous Integration Continuous Deployment
- Market Research

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Head of Sales / Pre-Sales Director / Pre-Sales Consultant / Sales Director / Sales Account Manager / Business Development Manager / Channel Sales Manager / Sales Executive / Customer Success Director / Customer Success Manager

IN 3-5 YEARS

Job holders will continue to be key in diagnosing and resolving any technical issues arising from customers, and delivering presentations to convert sales opportunities to client accounts.

KEY TRENDS

AI & Analytics

FUTURE TASK-LEVEL VIEW

- AI can perform data crawling to provide job holders with insights on which customers to target, how to identify customer profiles and which buyers are most likely to respond to different messages and offers
- Job holders from the Pre-Sales, Sales and Customer Success teams remain relevant moving forward as they are required to work collaboratively to ensure a complete end-to-end customer journey. Job holders remain key in driving sales and engaging stakeholders
- Job holders will continue to be involved in developing Proof-of-Concepts and delivering business pitches which requires close collaboration with stakeholders and understanding of client operations to identify opportunities for improvement

SKILLS ANALYSIS

CURRENT SKILLS GAP

- Data Analytics
- Pricing Strategy
- Communication
- Sense Making

ADDITIONAL FUTURE SKILLS

- Customer Behaviour Analysis
- Business Agility
- Lifelong Learning

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Marketing Director / Marketing Manager / Marketing Executive

LOW

IN 3-5 YEARS

Job holders will continue to leverage AI and Analytics to better target and engage with customers and partners, while Covid-19 has pushed businesses to enhance marketing channels and strategies in place of conventional channels.

KEY TRENDS

- AI & Analytics
- COVID-19

FUTURE TASK-LEVEL VIEW

- Job holders continue to conceptualise and develop the Integrated Marketing Communciations (IMC) strategy which requires a good understanding of market segments
- With COVID-19, organisations are looking into having more virtual and immersive events which may result in new ways of marketing i.e. moving to more immersive videos and leveraging more social media channels to get their brands and products across to customers
- AI can provide market insights on customers' opinions and preferences by crawling through available data, which allows job holders to have a better understanding on how to best communicate with customers through the right affiliation, sponsors and product placement

SKILLS ANALYSIS

CURRENT SKILLS GAP

- Customer Behaviour Analysis
- Customer Experience Management
- Data Analytics

ADDITIONAL FUTURE SKILLS

- NA

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Infrastructure Architect

MEDIUM

IN 3-5 YEARS

Job holders will play a larger role in the migration from on-premise infrastructure to cloud technologies by organisations, and also lead the push to adopt Industrial Revolution 4.0 technologies that leverage 5G and IoT.

KEY TRENDS

- 5G & IoT
- Cloud Computing

FUTURE TASK-LEVEL VIEW

- Job holders will play a larger role in ensuring the smooth transition of IT infrastructure from on-premise to cloud and aligning all architectural decisions to the business priorities
- For many organisations, job holders will also be in the lead role to push the adoption and implementation of Industrial Revolution 4.0 technologies that leverage 5G and IoT

SKILLS ANALYSIS

CURRENT SKILLS GAP

- Business Continuity
- Business Needs Analysis
- Stakeholder Management

ADDITIONAL FUTURE SKILLS

- Cloud Computing

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Associate Infrastructure Engineer/ Infrastructure Engineer

HIGH

IN 3-5 YEARS

With the move to cloud platforms, there will be a decreasing need for stand-alone Infrastructure Engineering roles for organizations that do not have on-premise infrastructure. Job holders might also need to take on SRE functions that can better automate and optimise infrastructure performance

KEY TRENDS

- Cloud Computing
- Evolving IT Ecosystem

FUTURE TASK-LEVEL VIEW

- For organisations that leverage cloud services for infrastructure solutions, job tasks of designing and deploying IT infrastructure will be outsourced to cloud service providers, thus potentially reducing demand for stand-alone infrastructure engineers
- As many organisations move towards creating scalable and reliable infrastructure systems, infrastructure engineering tasks will be integrated/expanded with Site Reliability Engineer (SRE) functions. SRE allows for more efficient and robust infrastructure performance and reliability by automating repetitive tasks, providing continuous monitoring and analyses of IT environments, and managing on-call and emergency support etc.

POSSIBLE JOBS TO MOVE INTO

For Associate Infrastructure Engineer/ Infrastructure Engineer

- SysOps Engineer (Moderate)
- Automation and Orchestration Engineer (Moderate)
- Security Engineer (Challenging)

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Associate Network Engineer/ Network Engineer

HIGH

IN 3-5 YEARS

Job holders will be able to use AI to improve network planning, operations and recovery, and the move to software-defined networks will also see these functions being subsumed under SRE.

KEY TRENDS

- AI & Analytics
- Evolving IT Ecosystem

FUTURE TASK-LEVEL VIEW

- AI will support job holders in network capacity planning and optimisation by modelling network behavior and measuring network utilisation more accurately
- As many organisations move towards creating scalable and reliable infrastructure systems, network engineering tasks will fall under the SRE function which uses software-defined networking to increase the network's reliability and performance
- AI will support job holders in monitoring and maintaining network by automatically detecting and notifying network anomalies and faults, analysing root causes and activating fault recoveries, reducing manual tasks and increasing work efficiency

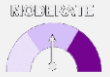
POSSIBLE JOBS TO MOVE INTO

For Associate Network Engineer/ Network Engineer

- SysOps Engineer (Moderate)
- Automation and Orchestration Engineer (Moderate)
- Security Engineer (Challenging)

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Possible job roles to move into for:
(Associate) Infrastructure Engineer / (Associate) Network Engineer

POSSIBLE MOBILITY OPPORTUNITIES		
SysOps Engineer 	**Automation and Orchestration Engineer** 	**Security Engineer** 
RATIONALE		
▪ Infrastructure Engineers can leverage their skills in **operating and troubleshooting infrastructure systems and platforms.** ▪ Network Engineer scan leverage their skills in **network operation and optimization.** ▪ Infrastructure and Network Engineers would need to upskill in platform-based scripting skills to embark on this transition.	▪ Infrastructure Engineers can leverage their skills in **operating and troubleshooting infrastructure systems and platforms.** ▪ Network Engineers can leverage their skills in **network operation and optimization.** ▪ Infrastructure and Network Engineers would need to upskill in configuring, scaling and deploying infrastructure components and algorithms, and automating network operations.	▪ Infrastructure Engineer can leverage their skills in **infrastructure security.** ▪ Network Engineer can leverage their skills in **network security management.** ▪ This mobility opportunity is more difficult as it requires specific training in the security domain. Moreover, it requires a mindset change, e.g. think of security in terms of design, which is not a mindset required by their current job tasks.
TOP SKILLS MATCH		
▪ Cyber and Data Breach Incident Management ▪ Infrastructure Support ▪ Network Administration and Maintenance ▪ Network Configuration	▪ Network Administration and Maintenance ▪ Network Configuration ▪ Service Level Management ▪ Test Planning	▪ Business Needs Analysis ▪ Cyber and Data Breach Incident Management ▪ Emerging Technology Synthesis
TOP SKILLS GAP		
▪ Application Development ▪ Applications Integration ▪ Continuous Integration and Continuous Deployment ▪ Software Configuration ▪ Virtual Collaboration	▪ Artificial Intelligence Application ▪ Network Slicing ▪ Radio Frequency Engineering ▪ System Integration	▪ Business Risk Management ▪ Cyber Risk Management ▪ Security Architecture ▪ Security Governance ▪ Security Programme Management

Click here to find out more on the programmes and support available to close skills gaps

Associate Radio Frequency Engineer/ Radio Frequency Engineer

MEDIUM

IN 3-5 YEARS

Job holders will leverage vendors in wireless network and infrastructure design and AI in wireless network deployment and optimisation, and will need to familiarise themselves in AI and 5G to drive the implementation of these technologies in their areas of work.

KEY TRENDS

- 5G & IoT
- AI & Analytics

FUTURE TASK-LEVEL VIEW

- Organisations will continue to outsource the design tasks to radio frequency equipment vendors, allowing job holders to focus on equipment enhancement if required during the deployment process
- AI will support job holders in wireless network deployment and optimisation as AI enables and amplifies self-deployment, self-correcting and self-healing network capabilities
- Job holders will also need to upskill their knowledge in 5G technologies to prepare for the upcoming migration

SKILLS ANALYSIS

CURRENT SKILLS GAP

- Radio Frequency Engineering (in the area of 5G)

ADDITIONAL FUTURE SKILLS

- Artificial Intelligence Application

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

SysOps Engineer

LOW

IN 3-5 YEARS

Job holders' functions will remain relevant as organisations move to cloud technologies and SRE, and they will play an important role in helping organisations to manage their infrastructure successfully in new environments.

KEY TRENDS

Cloud Computing

FUTURE TASK-LEVEL VIEW

- SysOps functions will continue to remain relevant going forward as they remain key in configuring and optimising infrastructure, and would require job holders' coding/scripting skills to perform these tasks
- Job holders would need to collaborate and work effectively with a variety of internal and external stakeholders, and ensure security and compliance in leveraging cloud platforms

SKILLS ANALYSIS

CURRENT SKILLS GAP

- N/A

ADDITIONAL FUTURE SKILLS

- Communication
- Collaboration

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Automation and Orchestration Engineer

LOW

IN 3-5 YEARS

Job holders will continue to leverage AI in network performance management, resource sourcing and consumption allocation, and need to be well-versed in the ongoing application of AI in their areas of work.

KEY TRENDS

AI & Analytics

FUTURE TASK-LEVEL VIEW

- Job holders will continue to leverage AI to automate and orchestrate the provision of network services to customers. As the functionality of AI progresses, job holders need to familiar in its applications in their line of work to be able to use them effectively
- Defining and measuring service Key Performance Indicators will continue to remain relevant going forward as they remain key in monitoring service and managing service level agreements, and would require close collaboration with internal stakeholders and vendors

SKILLS ANALYSIS

CURRENT SKILLS GAP

- N/A

ADDITIONAL FUTURE SKILLS

- Artificial Intelligence Application

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Infrastructure Engineering Manager/ Head of Infrastructure

LOW

IN 3-5 YEARS

As the infrastructure function is impacted by AI, cloud technologies and automation led by SRE, job holders will need to manage these changes effectively and ensure the transition of the team.

KEY TRENDS

- AI & Analytics
- Cloud Computing
- Evolving IT Ecosystem

FUTURE TASK-LEVEL VIEW

- With the rise of cloud technologies and AI, job holders will need to be familiar in these areas to ensure that their organisation will be supported by a nimble and state-of-the-art infrastructure
- As many organisations move towards creating scalable and reliable infrastructure systems through SRE, job holders will need to foster agile mindsets and practices within the infrastructure team to adapt to changes and achieve desired outcomes quickly

SKILLS ANALYSIS

CURRENT SKILLS GAP

- Change Management
- Cloud Computing

ADDITIONAL FUTURE SKILLS

- Agile Coaching
- Business Agility

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Associate Infrastructure Support Engineer/ Infrastructure Support Engineer

HIGH

IN 3-5 YEARS

With the move to AI, cloud and DevOps, there will be a decreasing need for stand-alone Infrastructure Support Engineer roles. Their job tasks can be subsumed under the DevOps functions.

KEY TRENDS

- AI & Analytics
- Cloud Computing
- Evolving IT Ecosystem

FUTURE TASK-LEVEL VIEW

- AI will support job holders in infrastructure operations by predicting server load and automatically locating back-up servers
- With the benefits of cloud services, many organisations will gradually reduce their on-premise infrastructure and increasingly use cloud service providers to meet their infrastructure needs
- AI will support job holders in issue resolution by automating real-time root cause analysis, allowing job holders to focus on resolving issues with higher complexities
- With the increased use of tooling and automation, the tasks of monitoring and managing infrastructure operations as well as resolving infrastructure related issues would be integrated together with DevOps practices (eg. Infrastructure-as-Code) to provide more holistic support

POSSIBLE JOBS TO MOVE INTO

For Associate Infrastructure Support Engineer/ Infrastructure Support Engineer

- DevOps Engineer (Moderate)
- SysOps Engineer (Moderate)
- Security Engineer (Challenging)

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Associate Systems Support Engineer/ Systems Support Engineer

HIGH

IN 3-5 YEARS

With the move to AI and DevOps, there will be a decreasing need for stand-alone Associate Systems Support Engineer/Systems Support Engineer roles. The job tasks of these job holders will be subsumed under the DevOps team's job tasks.

KEY TRENDS

- AI & Analytics
- Evolving IT Ecosystem

FUTURE TASK-LEVEL VIEW

- With the rise of Agile/CICD approach, the DevOps function will take over the tasks of overseeing service level agreements and developing new systems
- AI will support job holders in system performance optimisation by automating root cause analysis and providing preventive measures
- The development function will take over the tasks of managing and optimising system performance, bringing development and operation together to provide more holistic support

POSSIBLE JOBS TO MOVE INTO

For Associate Systems Support Engineer/ Systems Support Engineer

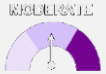
- DevOps Engineer (Moderate)
- SysOps Engineer (Moderate)
- Security Engineer (Challenging)

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Possible job roles to move into for:
(Associate) Infrastructure Support Engineer / (Associate) Systems Support Engineer

POSSIBLE MOBILITY OPPORTUNITIES

DevOps Engineer



SysOps Engineer

Security Engineer

RATIONALE

- Infrastructure Support Engineers and Systems Support Engineers can leverage their experience in **Infrastructure/ Systems operation and maintenance,** which could help them contribute to design and building of applications.

- Infrastructure Support Engineers and Systems Support Engineers can leverage their skills in **Infrastructure/ Systems operation, maintenance and optimisation.**
- They would be able to take on tasks such as **optimizing performance of infrastructure/systems** quickly as they might have been performing these tasks as part of their current job functions.

- Infrastructure Support Engineers and Systems Support Engineers can leverage their knowledge of **infrastructure systems and networks,** as systems and networks are critical components to guard against security threats for Security Engineers.
- This job transition will be more challenging as it requires more skills in the security domain, e.g. security design.

TOP SKILLS MATCH

- Business Needs Analysis
- Network Configuration
- Project Management
- Security Administration
- System Integration

- Cyber and Data Breach Incident Management
- Infrastructure Support
- Network Administration and Maintenance
- Process Improvement and Optimisation
- Procurement

- Business Needs Analysis
- Cyber and Data Breach Incident Management

TOP SKILLS GAP

- Agile Software Development
- Automation Management
- Cloud Computing
- Software Testing
- Systems Design
- Continuous Integration and Continuous Deployment

- Applications Development
- Cloud Computing
- Continuous Integration and Continuous Deployment
- Solution Architecture
- Software Configuration
- Virtual Collaboration

- Business Risk Management
- Cyber Risk Management
- Infrastructure Design
- Network Security
- Security Administration
- Security Architecture
- Security Governance
- Security Programme Management

Click here to find out more on the programmes and support available to close skills gaps

Associate Database Support Engineer/ Database Support Engineer

MEDIUM

IN 3-5 YEARS

Job holders will leverage AI in database administration, performance optimisation and incidents resolution, and be aware of cloud computing and security threats. They will also help coordinate the needs of data scientists and data engineers throughout the data lifecycle.

KEY TRENDS

- AI & Analytics
- Cloud Computing

FUTURE TASK-LEVEL VIEW

- AI will support job holders in database administration tasks by providing automatic upgrades and patches
- With the move to cloud databases, job holders will need to be skilled in cloud computing and security awareness to perform their tasks effectively and securely
- AI will support job holders in optimising database performance by monitoring workload patterns and applying tuning automatically
- AI will support job holders in resolving issues by automating root cause analysis, accelerating the resolution process

SKILLS ANALYSIS

CURRENT SKILLS GAP

- Cyber and Data Breach Incident Management
- Data Engineering

ADDITIONAL FUTURE SKILLS

- Artificial Intelligence Application
- Cloud Computing
- Security Education and Awareness

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Associate Data Centre Operations Engineer/ Data Centre Operations Engineer

MEDIUM

IN 3-5 YEARS

Job holders will leverage AI in data centre performance optimisation and incidents resolution, and need to be well-versed in vendor/client management to ensure that data centre operations meet business needs.

KEY TRENDS

- AI & Analytics
- Cloud Computing

FUTURE TASK-LEVEL VIEW

- As many organizations tap on data centres owned by cloud service providers, job holders will have to be familiar with and factor in various client needs in the technical feasibility and design of data centres
- AI will support job holders in data centre performance optimisation by automating workload distribution across servers, identifying defects in equipment and improving energy consumption efficiency
- AI will support job holders in incident prevention by automating data screening, detecting malware, monitoring server performance, network congestion as well as disk utilisation to detect and predict data outrages

SKILLS ANALYSIS

CURRENT SKILLS GAP

- Business Continuity
- Cyber and Data Breach Incident Management
- Data Centre Facilities Management

ADDITIONAL FUTURE SKILLS

- Artificial Intelligence Application
- Cloud Computing
- Vendor Management

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Associate Operations Centre Support Engineer/ Operations Centre Support Engineer

HIGH

IN 3-5 YEARS

With the use of AI to automate operations centre support and the outsourcing of these functions to IT service providers, the need for such roles will be reduced, especially for organisations without critical on-premise infrastructure.

KEY TRENDS

AI & Analytics

FUTURE TASK-LEVEL VIEW

- IT service providers will increasingly manage the installment and maintenance of software and hardware, reducing the need for in-house capabilities to manage these job tasks
- AI will automate the operations monitoring tasks of job holders as it is able to analyse the logs of all network devices, learn the baseline environment and provide alerts on anomalies, allowing for the detection of potential issues and malfunctions more quickly and with greater accuracy
- AI will automate technical support and incident escalation tasks as it is able to match incidents to previous similar incidents and resolutions, and escalate to relevant engineers with information that would help accelerate the resolution of these incidents

POSSIBLE JOBS TO MOVE INTO

For Associate Operations Centre Support Engineer/ Operations Centre Support Engineer

- Cyber Risk Analyst (Moderate)
- Project Manager/Scrum Master (Moderate)
- SysOps Engineer (Challenging)
- DevOps Engineer (Challenging)

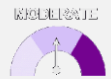
Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Possible job roles to move into for:
(Associate) Operations Centre Support Engineer

POSSIBLE MOBILITY OPPORTUNITIES

Cyber Risk Analyst

Project Manager/ Scrum Master



RATIONALE

- Job holders can leverage their experience in **monitoring systems and resolving technical incidents** to transit into this role. This is especially applicable for job holders who already have experience in handling security incidents, but additional skills in cybersecurity will be required.

- Job holders can leverage their **project management related skills** to transit into this role. This is especially applicable for job holders who already have experience in managing projects, but additional skills in team/ people management will be required.

TOP SKILLS MATCH

- Business Needs Analysis
- Cyber and Data Breach Incident Management
- Stakeholder Management

- Business Needs Analysis
- Process Improvement and Optimisation
- Project Management
- Stakeholder Management

TOP SKILLS GAP

- Audit and Compliance
- Cyber Forensics
- Cyber Risk Management

- Agile Coaching
- Business Risk Management
- Contract Management
- Data Analysis
- Solution Architecture

Click here to find out more on the programmes and support available to close skills gaps

Possible job roles to move into for:
(Associate) Operations Centre Support Engineer

POSSIBLE MOBILITY OPPORTUNITIES

SysOps Engineer

CHALLENGING

DevOps Engineer

CHALLENGING

RATIONALE

- Job holders can leverage their skills in **supporting systems, network and infrastructure operations** to transit into this role. This is especially applicable for job holders who have experience in supporting cloud-based operations.
- This mobility opportunity is more difficult as it requires additional skills in platform-based scripting which is more technical.

- Job holders can leverage their skills in **supporting systems, network and infrastructure operations** to transit into this role. Their experience in collaborating with stakeholders and working across hardware and software teams might be beneficial.
- This mobility opportunity is more difficult as it requires skills in software development and agile methodology (both technical and mindset changes).

TOP SKILLS MATCH

- Configuration Tracking
- Infrastructure Support
- Procurement

- Business Needs Analysis
- Configuration Tracking
- Project Management

TOP SKILLS GAP

- Application Development
- Communication
- Continuous Integration and Continuous Deployment
- Cloud Computing
- Infrastructure Deployment

- Infrastructure Design
- Network Administration and Maintenance
- Network Security
- Solution Architecture
- Virtual Collaboration

- Agile Software Development
- Automation Management
- Cloud Computing
- Continuous Integration and Continuous Deployment
- Data Design

- Network Configuration
- Software Design
- Software Testing
- Systems Design

Click here to find out more on the programmes and support available to close skills gaps

Associate Applications Support Engineer/ Applications Support Engineer

HIGH

IN 3-5 YEARS

With the move to AI and DevOps, there will be a decreasing need for stand-alone Associate Applications Support Engineer/Applications Support Engineer roles. The job tasks of these roles will be subsumed under the Applications Development or DevOps team's job tasks.

KEY TRENDS

- AI & Analytics
- Cloud Computing
- Evolving IT Ecosystem

FUTURE TASK-LEVEL VIEW

- AI will support job holders in help desk activities by automating the process of providing customers with answers/ solutions and routing tickets to the right people
- With the rise of Agile/CICD approach, development function will take over the tasks of maintaining software and overseeing software transition and testing, bringing development and operation together to provide a more holistic support
- With the adoption of Software as a Service (SaaS) and/or Platform as a Service (PaaS), IT service providers will take over the job tasks of maintaining and updating existing software and/or platform, providing security measures and resolving issues, reducing the manpower needed for the in-house capability

POSSIBLE JOBS TO MOVE INTO

For Associate Applications Support Engineer/ Applications Support Engineer

- DevOps Engineer (Easy)
- Project Manager/Scrum Master (Easy)
- Software Engineer (Moderate)

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Possible job roles to move into for:
(Associate) Applications Support Engineer

POSSIBLE MOBILITY OPPORTUNITIES

DevOps Engineer

RATIONALE

- Job holders can leverage their skills in the **operation, support and maintenance of software applications** to transit into this role.
- They would be familiar with certain operational/post-production tasks of DevOps Engineers such as software testing and configuration, which makes the transition easier.

TOP SKILLS MATCH

- Applications Support and Enhancement
- Applications Integration
- Configuration Tracking
- Software Configuration
- Software Testing

TOP SKILLS GAP

- Agile Software Development
- Automation Management
- Continuous Integration and Continuous Deployment
- Software Design
- Systems Design

Project Manager/ Scrum Master

RATIONALE

- For projects involving application/product development, job holders can use their **understanding of application functions and operational processes** to transit into Project Manager/Scrum Master roles.

TOP SKILLS MATCH

- Business Needs Analysis
- Process Improvement and Optimisation
- Stakeholder Management

TOP SKILLS GAP

- Agile Coaching
- Business Requirements Mapping
- Contract Management
- Project Management

Software Engineer

RATIONALE

- Job holders can leverage their skills in **application development, support and integration** to transit into this role.
- As software engineers are more focused on the development aspects, this is move would be applicable for Applications Support Engineers who have deeper programming skills.

TOP SKILLS MATCH

- Applications Support and Enhancement
- Business Needs Analysis
- Configuration Tracking
- Software Configuration
- Software Testing

TOP SKILLS GAP

- Continuous Integration and Continuous Deployment
- Data Design
- Product Management
- Software Design
- Solution Architecture
- System Integration

Click here to find out more on the programmes and support available to close skills gaps

Operations and Support Manager/ Head of Operations and Support

LOW

IN 3-5 YEARS

As Operations and Support functions are being impacted by AI, Cloud and Agile transformation, job holders will need to manage these changes and ensure the Operations and Support functions are successfully integrated or adapted.

KEY TRENDS

- AI & Analytics
- Cloud Computing
- Evolving IT Ecosystem

FUTURE TASK-LEVEL VIEW

- Job holders' functions will continue to remain relevant going forward in formulating strategy for service level agreements and improvements, and would require close collaboration with stakeholders and understanding of business requirements
-
- Job holders will take a lead role in driving AI automation, cloud integration and Agile/CICD transformation, as well as ensuring minimal disruptions to business and people during these transitions

SKILLS ANALYSIS

CURRENT SKILLS GAP

- Change Management

ADDITIONAL FUTURE SKILLS

- Creative Thinking
- Data Analytics

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Associate Software Engineer/ Software Engineer/Software Architect/ DevOps Engineer/ Software Engineering Manager

MEDIUM

IN 3-5 YEARS

Job holders will use ML algorithms and RPA to automate software design, development and testing tasks. Cloud platforms will streamline software and application development process and allow job holders to focus on reviewing the end-to-end software development.

KEY TRENDS

- AI & Analytics
- Robotics
- Cloud Computing

FUTURE TASK-LEVEL VIEW

- ML algorithms will streamline and automate the planning and design process by gathering data such as names of project stakeholders, location, customer needs, products, and type of business to auto-create intuitive instructions on what design approach to take
- RPA will replace time-consuming activities such as test data preparation, setting up of preconditions and can help finish lines of code to flag out prospective bugs in real-time
- Cloud platforms will streamline the software and application development process by providing access to testing and staging servers, thereby enhancing speed and improving applications delivery
- Job holders will focus on reviewing and monitoring the overall end-to-end process of software development and facilitating software design review sessions
- Software Architects continue to remain relevant in determining design specifications, facilitating software architecture governance process, and recommending approaches that balances security, stability, and performance needs with user requirements

SKILLS ANALYSIS

CURRENT SKILLS GAP

- Agile Software Development
- Agile Coaching
- Communication
- Software Configuration

ADDITIONAL FUTURE SKILLS

- Business Agility
- Continuous Integration and Continuous Deployment
- Cloud Computing
- Data Ethics

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Associate Embedded Systems Engineer/ Embedded Systems Engineer/ Embedded Systems Engineering Manager

MEDIUM

IN 3-5 YEARS

Job holders will leverage AI to implement and test embedded systems for IoT applications, and also shift from developing embedded systems in silos to maintaining them in an ecosystem environment of devices that ride on advancements in 5G infrastructure and edge computing.

KEY TRENDS

- AI & Analytics
- Cloud Computing
- 5G & IoT

FUTURE TASK-LEVEL VIEW

- Machine Learning and Computer Vision will assist job holders in implementing and testing embedded systems for IoT applications by performing object detection, recognition and provide automation solutions via AI test bots for testing
- Advancement in 5G infrastructure and edge computing reduces latency between devices, enabling embedded systems to function in an ecosystem of security intelligence, AI & Analytics and cloud. Job holders will shift from developing embedded systems in silos to maintaining embedded systems in an ecosystem environment

SKILLS ANALYSIS

CURRENT SKILLS GAP

- Embedded Systems Integration
- Network Security

ADDITIONAL FUTURE SKILLS

- Security Assessment and Testing
- Security Architecture

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Associate UI Designer/ UI Designer/ Lead UI Designer / Associate UX Designer/ UX Designer/ Lead UX Designer

MEDIUM

IN 3-5 YEARS

Job holders will use AI to assist in more routine tasks such as correcting designs and automating test runs. Insights from Analytics can also be used to enhance UI/UX features, but expertise from job holders are still required to refine the user journey.

KEY TRENDS

AI & Analytics

FUTURE TASK-LEVEL VIEW

- AI will take over more repetitive and mundane tasks such as resizing, color-correction and cropping pictures based on pre-determined rules and algorithms by job holders
- Analytics can help identify trends in user preferences and behaviours by analysing user and product data, such as commonly accessed panes within a website/application or the average duration users stay on a tab/pane. This helps job holders develop more customised designs to maximise product features
- AI test bots will conduct usability testing on more routine and basic aspects of the UI/UX design by automating test runs based on pre-determined rules by job holders
- Job holders will still be required to pick out detailed refinements in the user journey based on their expertise in user experience and interface design, as AI application in this field is still in its' nascent stages

SKILLS ANALYSIS

CURRENT SKILLS GAP

- Data Analytics
- Design Thinking Practice
- Product Management

ADDITIONAL FUTURE SKILLS

- Agile Software Development
- Consumer Intelligence Analysis

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Head of Software Engineering

LOW

IN 3-5 YEARS

AI will assist job holders in monitoring the quality of their engineering products, but they will also need to be well-versed in software development best practices and understand the linkages across different disciplines

KEY TRENDS

- AI & Analytics
- Robotics

FUTURE TASK-LEVEL VIEW

- This role will remain relevant and key to define the software development vision and strategy and ensure alignment with the organisation's architecture
- AI will assist job holders in monitoring the quality of their engineering products by crawling through established Key Performance Indicators (KPIs) and Service Level Agreements (SLAs) to ensure alignment
- Job holders will also need to be well-versed in the latest technology developments to adopt best practices in software development in the organisation, and understand the linkages across different disciplines

SKILLS ANALYSIS

CURRENT SKILLS GAP

- Partnership Management

ADDITIONAL FUTURE SKILLS

- Artificial Intelligence Application
- Change Management
- Transdisciplinary Thinking

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Cyber Risk Analyst/ Cyber Risk Manager

MEDIUM

IN 3-5 YEARS

Job holders will increasingly use AI to aid in decision-making and developing cybersecurity policies as cyber risk management and assessment changes from qualitative to more data-driven types of assessment.

KEY TRENDS

AI & Analytics

FUTURE TASK-LEVEL VIEW

- AI algorithms will identify potential risks and threats by correlating and analysing data from vulnerability/web application scanners, security information and event management software, and assisting job holders in risk assessment decisions and implementing preventive strategies
- AI will recommend corrective actions and controls by automating time-consuming and repetitive response action to mitigate cyber risks
- AI is able to extract and synthesize regulatory information from multiple regulatory sources and guidelines, thereby assisting job holders in developing and reviewing the organisation's cybersecurity policies

SKILLS ANALYSIS

CURRENT SKILLS GAP

- Strategy Implementation

ADDITIONAL FUTURE SKILLS

- Business Process Re-engineering
- Data Visualisation

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Vulnerability Assessment and Penetration Testing Analyst/Manager/ Threat Analysis Manager

LOW

IN 3-5 YEARS

AI and GRC tools will supplement job functions such as identifying gaps in cybersecurity set-ups and analyzing results of simulation tests, but job holders will still be needed to run complex simulations and approve penetration testing results.

KEY TRENDS

AI & Analytics

FUTURE TASK-LEVEL VIEW

- Analytics provide insights by tracking data, risk indicators and controls real-time, enabling job holders to leverage these insights to perform further investigative tasks
- AI will analyse test results through automated comprehensive reporting processes to highlight key threats and provide job holders with better understanding and visibility of potential cyber damages. However, job holders will continue to run complex processes for cyber ranges, test attacks and stimulations
- Job holders will continue to certify IT components and approve penetration testing results, with the help of GRC tools to monitor and identify gaps in compliance

SKILLS ANALYSIS

CURRENT SKILLS GAP

- NA

ADDITIONAL FUTURE SKILLS

- Business Agility
- Cloud Computing
- Communication
- Stakeholder Management

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Associate Security Analyst/ Security Operations Analyst

HIGH

IN 3-5 YEARS

As Security Orchestration, Automation and Response (SOAR) continues to mature and increasingly automate and orchestrate workflows, core tasks of these job holders will be replaced. Job holders will face potential displacement and move into more specialized or experienced roles to manage SOAR.

KEY TRENDS

- AI & Analytics
- Evolving IT Ecosystem

FUTURE TASK-LEVEL VIEW

- Automated control assessment tools assist job holders in assessing security controls by providing real-time updates on the enterprise's security posture
- SOAR (Security Orchestration, Automation and Response) will take over manual tasks in cyber monitoring activities and reporting, leaving job holders to use their technical expertise and discretion in analysing insights from log data and reports
- SOAR will potentially replace core tasks such as managing cyber security systems and operations by orchestrating processes, policy execution and reporting, thereby reducing the manpower required for these tasks
- ML will assist job holders in automating security alerts and response prioritisation by adapting from previous cyber security incidents

POSSIBLE JOBS TO MOVE INTO

For Associate Security Analyst

- Incident Investigator (Easy)
- Cyber Risk Analyst (Easy)
- Forensics Investigator (Moderate)
- Vulnerability Assessment & Penetration Testing Analyst (Moderate)

For Security Operations Analyst

- Incident Investigator (Easy)
- Security Engineer (Moderate)
- Forensics Investigator (Moderate)
- Vulnerability Assessment & Penetration Testing Analyst (Moderate)

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Possible job roles to move into for:
Associate Security Analyst

POSSIBLE MOBILITY OPPORTUNITIES

Incident Investigator 

Cyber Risk Analyst 

RATIONALE

- Job holders can make use of their experience in **monitoring security alerts and events, and documenting information based on established practices**, which helps them transit into this role to **identify and define cyber threats and root causes, and develop reports that detail cyber incident details**.

- Job holders have experience in **analyzing security-related information and events, as well as preparing and publishing security advisories**, which will enable them to **identify IT related risk** and **determine appropriate controls to mitigate risks** in this role.

TOP SKILLS MATCH

- Cyber Forensics
- Cyber and Data Breach Incident Management
- Security Assessment and Testing
- Stakeholder Management
- Threat Analysis and Defence
- Threat Intelligence and Detection
- Business Needs Analysis
- Cyber Forensics
- Cyber and Data Breach Incident Management
- Security Administration
- Security Education and Awareness
- Security Programmme Management
- Stakeholder Management

TOP SKILLS GAP

- Cyber Risk Management
- Audit and Compliance
- Cyber Risk Management
- IT Governance
- Security Governance
- Strategy Implementation
- Strategy Planning

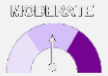
Click here to find out more about the programmes and support available to close skills gaps

Possible job roles to move into for:
Associate Security Analyst

POSSIBLE MOBILITY OPPORTUNITIES

Forensics Investigator

Vulnerability Assessment & Penetration Testing Analyst



RATIONALE

- Job holders can leverage their skills to **collect and analyse threat data** and transit into this role by upskilling and gaining additional skills to **investigate the root cause of cyber attacks post mortem.**

- Job holders can leverage their **understanding of cybersecurity systems, operational and maintenance vulnerabilities** to learn how to **design and perform tests on systems that might be vulnerable to attacks in this role.**

TOP SKILLS MATCH

- Cyber Forensics
- Security Administration
- Security Assessment and Testing
- Stakeholder Management
- Threat Analysis and Defence
- Threat Intelligence and Detection
- Security Assessment and Testing
- Threat Analysis and Defence
- Stakeholder Management

TOP SKILLS GAP

- Cyber Risk Management
- Emerging Technology Synthesis
- Failure Analysis
- Network Security
- Cyber Risk Management
- Emerging Technology Synthesis
- Network Security
- Security Strategy
- Test Planning

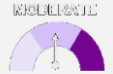
Click here to find out more on the programmes and support available to close skills gaps

Possible job roles to move into for:
Security Operations Analyst

POSSIBLE MOBILITY OPPORTUNITIES

Incident Investigator

Security Engineer



RATIONALE

- Job holders can leverage their **experience in analyzing security log data and responding to security-related incidents**, which gives them an advantage to transit into this role to **investigate causes of intrusion or attack, and defining their root causes.**

- Job holders can leverage their experience in **performing cybersecurity monitoring activities and implementing cybersecurity protocols,** which will help job holders use their knowledge to **design security controls and systems, test and implement these security systems.**

TOP SKILLS MATCH

- Cyber and Data Breach Incident Management
- Cyber Risk Management
- Stakeholder Management
- Threat Analysis and Defence
- Threat Intelligence and Detection
- Cyber and Data Breach Incident Management
- Cyber Risk Management
- Network Security
- Security Adminstration
- Security Programme Management

TOP SKILLS GAP

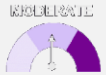
- Cyber Forensics
- Security Assessment and Testing
- Business Needs Analysis
- Emerging Technology Synthesis
- Infrastructure Design
- Security Architecture
- Security Governance

Click here to find out more on the programmes and support available to close skills gaps

Possible job roles to move into for:
Security Operations Analyst

POSSIBLE MOBILITY OPPORTUNITIES

Forensics Investigator



Vulnerability Assessment & Penetration Testing Analyst

RATIONALE

- Job holders can leverage their experience of **analyzing security log data and evaluating security events** to transit into this role to **analyse threat data and risks from affected systems and provide mitigation strategies.**
- Job holders can leverage their **security analysis and understanding on recurring security issues and risks** and transit into this new role by taking a step further to **design and perform tests on systems that might be vulnerable to attacks**

TOP SKILLS MATCH

- Cyber Risk Management
- Network Security
- Security Administration
- Stakeholder Management
- Threat Analysis and Defence
- Threat Intelligence and Detection
- Audit and Compliance
- Cyber Risk Management
- Network Security
- Stakeholder Management
- Threat Analysis and Defence

TOP SKILLS GAP

- Cyber Forensics
- Emerging Technology Synthesis
- Failure Analysis
- Security Assessment and Testing
- Emerging Technology Synthesis
- Security Assessment and Testing
- Security Strategy
- Strategy Implementation
- Strategy Planning
- Test Planning

Click here to find out more on the programmes and support available to close skills gaps

Security Operations Manager

MEDIUM

IN 3-5 YEARS

Job tasks shift from managing analysts to managing SOAR technology that perform fundamental security operational tasks. Job holders will use their technical expertise to encode rules in SOAR and review deliverables.

KEY TRENDS

AI & Analytics

FUTURE TASK-LEVEL VIEW

- Job holders will continue to collect and analyse threat data, and implement mechanisms that improve cyber security measures and incident response times, such as using SOAR to automate and accelerate incident response
- Job holders continue to conduct forensic investigations to determine causes of security incidents and update the threat database based on findings

SKILLS ANALYSIS

CURRENT SKILLS GAP

- Cyber Risk Management
- Emerging Technology Synthesis
- Security Strategy
- Strategy Planning

ADDITIONAL FUTURE SKILLS

- Security Architecture

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Forensic Investigator/Forensic Investigation Manager/ Incident Investigator/ Incident Investigation Manager

LOW

IN 3-5 YEARS

Job holders will continue to collect and analyse threat data and improve incident response times through SOAR. They will also continue to conduct forensic investigations and update the threat database based on findings.

KEY TRENDS

AI & Analytics

FUTURE TASK-LEVEL VIEW

- Job holders will continue to collect and analyse threat data, and implement mechanisms that improve cyber security measures and incident response times, such as using SOAR to automate and accelerate incident response
- Job holders continue to conduct forensic investigations to determine causes of security incidents and update the threat database based on findings

SKILLS ANALYSIS

CURRENT SKILLS GAP

- Communication
- Cyber Risk Management
- Developing People
- Problem Solving
- Threat Intelligence and Detection

ADDITIONAL FUTURE SKILLS

- Business Continuity
- Crisis Management

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Senior Security Engineer/ Security Engineer/ Security Architect

LOW

IN 3-5 YEARS

Job holders will continue to be key in reviewing and approving recommendations on security architecture standards and procedures, and will use AI-enabled Adaptive Security Architecture to make better decisions on enterprise security architecture.

KEY TRENDS

AI & Analytics

FUTURE TASK-LEVEL VIEW

- Job holders continue to be key in reviewing and approving recommendations on security architecture standards, policies and procedures based on their technical expertise and experience
- In light of the closer integration between business needs and cyber risk, job holders' tasks of developing security architecture will increasingly need to encapsulate business considerations
- AI capabilities enables the use of Adaptive Security Architecture to provide insights on risks so that job holders can make better decisions in the design and implementation of enterprise security architecture

SKILLS ANALYSIS

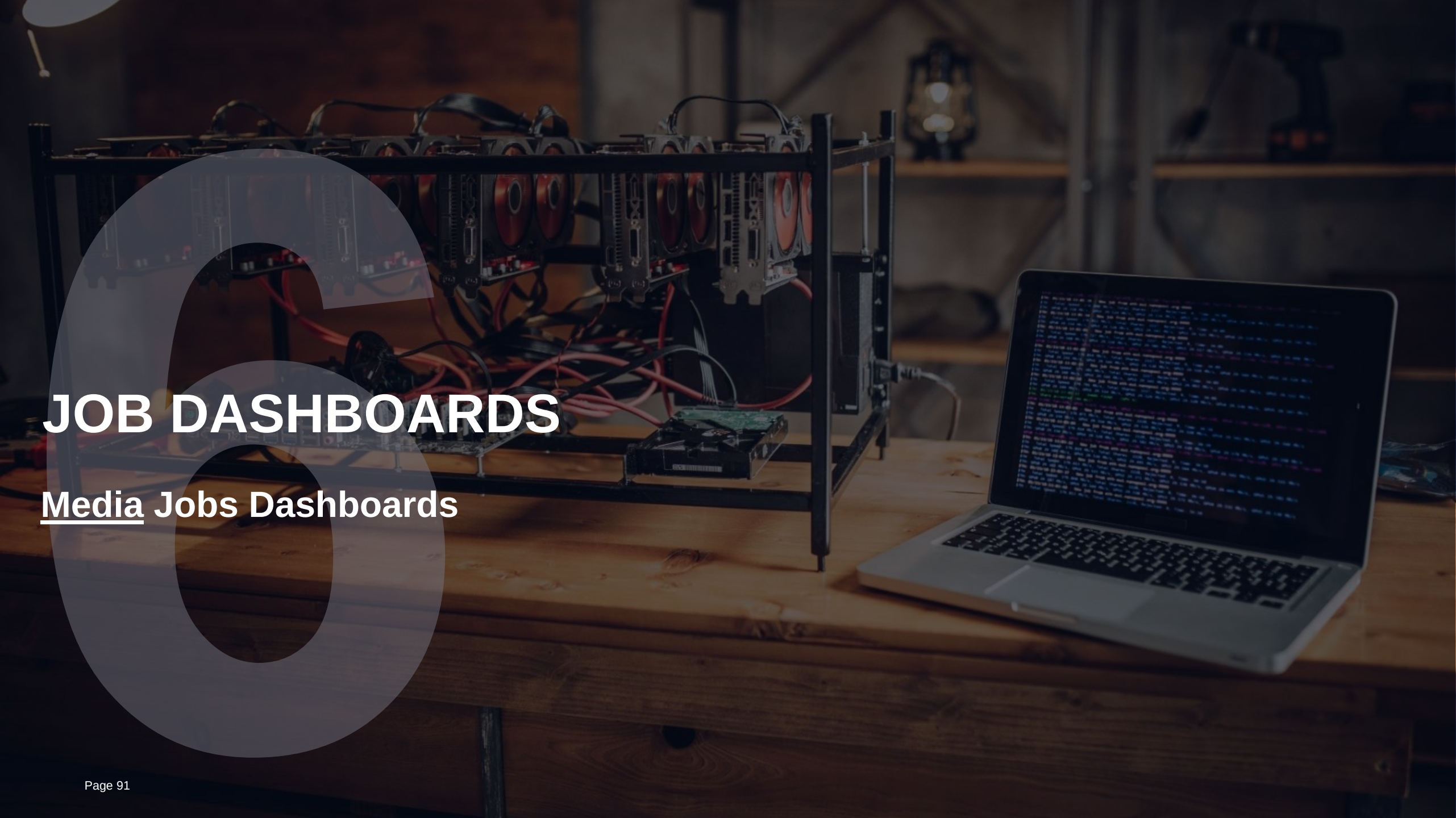
CURRENT SKILLS GAP

- Business Needs Analysis
- Cyber Risk Management
- Emerging Technology Synthesis
- Security Administration
- Strategy Implementation
- Security Strategy

ADDITIONAL FUTURE SKILLS

- Business Risk Management

Click here to find out more on the programmes and support available to close skills gaps and gain future skills



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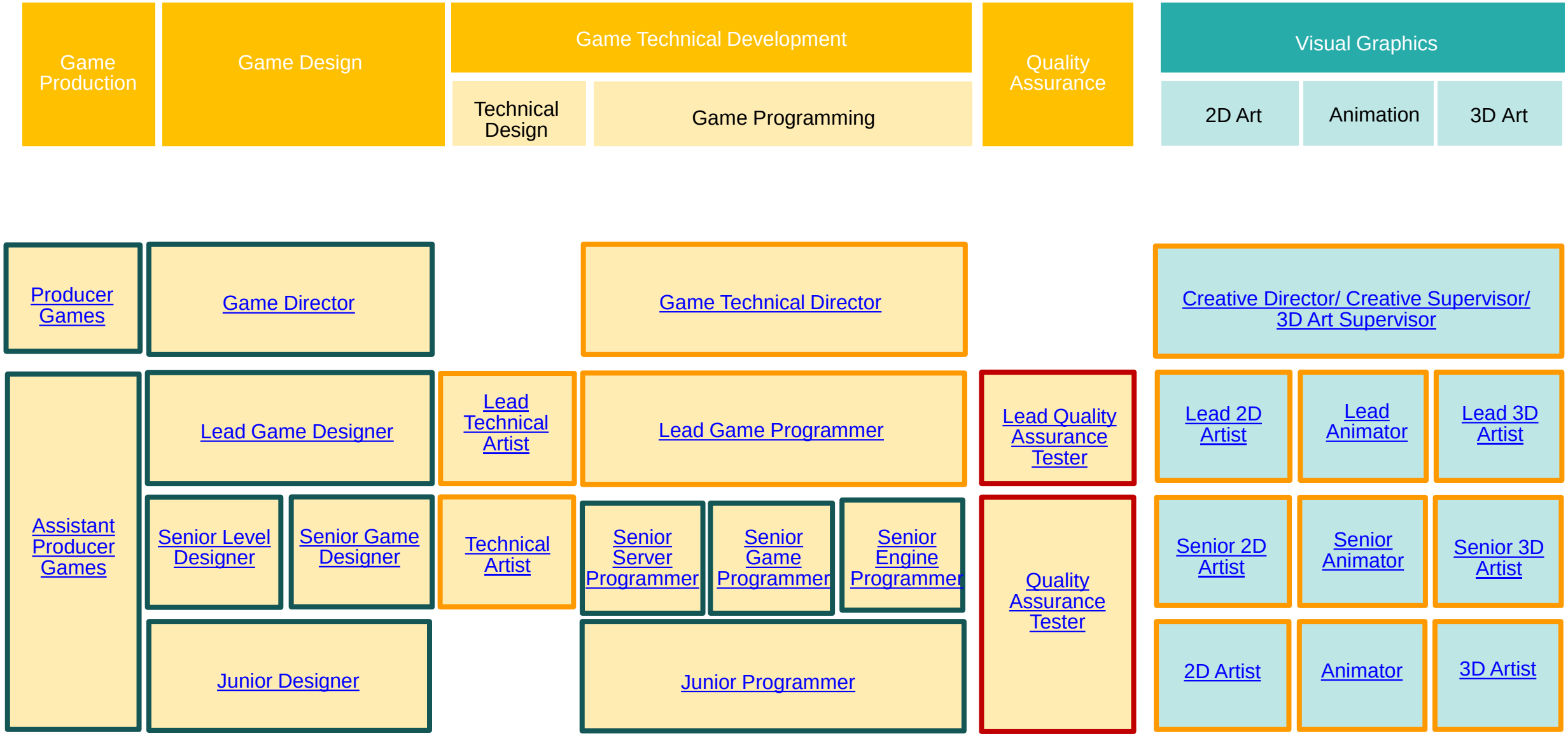
JOB DASHBOARDS

Media Jobs Dashboards

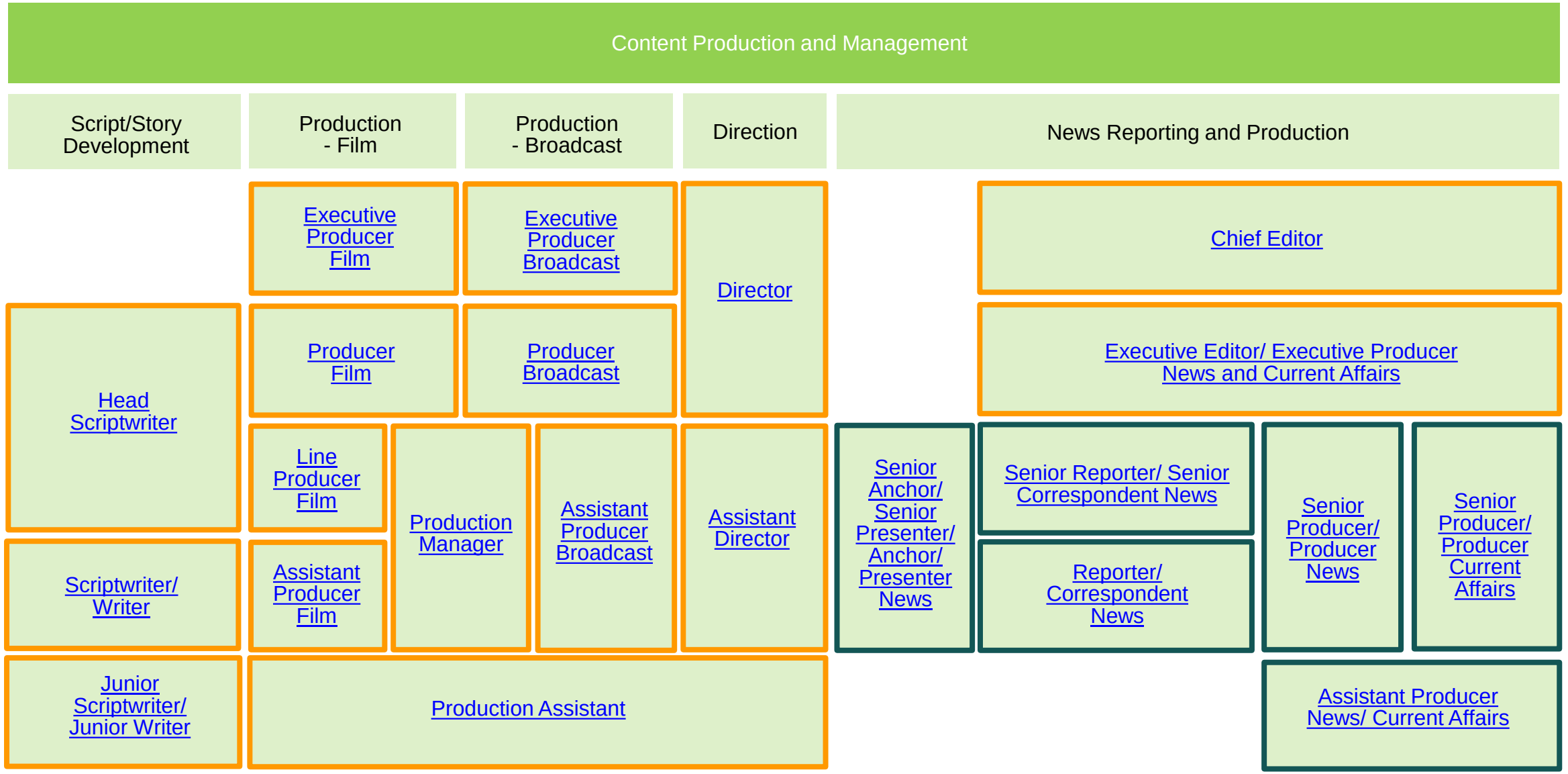
Click on the job role below to view the dashboard:

LEGEND:
High-impact job role
Medium-impact job role
Low-impact job role



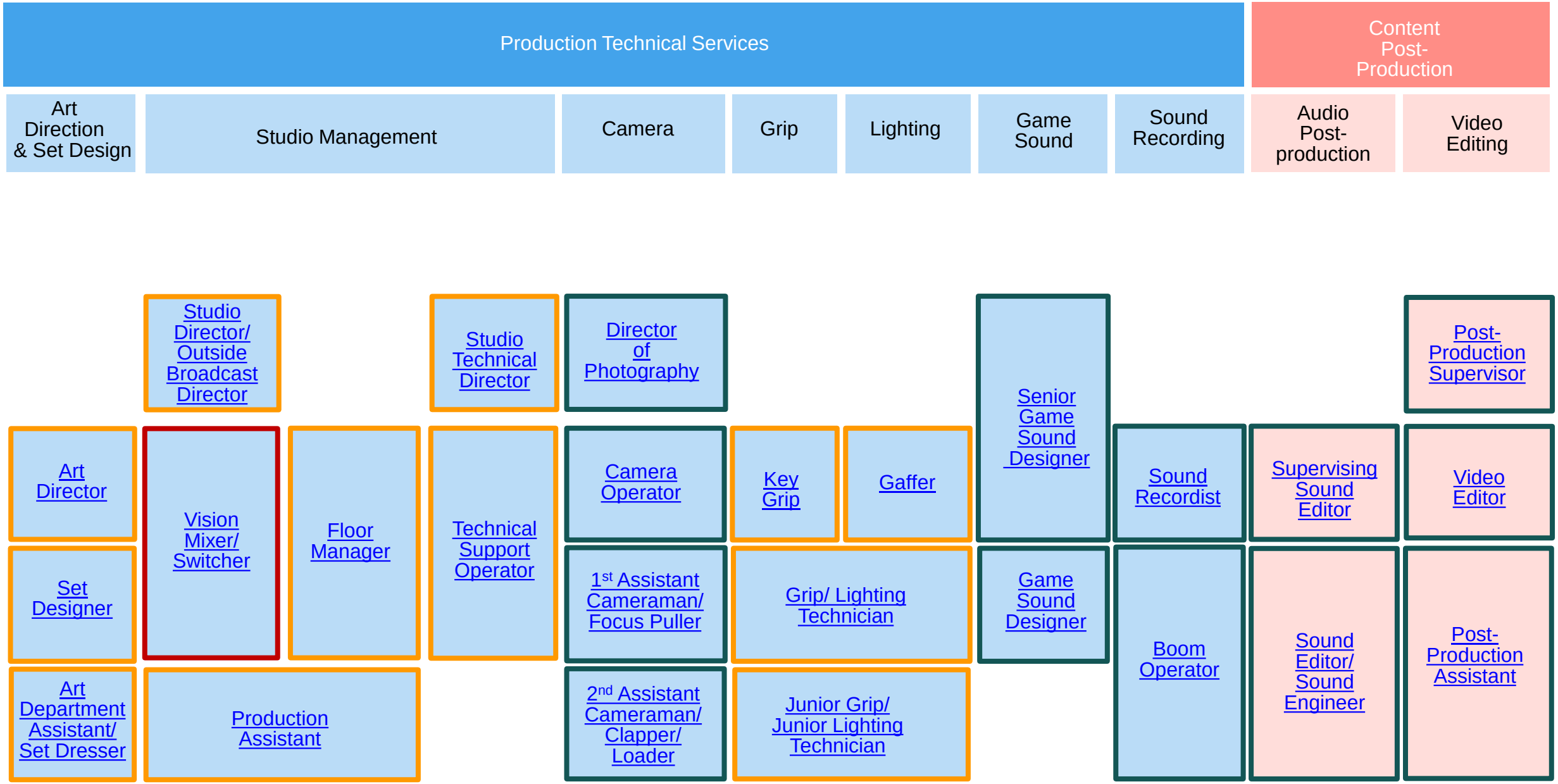
Click on the job role below to view the dashboard:

LEGEND:
High-impact job role
Medium-impact job role
Low-impact job role



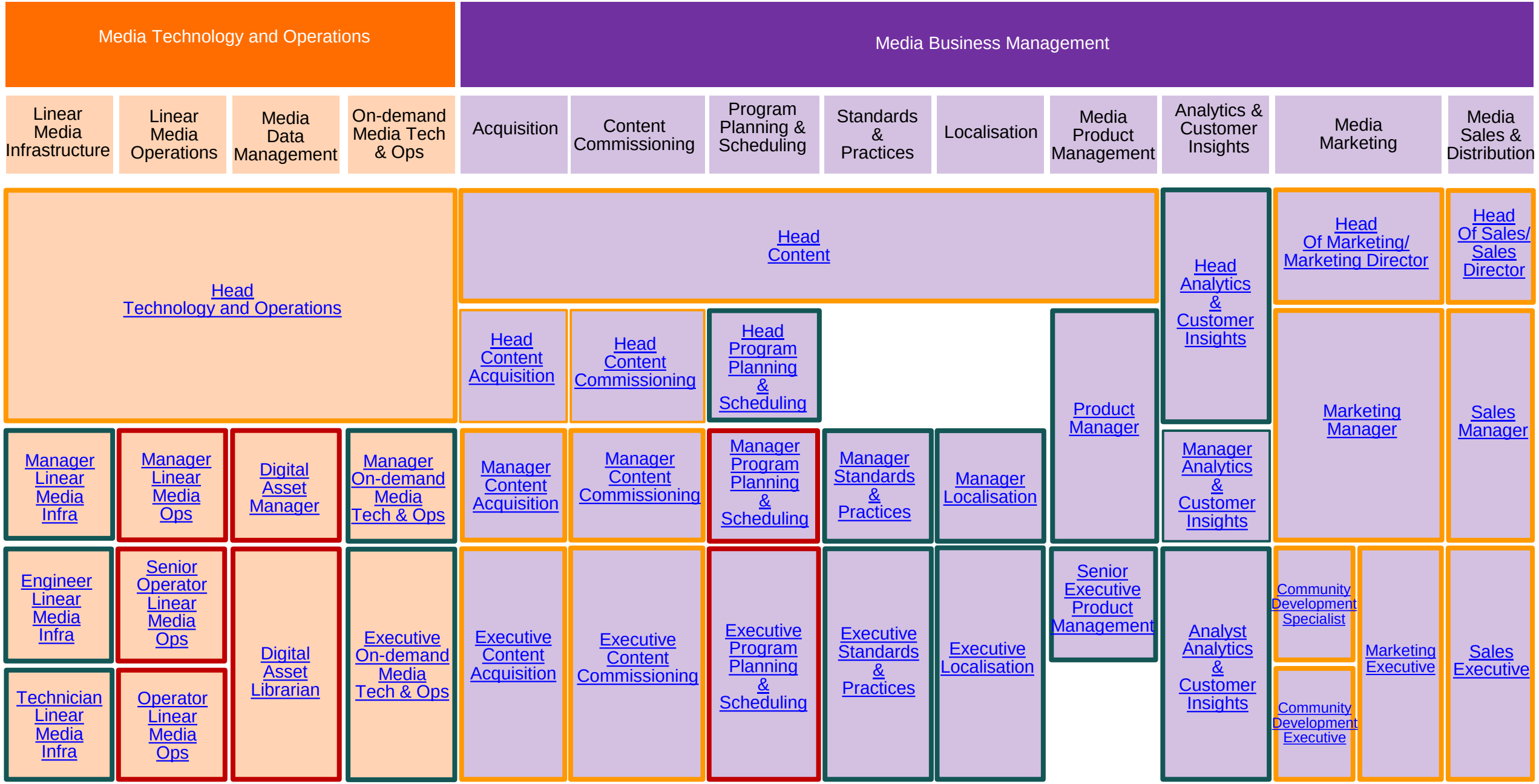
Click on the job role below to view the dashboard:

LEGEND:
High-impact job role
Medium-impact job role
Low-impact job role



Click on the job role below to view the dashboard:

LEGEND:
High-impact job role
Medium-impact job role
Low-impact job role



Content Acquisition (Executive/Manager/Head), Content Commissioning (Executive/Manager/Head), Head of Content

LOW

IN 3-5 YEARS

Job holders can use advanced analytics to identify content with commercial profitability and aid in evaluating content ideas and concepts, especially with the rise of OTT Media content.

KEY TRENDS

- AI & Analytics
- Shift in media consumption pattern

FUTURE TASK-LEVEL VIEW

- Advanced Analytics is able to analyse existing content based on algorithm inputs by job holders to identify content with better commercial profitability and aid in evaluating content ideas and concepts
- Negotiating content licensing and commissioning details will continue to remain key going forward, with job holders required to coordinate and communicate effectively across stakeholders
- With the rise of OTT Media content and the huge demand for original premium regional content, job tasks will expand to consider high-value productions that can seize value from IP creation and showrunning opportunities, and can meet varied audience preferences on multiple platforms

SKILLS ANALYSIS

CURRENT SKILLS GAP

- Concept Creation
- Content Strategy
- Pricing Strategy
- Product Management
- Programme Planning
- Project Management

ADDITIONAL FUTURE SKILLS

- Business Acumen
- Intellectual Property (IP) Management
- Collaboration

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Executive - Programme Planning & Scheduling/ Manager - Programme Planning and Scheduling

HIGH

IN 3-5 YEARS

AI can help in identifying optimal program scheduling and advertising slots, and the potential success of programmes. RPA will help job holders' manage network scheduling tasks at a more accurate and faster pace.

KEY TRENDS

AI & Analytics

Robotics

FUTURE TASK-LEVEL VIEW

- Advanced analytics can identify optimal program scheduling slots by consolidating trends on content shortfalls and opportunities, while predictive analytics can predict the potential success of programmes based on audiences profiles and past consumption trends
- RPA helps manage network scheduling tasks as per content and commercial requirements at a more accurate and faster pace
- AI can help in pricing advertising slots for specific events by recommending audience measurement projections and benchmark figures based on historical data
- Job holders will continue to review content, promotions and commercials placements from pricing and transmission reports to evaluate scheduling performance

POSSIBLE JOBS TO MOVE INTO

For Executive - Programme Planning & Scheduling

- Localisation Executive (Easy)
- Standards & Practices Executive (Easy)
- Content Acquisition Executive (Moderate

For Manager - Programme Planning and Scheduling

- Localisation Manager (Easy)
- Standards & Practices Manager (Easy)
- Community Development Specialist (Moderate)

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Possible job roles to move into for:
Executive - Programme Planning & Scheduling

POSSIBLE MOBILITY OPPORTUNITIES		
Localisation Executive 	**Standards & Practices Executive** 	**Content Acquisition Executive** 
RATIONALE		
▪ Job holders can transit to the localisation role as they would have gained an understanding of consumer preferences, as well as content sensitivities and nuances, from their current role. This would be helpful in learning about content customization and localization in this role.	▪ Job holders possess an understanding of the types of content that can/cannot be aired locally based on their experience in scheduling and reviewing content in line with regulatory/compliance guidelines. This facilitates their transition to this role.	▪ Job holders can transit into this role by leveraging their experience in enhancing content monetization potential and evaluating content performance. However, they will need to learn more about the financial modelling and licensing negotiation aspects in content acquisitions.
TOP SKILLS MATCH		
▪ Customer Behaviour Analysis ▪ Research	▪ Customer Behaviour Analysis ▪ Research	▪ Customer Behaviour Analysis ▪ Research
TOP SKILLS GAP		
▪ Customisation and Localisation	▪ Content Rating and Compliance	▪ Business Negotiation ▪ Content Acquisition Management ▪ Contract and Vendor Management

Click here to find out more on the programmes and support available to close skills gaps

Possible job roles to move into for:
Manager - Programme Planning & Scheduling

POSSIBLE MOBILITY OPPORTUNITIES		
Localisation Executive 	**Standards & Practices Executive** 	**Community Development Specialist** 
RATIONALE		
▪ Job holders can transit to the localisation role as they would have gained an understanding of consumer preferences, as well as content sensitivities and nuances, from their current role. This would be helpful in learning about content customization and localization in this role	▪ Job holders possess an understanding of the types of content that can/cannot be aired locally and can design advisory ratings/guidelines for content based on their experience in scheduling and reviewing content in line with regulatory/compliance guidelines.	▪ Job holders can leverage their expertise in analysing content with monetisation opportunities and understanding of audience preferences. ▪ Moving into this role is more difficult as the Community Development Specialist is required to engage with audiences directly through various physical and virtual platforms, which job holders might not have experience in
TOP SKILLS MATCH		
▪ Customer Behaviour Analysis ▪ Research	▪ Customer Behaviour Analysis ▪ Research	▪ Customer Behaviour Analysis ▪ Research
TOP SKILLS GAP		
▪ Customisation and Localisation	▪ Content Rating and Compliance	▪ Market Intelligence ▪ Content Marketing Strategy

Click here to find out more on the programmes and support available to close skills gaps

Head - Programme Planning & Scheduling

MEDIUM

IN 3-5 YEARS

With AI replacing manual planning and scheduling job tasks, job holders will now oversee automation systems and leverage AI technology to make informed decisions on network scheduling strategy, as well as generate recommended content on OTT Media platforms.

KEY TRENDS

- AI & Analytics
- Shift in media consumption pattern

FUTURE TASK-LEVEL VIEW

- The move towards OTT Media platforms results in expansion of job tasks by using Machine Learning to customise programme recommendations for end-users based on their watch preferences on OTT Media platforms of broadcasting companies
- Machine Learning can pull out key trends of the network's viewership ratings and provide recommendations on whether a content should be continued or discontinued, and generate ideas to enhance the monetization of content and scheduling slots

SKILLS ANALYSIS

CURRENT SKILLS GAP

- Business Negotiation
- Content Strategy
- Market Evaluation

ADDITIONAL FUTURE SKILLS

- Business Acumen
- Collaboration
- Quality Assurance
- Stakeholder Management
- Transdisciplinary Thinking

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Executive - Standards & Practices/ Manager - Standards & Practices /Executive - Localisation/ Manager - Localisation

MEDIUM

IN 3-5 YEARS

While AI tools can help to consolidate localization trends and flag out content not aligned with local media guidelines and regulations, job holders' knowledge and ability to interpret and assess content is still important in developing localization plans and best practices guides, as well as responding to public feedback.

KEY TRENDS

AI & Analytics

FUTURE TASK-LEVEL VIEW

- Machine Learning algorithms help to consolidate key localisation trends for specific territories and languages allowing for better reference when job holders develop localisation plans and best practices guides
- Machine Learning tools can scan and flag out content that are not aligned with media guidelines and regulations. However, job holders' knowledge and ability to interpret local nuances and assess content flagged by AI is still important, as well as for investigating public feedback on content censorship and classification issues

SKILLS ANALYSIS

CURRENT SKILLS GAP

- N/A

ADDITIONAL FUTURE SKILLS

- Intellectual Property (IP) Management
- Knowledge Management
- Global Perspective
- Legal and Compliance Management

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Senior Executive - Product Management/ Product Manager

MEDIUM

IN 3-5 YEARS

Job holders will use insights generated by analytics to formulate product and go-to-market strategies more quickly, expanding to an omni-channel strategy that includes OTT Media and digital media content.

KEY TRENDS

- AI & Analytics
- Shift in media consumption pattern

FUTURE TASK-LEVEL VIEW

- Data analytics helps to consolidate market trends and customers' preferences for strategic decision-making
- With the increasing popularity of OTT Media and digital media content, product strategy will expand to encompass an omni-channel strategy, including deepening relationships with multi-channel networks and influencers for content partnerships
- Predictive analytics will provide prospective trends on how products will be received upon launch. Job holders will focus on interpreting these insights and incorporating them into key metrics to drive product success
- Job holders will use insights generated by analytics to formulating go-to-market strategies with greater agility, and identify opportunities to improve and enhance products more quickly

SKILLS ANALYSIS

CURRENT SKILLS GAP

- Business Insights
- Business Negotiation

ADDITIONAL FUTURE SKILLS

- Business Acumen
- Design Thinking Practice
- Stakeholder Management
- Transdisciplinary Thinking
- Collaboration

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Analyst - Analytics and Customer Insights/ Manager - Analytics and Customer Insights/ Head - Analytics and Customer Insights

MEDIUM

IN 3-5 YEARS

With AI helping to analyse large datasets, job holders will focus on managing the various tools and working closely with various business functions to develop and apply relevant strategies from the datasets analysed.

KEY TRENDS

AI & Analytics

FUTURE TASK-LEVEL VIEW

- With increasing customer data collected from online and social media, AI and analytics tools will help job holders develop bespoke strategies for the product and marketing teams more efficiently, to enable them to identify content that best engage target audience and help brands build, scale and measure success of content and marketing campaigns
- Job holder's tasks will focus on managing the various AI tools and the quality of their outputs and deliverables
- Job holders will need to collaborate closely with various business functions to develop and apply relevant insights from datasets analysed

SKILLS ANALYSIS

CURRENT SKILLS GAP

- Data Analytics
- Data Visualisation

ADDITIONAL FUTURE SKILLS

- Artificial Intelligence Application
- Design Thinking Practice
- Knowledge Management

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Community Development (Executive/Specialist), Marketing (Executive/Manager/Head),Marketing Director/Head of Marketing

LOW

IN 3-5 YEARS

Job holders can use AI-enabled social listening tools to develop better targeted community development initiatives. Analytics will also continue to be used to track and improve customer engagement through partnerships and cross-platform marketing.

KEY TRENDS

- AI & Analytics
- Shift in media consumption pattern

FUTURE TASK-LEVEL VIEW

- AI-enabled social listening tools can help identify optimal social media engagements by analyzing large amount of data such as the types of social media posts and when they were posted. Job holders will be able to gain better insights on online community feedback which can be used in targeted community development initiatives
- Job holders will continue to use customer analytics to track and improve community and customer engagement, and identify relevant partners for marketing initiatives such as partnering influencers or creating digital avatars for marketing campaigns on social media, in addition to advertising on conventional platforms

SKILLS ANALYSIS

CURRENT SKILLS GAP

- Pricing Strategy

ADDITIONAL FUTURE SKILLS

- N/A

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Sales Executive/ Sales Manager/ Head of Sales/ Sales Director

LOW

IN 3-5 YEARS

Job holders can use customer analytics to get insights on driving sales and explore cross-selling/up-selling opportunities. They will continue to remain relevant in negotiating business deals and recommending new or enhanced offerings to customers.

KEY TRENDS

AI & Analytics

FUTURE TASK-LEVEL VIEW

- Customer analytics can provide job holders with more insights on market/customer trends, sales opportunities and generate dashboards with recommended sales targets based on past sales performance, allowing for better decision making to drive sales
- AI can provide a view on suggested cross-selling/ up-selling opportunities by synthesizing customer profiles available in CRM systems
- Job holders continue to remain relevant in managing stakeholders, negotiating business deals and recommending new or enhanced offerings to customers

SKILLS ANALYSIS

CURRENT SKILLS GAP

- Business Development
- Pricing Strategy

ADDITIONAL FUTURE SKILLS

- Business Acumen
- Customer Experience Management
- Data Analytics
- Fundraising and Sponsorships
- Collaboration

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Animator/ Senior Animator/ Lead Animator

LOW

IN 3-5 YEARS

Job holders will leverage AI tools to sequence preliminary key frames into animations and automate the creation of basic animation. Job holders' knowledge and collaboration with creative leadership teams will still be key in developing details within scripts into animation.

KEY TRENDS

AI & Analytics

FUTURE TASK-LEVEL VIEW

- Job holders continue to remain relevant going forward as their knowledge and collaboration with creative leadership teams is key in developing details within the script into animation
- AI computer visioning tools can be used to sequence preliminary key frames into animations. AI tools can automate the process of creating basic animation by interpreting the character and figuring out movements in the animation

SKILLS ANALYSIS

CURRENT SKILLS GAP

- Creative Storytelling
- Digital Fluency
- Research

ADDITIONAL FUTURE SKILLS

- Creative Storytelling
- Global Perspective

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

2D Artist/ Senior 2D Artist/ Lead 2D Artist/ 3D Artist/ Senior 3D Artist/ Lead 3D Artist/ Creative Director/ Creative Supervisor/3D Art Supervisor

LOW

IN 3-5 YEARS

Job holders can use AI tools to pick out art concepts, assist in basic visual drafting and applying 3D models to animation frames and mesh rigs, allowing them to perform their tasks more easily and efficiently.

KEY TRENDS

AI & Analytics

FUTURE TASK-LEVEL VIEW

- AI can provide job holder with suggested art concepts by sieving through visual graphic asset libraries and art concepts based on past consumers' preference, allowing for better creative leadership discussions
- AI tools help in basic or first-cut development of concept arts/creative assets for production by drawing or copying real life photos and automatically editing them according to requirements, allowing for better presentation of production art options to the creative leadership
- Machine learning or computer vision technology can study 3D/animation models and apply them to animation frames/3D mesh rigs, allowing job holders to work more efficiently by tweaking and adjusting their 3D animation on a per-edit basis instead of creating the 3D art asset from scratch

SKILLS ANALYSIS

CURRENT SKILLS GAP

- Creative Storytelling
- Digital Fluency
- Research

ADDITIONAL FUTURE SKILLS

- Creative Storytelling
- Global Perspective
- Market Research
- Transdisciplinary Thinking

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Technician Linear Media Infrastructure/ Engineer Linear Media Infrastructure/ Manager Linear Media Infrastructure

MEDIUM

IN 3-5 YEARS

Job holders will expand to deploying and maintaining media cloud platforms in addition to linear media infrastructure, and will leverage predictive analytics to facilitate maintenance and operations

KEY TRENDS

- AI & Analytics
- Cloud Computing

FUTURE TASK-LEVEL VIEW

- Job holders' job functions will expand to deploying and maintaining performance and security on OTT Media cloud platforms, in addition to linear media infrastructure
- Predictive analytics will pre-empt downtimes and typical fault areas to facilitate predictive and preventative infrastructure software maintenance, enabling job holders to perform routine maintenance more efficiently and minimise operations downtime

SKILLS ANALYSIS

CURRENT SKILLS GAP

- Broadcast Infrastructure Design
- Problem Solving

ADDITIONAL FUTURE SKILLS

- Cloud Computing
- Cyber Incident Management
- Cyber Security
- Incident Response
- Network Administration and Maintenance

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Operator Linear Media Operations/ Senior Operator Linear Media Operations/ Manager Linear Media Operations

HIGH

IN 3-5 YEARS

With AI and RPA automating most tasks in linear media operations, job holders might potentially be displaced or expand their functions to include operating and managing on-demand media.

KEY TRENDS

- AI & Analytics
- Robotics
- Shift in media consumption pattern

FUTURE TASK-LEVEL VIEW

- Plans for linear media operations will be increasingly agile as automation allows one single operator to manage multiple channels in the future
- RPA will automate ingesting, encoding and storing of content through set algorithms and help job holders save time by performing most core tasks in playout and transmission
- AI will take over metadata tagging by automating media management tasks for certain types of production (e.g. sports and live events) through image recognition
- RPA-enabled broadcast automation systems will take over retrieving, playout and switching between live and recorded programmes based on pre-determined inputs by job holders to save their time
- Job holders will learn new variations of distribution and problem resolution across multiple platforms as distribution operations become more varied due to usage of more streaming devices and IP restrictions
- AI and Analytics will generate and analyse real-time insights against performance metrics about linear media operations to provide insights for job holders to optimise performance and communicate recommendations to relevant stakeholders

POSSIBLE JOBS TO MOVE INTO

Operator Linear Media Operations/ Senior Operator Linear Media Operations

- On-demand Media Technology and Operations – Executive (Easy)
- Technical Support Operator (Moderate)

Manager Linear Media Operations

- On-demand Media Technology and Operations – Manager (Easy)
- Technical Support Operator (Moderate)

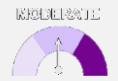
Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Possible job roles to move into for:
Operator/ Senior Operator / Manager - Linear Media Operations

POSSIBLE MOBILITY OPPORTUNITIES

On-demand Media Technology and Operations – Executive/ Manager

Technical Support Operator



RATIONALE

- Job holders can leverage their content ingest and quality control skills to move into this new role. They would have to learn how to develop media applications and deliver content over different platforms (linear vs on-demand).
- Job holders would be able to use their understanding of media file formats and playout in this role. However, mobility into this role is more difficult as job holders would have to learn how to operate recording equipment and use on-air graphic devices for studio graphic operations, which are functions that might not be familiar.

TOP SKILLS MATCH

- Content Ingest Operations
- Media File Formats Conformation

TOP SKILLS GAP

- Application Development
- Content Delivery Network Operations
- Network Administration and Maintenance
- Colour Grading
- Studio Graphics Operations
- Vision Mixing

Click here to find out more on the programmes and support available to close skills gaps

Digital Asset Librarian/ Digital Asset Manager

HIGH

IN 3-5 YEARS

AI and RPA can automate most core tasks such as cataloguing and retrieving media assets. Job holders' functions will be limited to defining rules for AI tools and reviewing their accuracy and outputs

KEY TRENDS

- AI & Analytics
- Cloud Computing

FUTURE TASK-LEVEL VIEW

- ML tools will filter and do the initial metadata tagging for digital media assets based on pre-defined rules by job holders, who will then review overall quality and accuracy of cataloguing
- Cloud-based digital asset management systems will enable respective team members to store and retrieve content quickly
- AI and Analytics will generate performance metrics about digital asset management and operations, and identify patterns and lapses to automate maintenance during operational lull periods

POSSIBLE JOBS TO MOVE INTO

Digital Asset Librarian/ Digital Asset Manager

- Post-Production Assistant/Video Editor (Moderate)
- Data Management Specialist* (Moderate)

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Possible job roles to move into for:
Digital Asset Librarian/ Digital Asset Manager

POSSIBLE MOBILITY OPPORTUNITIES

Post-Production Assistant/Video Editor	Data Management Specialist*

RATIONALE

- Job holders leverage their **understanding of media data cataloguing and management** in retrieval of raw footage and media assets for post production video edits. Both roles work in a post-production environment which enables easier transition to this role, but with additional skills in video editing and creativity required

- Job holders leverage their understanding of **data management and media cataloguing** to perform this role, which manages enterprise data files and creating metadata for ease of data retrieval.
- As the creation of metadata and establishment of naming conventions/ tagging will differ amongst industries, job holders may need to familiarize themselves with the specific industry.

TOP SKILLS MATCH

- Media Content Cataloguing
- Media Data Management

TOP SKILLS GAP

- Colour Grading
- Immersive Video Editing
- Media File Formats Conformation
- Video Editing
- Data Protection Management
- Data Design
- Data Governance

*Note: This role is not within the Skills Framework for Media

Click here to find out more on the programmes and support available to close skills gaps

Executive On-demand Media Technology & Operations /Manager On-demand Media Technology & Operations

MEDIUM

IN 3-5 YEARS

RPA and AI will facilitate loading and testing of media applications and generating insights on performance and user trends. Job holders will continue to plan for development of on-demand media operations and identify areas of improvement and solutions for breakdowns.

KEY TRENDS

- AI & Analytics
- Robotics
- Shift in media consumption pattern

FUTURE TASK-LEVEL VIEW

- Job holders will continue to strategically plan for development of on-demand media operations strategy and prepare operational budget to meet the needs of the rapidly changing OTT Media scene
- RPA will facilitate load and functionality testing of media applications, allowing job holders' to handle more complex cases and issues
- Job holders' expertise remains key in the deployment of CDNs to ensure operationally stable and efficient networks
- AI and Analytics will generate real-time insights on performance metrics and user trends of on-demand media technology and operations for job holders to develop focused solutions for improvement

SKILLS ANALYSIS

CURRENT SKILLS GAP

- N/A

ADDITIONAL FUTURE SKILLS

- Artificial Intelligence Application
- Asset Automation Management
- Content Distribution
- Cloud Computing
- Customer Behaviour Analysis
- Data Analytics

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Head - Technology and Operations

LOW

IN 3-5 YEARS

Job holders would need to evaluate the right technology to be used in the future arising from changes in the Media landscape, and using AI & Analytics to optimize operational performance and develop solutions for better efficiency.

KEY TRENDS

AI & Analytics

FUTURE TASK-LEVEL VIEW

- Job holders remain key in making planning and procurement decisions based on their technical expertise to set the direction for media operations, their annual priorities and develop performance metrics for media operations
- Job holders remain key in overseeing the architecture and design of the organisation's entire linear and digital infrastructure, and overseeing the budgetary and implementation processes
- AI and Analytics will provide insights on the performance of media operations for job holders to optimise performance and develop solutions and automated processes to improve efficiency

SKILLS ANALYSIS

CURRENT SKILLS GAP

- N/A

ADDITIONAL FUTURE SKILLS

- Business Continuity Management
- Data Analytics
- Global Perspective
- Innovation Management
- Stakeholder Management
- Transdisciplinary Thinking

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Junior Scriptwriter/ Junior Writer/ Scriptwriter/ Writer/ Head Scriptwriter

LOW

IN 3-5 YEARS

Job holders can use analytics to better target and engage audiences, but they will continue to rely primarily on their storytelling and creative vision to carry out script and storyline development and revision.

KEY TRENDS

AI & Analytics

FUTURE TASK-LEVEL VIEW

- Customer Behavior Analytics will help job holders to better understand audience preferences on genres and formats by analysing audience and content data
- Scriptwriters will still have to conceptualize ideas for content, develop the storyline and creative vision, flag potential legal and copyright issues, and ensure script quality and alignment to visual and production requirements

SKILLS ANALYSIS

CURRENT SKILLS GAP

- Creative Storytelling
- Narrative Design
- Creative Thinking
- Communication

ADDITIONAL FUTURE SKILLS

- Data Analytics
- Global Perspective
- Storyboarding

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Assistant Producer (Film)/ Line Producer (Film)/ Producer (Film)/Assistant Producer (Broadcast)/Producer (Broadcast)

LOW

IN 3-5 YEARS

Job holders will continue to oversee and manage end-to-end production operations, and work closely with crew members and creative leadership teams in setting creative direction. They can also use advanced analytics to optimize decisions on production budget and timeline.

KEY TRENDS

AI & Analytics

FUTURE TASK-LEVEL VIEW

- Job holders will continue to coordinate pre-production operations, select cast and crew, review location requirements for production and guide scriptwriting team to convert ideas into comprehensive storylines
- Job holders will continue to work closely with crew members and creative leadership teams to set creative directions, approve script changes and resolve issues on set
- Advanced Analytics will help job holders in optimising production budget and timeline by providing trends analysis for better decision-making

SKILLS ANALYSIS

CURRENT SKILLS GAP

- Communication

ADDITIONAL FUTURE SKILLS

- Data Analytics
- Transdisciplinary Thinking

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Production Assistant/ Production Manager

LOW

IN 3-5 YEARS

Job holders will leverage software robotics to reduce manual documents processing tasks, while analytics can be used to optimize budgeting and scheduling, and predict potential production delays.

KEY TRENDS

- AI & Analytics
- Robotics

FUTURE TASK-LEVEL VIEW

- Software robotics can help streamline compliance documents processing by automating data entry and data analytics can improve budget efficiency by suggesting possible areas for cost-savings, allowing job holders to focus on more important tasks like setting up the production office and coordinating and negotiating with crew and vendors
- Predictive Analytics can help job holders to preempt production delays by mapping common production issues and measuring timeline implications, enabling job holders to anticipate obstacles and take preventive measures accordingly

SKILLS ANALYSIS

CURRENT SKILLS GAP

- Production Operations
- Studio Technical Production

ADDITIONAL FUTURE SKILLS

- Risk Awareness
- Transdisciplinary Thinking
- Vendor Management

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Assistant Director/ Director

LOW

IN 3-5 YEARS

Job holders will leverage AI to understand audience preference, and Advanced equipment can be used to improve shooting processes.

KEY TRENDS

AI & Analytics

FUTURE TASK-LEVEL VIEW

- AI will supplement job holders with reference information to help capture audience by detecting elements of past films and “micro-segment” garnering audience appeals. However, it would still require job holders to upskill in data analytics to interpret insights well and creative storytelling for creativity and judgement on content creation and revision
- Advanced equipment (such as 360/drone cameras) will enhance overall shooting processes to capture complex and multiple scenes at once. However, angle positioning and shots will still be decided by job holders based on their overall vision of the production
- These functions remain relevant going forward as they remain key in managing post-production, and would require job holders’ intricate understanding of the film to synchronise the flow of content and select scenes to be edited and/or included in the film

SKILLS ANALYSIS

CURRENT SKILLS GAP

- Creative Storytelling
- Communication

ADDITIONAL FUTURE SKILLS

- Data Analytics

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Executive Producer (Film)/ Executive Producer (Broadcast)

LOW

IN 3-5 YEARS

Job holders will leverage Big Data Analytics to improve production profits, however they will continue to rely on their skills to drive content strategy, guide content production and acquire financial support.

KEY TRENDS

AI & Analytics

FUTURE TASK-LEVEL VIEW

- Big Data Analytics will supplement job holders in improving film/ broadcast profits by analysing production trends and consumption patterns to provide insights on content with audience appeal. However, it would still require job holders' industry experience and expertise to develop and drive the overall creative content strategy
- Reviewing creative and commercial aspects of proposals remains key in coordinating pre-production operations, and would require job holders to consider multi-faceted factors such as budget, audience appeal, profitability, marketing, cultural sensitivities and advertisers and sponsors attraction
- Securing funding and sponsorships remains crucial, and would require negotiation and collaboration with stakeholders and hone stronger business acumen to drive monetisation strategy and plans

SKILLS ANALYSIS

CURRENT SKILLS GAP

- N/A

ADDITIONAL FUTURE SKILLS

- Business Acumen
- Data Analytics

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Senior Anchor/Senior Presenter/Anchor Presenter News, Reporter/ Correspondent, News Senior Reporter/Senior Correspondent News

MEDIUM

IN 3-5 YEARS

Job holders will leverage AI to support news research and robo-journalism to support news writing, while AI and advanced computer vision can be used to help job holders to engage audience during news presentation.

KEY TRENDS

- AI & Analytics
- Robotics

FUTURE TASK-LEVEL VIEW

- AI will support job holders in news stories development by tagging related archived news content, giving job holders easy access to research data
- NLP will support job holders in increasing programme viewership by analysing emerging themes and trends to provide suggestions on news topics that can garner audience attention
- Robo-journalism will use machine learning algorithms to support job holders in drafting factual news content at a faster rate, reducing manual writing and increasing work efficiency
- AI can produce automated real-time infographics on news shows for audiences, though job holders are still required to interpret these infographics and articulate the insights to audiences

SKILLS ANALYSIS

CURRENT SKILLS GAP

- News Story Research
- Social Media Content Creation and Management

ADDITIONAL FUTURE SKILLS

- Artificial Intelligence Application
- Data Analytics
- Data Visualisation

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Assistant Producer - News/Current Affairs/ Senior Producer/ Producer – News/ Senior Producer/Producer - Current Affairs

MEDIUM

IN 3-5 YEARS

Job holders will leverage AI to accelerate news development, better target audience and improve news content, analytics and RPA will also be helpful in administrative tasks such as budging and copyright clearance.

KEY TRENDS

- AI & Analytics
- Robotics

FUTURE TASK-LEVEL VIEW

- AI will support job holders in news stories development by tagging related archived news content, giving job holders easy access to research data
- NLP will support job holders in creating more targeted news programme by analysing emerging themes and trends
- AI and computer vision technology will support job holders in optimising news content and visuals by identifying trending news stories and suitable photographs/slideshows
- Analytics will support job holders in budget management by analysing historical news operation expenses to provide budget references
- RPA will help job holders to expedite the copyright clearance process by matching copyright clauses with pre-determined copyright terms of each programme

SKILLS ANALYSIS

CURRENT SKILLS GAP

- N/A

ADDITIONAL FUTURE SKILLS

- Creative Thinking
- Data Analytics
- Data Visualisation

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Executive Editor/ Executive Producer - News and Current Affairs/Chief Editor

LOW

IN 3-5 YEARS

Job holders will leverage AI to support direction setting of programmes and promotion of viewership, however they remain responsible for the overall operation and development of news and current affairs programmes.

KEY TRENDS

AI & Analytics

FUTURE TASK-LEVEL VIEW

- AI will analyse trends of similar news production in the past to provide job holders with reference points in setting directions for news/current affair programmes
- Overseeing operations and seeking sponsorships will remain key to ensure the standards and deliverables of news/current affairs programmes
- AI and Analytics will help job holders in promoting viewership and subscription by analyzing user data and providing insights on optimal platforms for news stories. Job holders will leverage these insights to align marketing strategies and make recommendations to achieve corporate goals

SKILLS ANALYSIS

CURRENT SKILLS GAP

- N/A

ADDITIONAL FUTURE SKILLS

- Business Acumen
- Data Analytics
- Strategy Planning

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Art Department Assistant/ Set Dresser/ Set Designer/ Art Director

LOW

IN 3-5 YEARS

Job holders can leverage immersive technologies to supplement set design and planning, though they still remain key in ensuring smooth transitions between sets and managing operational exigencies.

KEY TRENDS

Immersive Technology

FUTURE TASK-LEVEL VIEW

- Job holders are required to interpret thematic ideas, and create design concepts while accounting for production requirements
- Virtual reality will be able to create simulated mock-ups of sets and locations for review and amendments, increasing certainty of final design and reducing time spent on changes
- Augmented reality can be used to view placement and alignment of decorations and props before being delivered on set
- While immersive technology can be used to supplement set design and planning, job holders remain key in ensuring smooth transition between sets, exercising technical judgement to manage operational exigencies, and perform quality and safety checks

SKILLS ANALYSIS

CURRENT SKILLS GAP

- Prop Design
- Visual Style Development

ADDITIONAL FUTURE SKILLS

- Creative Storytelling
- Critical Thinking
- Stakeholder Management

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Vision Mixer/ Switcher

HIGH

IN 3-5 YEARS

Job holders' vision mixing and switching tasks will mostly be automated by studio automation systems based on pre-determined inputs. Job holder will focus more on operating the studio automation system and resolving ad-hoc complex issues during production.

KEY TRENDS

- AI & Analytics
- Robotics

FUTURE TASK-LEVEL VIEW

- AI and Analytics will recommend the best vision mixing and switching set up by analysing past scenes/shot transitions to help job holders determine the transitions and digital effects needed
- RPA will assist job holders in automating baseline routine functionality checks on vision mixing devices
- Studio automation system, powered by AI, will pick up critical scenes and automatically perform selection and transition of images or apply digital effects during a live production, based on the algorithm input by job holders
- With most core tasks being done by AI, job holders will focus more on operating the studio automation system and handle ad-hoc complex situations which studio automation systems are not able to perform

POSSIBLE JOBS TO MOVE INTO

Digital Asset Librarian/ Digital Asset Manager

- Video Editor (Easy)
- Technical Support Operator (Moderate)

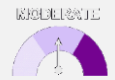
Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Possible job roles to move into for:
Vision Mixer/ Switcher

POSSIBLE MOBILITY OPPORTUNITIES

Video Editor

Technical Support Operator



RATIONALE

- Job holders can leverage their experience in **combining images, applying digital effects and understanding of colour balances** for video editing. The familiarity in studio/production operations can also help them to transit into this role.

- Job holders leverage their **understanding of recorded video formats and colour and lighting levels**, which can be applied in video tape or camera control unit operations**.** Their **experience in studio operations and set-up** will also be useful in collaborating with camera and direction teams and on-air graphics systems.

- Job holders will need to learn how to operate and maintain recording devices and camera output, or update on-air graphic systems and execute their playout.

TOP SKILLS MATCH

- Media File Formats Conformation
- Video Editing

- Media File Formats Conformation
- Vision Mixing

TOP SKILLS GAP

- Immersive Video Editing

- Colour Grading
- Studio Graphics Operations

Click here to find out more on the programmes and support available to close skills gaps

Production Assistant/ Floor Manager

LOW

IN 3-5 YEARS

Job holders can use VR/AR to simulate mock-ups of sets and placement of decorations and props, but they will still need to ensure smooth end-to end studio operations and coordinating production flow between creative leadership, floor crew and cast.

KEY TRENDS

Immersive Technology

FUTURE TASK-LEVEL VIEW

- Job holders are required to interpret thematic ideas, and create design concepts while accounting for production requirements
- Virtual reality will be able to create simulated mock-ups of sets and locations for filming, allowing film-makers and studios to overcome physical location constraints
- Augmented reality can be used to view placement and alignment of decorations and props before being delivered on set
- While immersive technology can be used to supplement set design and planning, job holders remain key in ensuring smooth transition between sets, exercising technical judgement to manage operational exigencies, and perform quality and safety checks

SKILLS ANALYSIS

CURRENT SKILLS GAP

- Production Operations
- Production Planning and Scheduling
- Studio Technical Production

ADDITIONAL FUTURE SKILLS

- Process Improvement and Optimisation
- Project Management
- Risk Awareness
- Transdisciplinary Thinking
- Vendor Management

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Technical Support Operator/ Studio Director/Outside Broadcast Director/ Studio Technical Director

LOW

IN 3-5 YEARS

Job holders can leverage immersive technology and analytics to assist in enhancing deliverables of production operations and reducing equipment downtime, and have to be well-versed in providing technical guidance and the use of the studio's equipment and automation systems.

KEY TRENDS

- AI & Analytics
- Immersive Technology

FUTURE TASK-LEVEL VIEW

- Job holders remain key in translating creative inputs into technical requirements and developing a shooting plan
- AR and VR will allow better visualization of camera placements, reducing time required for adjustments to align with requirements
- Predictive analytics and preventive maintenance will provide insights on equipment status to provide an estimate of the number of hours of usage before servicing is required to reduce equipment downtime
- Job holders are still required to guide staff to manage deliverables, provide technical guidance and keep updated with SOPs and technologies that enhance quality of deliverables

SKILLS ANALYSIS

CURRENT SKILLS GAP

- Production Budget Management
- Production Operations
- Production Planning and Scheduling

ADDITIONAL FUTURE SKILLS

- Data Analytics
- Process Improvement and Optimisation
- Stakeholder Management
- Transdisciplinary Thinking

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

2nd Assistant Cameraman/ Clapper/ Loader/ 1st Assistant / Cameraman/ Focus Puller/ Camera Operator/ Director Of Photography

MEDIUM

IN 3-5 YEARS

Job holders will leverage advanced filming equipment with immersive features to increase creative opportunities and enable complex filming operations, as well as use cloud computing and 5G networks to enable faster data storage and post-production processing.

KEY TRENDS

- Cloud Computing
- Robotics
- Immersive Technology

FUTURE TASK-LEVEL VIEW

- Drone cameras and virtual reality cameras will enable more opportunities for framing and visual styling decisions that can better achieve the creative vision and capture audience attention
- RPA-powered remote camera controls will allowing job holders to simultaneously control multiple cameras and equipment from the same location
- Cloud computing and 5G networks will enable faster remote storage, transmission and retrieval of digital content from filming sites to studios, making the post-production process more efficient and allowing convenient access on the go

SKILLS ANALYSIS

CURRENT SKILLS GAP

- Camera Operations

ADDITIONAL FUTURE SKILLS

- Studio Automation Management
- Incident Response
- Workplace Safety and Health
- Production Operations
- Stakeholder Management

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Junior Grip/ Junior Lighting Technician/ Grip/ Lighting Technician/ Key Grip/ Gaffer

LOW

IN 3-5 YEARS

Job holders can use virtual reality to help in planning and testing of lighting scenarios, and robotic arms in positioning lighting equipment and controlling them remotely. However, they will still be needed to assess electrical and lighting requirements and conduct functionality and safety checks.

KEY TRENDS

- Robotics
- Immersive Technology

FUTURE TASK-LEVEL VIEW

- Virtual reality can help in the planning and testing of lighting scenarios and ambiances, hence reducing number of adjustments required at shoots
- Job holders remain key in assessing the electrical and lighting requirements, and conducting functionality checks pre-filming
- Robotic arms will assist to position lighting equipment and allow for remote and automated management of lighting controls from a centralized system, hence reducing the need for manual labor and improving coordination
- Job holders remain key in conducting safety inspections and verification to ensure adherence and compliance with regulations

SKILLS ANALYSIS

CURRENT SKILLS GAP

- Lighting Operations
- Rigging Operations

ADDITIONAL FUTURE SKILLS

- Studio Automation Management
- Production Operations
- Stakeholder Management

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Game Sound Designer/ Senior Game Sound Designer/ Boom Operator/ Sound Recordist/ Sound Editor/ Sound Engineer/ Supervising Sound Editor

MEDIUM

IN 3-5 YEARS

Job holders can leverage analytics and RPA systems to assign sound effects and store/retrieve sound assets, allowing job holders to focus on assessing overall sound requirements and ensuring quality of sounds.

KEY TRENDS

- AI & Analytics
- Robotics

FUTURE TASK-LEVEL VIEW

- AI will analyse previous tracks to perform mastering to ensure the sound experience is consistent across all formats, and also analyse source materials (i.e. guitars and vocals) to suggest mixing decisions to integrate these sounds, enabling job holders to make more complex and creative decisions
- Job holders will focus on assessing shoot location and studio configuration based on the overall sound requirements and planning for deviations
- RPA-enabled post-production systems can crawl through sound database and assign the most appropriate sound effects for each scene and analyse sound bites to perform the first-cut of sound editing
- Job holders will focus on ensuring quality of all sounds in context to the storyline of each scene, including streamlining atmospheric sound, reverb, background music to evoke certain emotions and volume of conversation to enhance the production

SKILLS ANALYSIS

CURRENT SKILLS GAP

- Audio Programming
- Sound Recording Operations

ADDITIONAL FUTURE SKILLS

- Artificial Intelligence Application
- Data Analytics
- Production Operations
- Stakeholder Management
- Studio Automation Management

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Post-production Assistant/ Video Editor/ Post-Production Supervisor

MEDIUM

IN 3-5 YEARS

Job holders will leverage AI to automate some non-creative tasks and use cloud software to allow concurrent editing across team members and locations, hence shortening the post-production process. Job holders will focus on ensuring post-production operations are on track and adding in creative elements.

KEY TRENDS

- AI & Analytics
- Cloud Computing

FUTURE TASK-LEVEL VIEW

- Job holders remain key in ensuring post-production operations are aligned to overall production schedules by tracking progress through the project management software
- Cloud software (eg. WeVideo, Adobe Creative Cloud) enhances collaboration by allowing concurrent edits across teams from multiple locations for the same post-production projects, hence streamlining post-production operations
- AI will learn past transcribing/translating/colour-correction and other post-production tasks to enable simultaneous translation into multiple languages and transcoding into different file formats, thereby shortening post-production time and extending the international reach of content
- Job holders remain key in reviewing and providing creative elements in the post-production process

SKILLS ANALYSIS

CURRENT SKILLS GAP

- Video Editing

ADDITIONAL FUTURE SKILLS

- Artificial Intelligence Application
- Data Analytics
- Global Perspective
- Process Improvement and Optimisation
- Studio Automation Management

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Assistant Producer Games/ Producer Games

MEDIUM

IN 3-5 YEARS

Job holders can leverage analytics to provide insights on gaming trends, and will expand their scope to include cloud gaming and VR platforms to boost game production and marketing.

KEY TRENDS

- AI & Analytics
- Cloud Computing
- Immersive Technology

FUTURE TASK-LEVEL VIEW

- Analytics algorithms can predict future gaming trends by analysing user data, and job holders can reference these insights to review and tailor game ideas and concepts in subsequent game productions
- With the rise of cloud gaming, job holders will expand their game concept and development scope to include games-as-a-service
- Virtual Reality (VR) platforms can be leveraged to assist in game launches/marketing endeavours
- Job holders will continue to use their in-depth understanding of gamers' psychology to improve game marketing and community outreach results

SKILLS ANALYSIS

CURRENT SKILLS GAP

- Customer Behaviour Analysis
- Collaboration
- Problem Solving

ADDITIONAL FUTURE SKILLS

- Business Acumen
- Strategy Planning
- Strategy Implementation
- Fundraising and Sponsorships
- Transdisciplinary Thinking
- Stakeholder Management

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Junior Designer/ Senior Level Designer/ Senior Game Designer

MEDIUM

IN 3-5 YEARS

Job holders will leverage AI & Analytics to execute preliminary basic game designs/testing, provide insights on popular game designs to aid game designers in design curation. Job holders focus on spotting loopholes in gameplay and designing.

KEY TRENDS

- AI & Analytics
- Immersive Technology

FUTURE TASK-LEVEL VIEW

- AI automates basic routine game design tasks (e.g. NPC creation, setting basic challenges)
- Job holders will focus on seeking potential improvements and spotting loopholes in gameplay that remain undetectable by technology
- Customer Behavioural Analytics routinely collects data on gameplay experience to tailor game designs to gamers' preferences
- AI will analyse past gaming user data and experience to suggest game application interfaces that users prefer using to ensure that UI/UX are well-customised to appeal to gamers
- Virtual Reality enhances visualization of game designs by job holders and allows them to use 3D models for aesthetic development and trials

SKILLS ANALYSIS

CURRENT SKILLS GAP

- Game Concept Design
- Gameplay Design
- User Experience Design

ADDITIONAL FUTURE SKILLS

- Customer Behaviour Analysis
- Creative Storytelling
- Critical Thinking
- Data Analytics
- Transdisciplinary Thinking

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Lead Game Designer/ Game Director

MEDIUM

IN 3-5 YEARS

Job holders can leverage AI & Analytics to provide insights on game vision and gameplay, and use cloud gaming platforms to accelerate the review of games via real-time gaming feedback. Job holders remain key in ideation of game design and styles, and in coaching their team to achieve desired outcomes.

KEY TRENDS

- AI & Analytics
- Cloud Computing
- Immersive Technology

FUTURE TASK-LEVEL VIEW

- Behavioural Analytics provide insights on game vision and gameplay by crawling through market reports and external research to assist job holders in making better informed decisions and drive game vision
- AI and 3D VR models will add an interactive element in gameplay which assists in elevating the quality of game designs curated by job holders
- Job holders will continue to use their technical experience to define design and technical requirements, solve complex issues and align expectations
- Cloud Computing enables real-time gaming feedback through cloud systems, thereby accelerating the review of games by job holders
- Job holders remain key in ideation of game design and styles, and will need to coach their team to achieve the desired outcomes

SKILLS ANALYSIS

CURRENT SKILLS GAP

- Decision Making
- Developing People
- Game Concept Design
- Game Technical Design
- Gameplay Design

ADDITIONAL FUTURE SKILLS

- Business Acumen
- Business Negotiation
- Creative Storytelling
- Data Analytics
- Market Research
- Transdisciplinary Thinking

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Technical Artist/ Lead Technical Artist

LOW

IN 3-5 YEARS

Job holders will leverage immersive technologies to improve the artistic pipeline. They will continue to curate trend-setting games from a technical/artistic angle and integrate new technologies in the artistic pipeline.

KEY TRENDS

Immersive Technology

FUTURE TASK-LEVEL VIEW

- Job holders can elevate the artistic pipeline by using augmented reality and virtual reality to animate game characters and perform rigging and artistic tasks for better visual/aesthetic experience for gamers
- Job holders remain key in using their technical and artistic expertise to finalise and curate workflows and tools for each production
- Job holders continue to use their experience in different aspects of art and programming to guide teams and resolve complex problems related to game and production pipeline
- Job holders continue to evaluate the right technologies and tools to be used, and apply these technologies to the production pipeline

SKILLS ANALYSIS

CURRENT SKILLS GAP

- Collaboration
- Game Technical Design

ADDITIONAL FUTURE SKILLS

- Creative Storytelling
- Critical Thinking
- Stakeholder Management

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Junior Programmer/ Senior Server Programmer/ Senior Game Programmer/ Senior Engine Programmer

MEDIUM

IN 3-5 YEARS

Job holders will leverage AI to automate basic game coding and stress-test game performance, and will also incorporate cloud gaming into the overall game engine and architecture.

KEY TRENDS

- AI & Analytics
- Cloud Computing

FUTURE TASK-LEVEL VIEW

- Job holders remain key in developing technical specifications on UI, gameplay features and design overall engine and architecture features, but will have to expand their scope to incorporate cloud gaming elements into these tasks
- AI algorithms will increase efficiencies by writing basic programming codes at a faster pace and allowing job holders to focus on reviewing these codes and performing more complex programming tasks
- Job holders will have to manage software security issues that emerge due to the move towards programming games for cloud platforms
- AI Bots will stress-test game performance and stability and help provide recommendations of preliminary solutions for software updates and game performance optimisation. Job holders will focus on further refining them to customise to game requirements.

SKILLS ANALYSIS

CURRENT SKILLS GAP

- Game Server Programming

ADDITIONAL FUTURE SKILLS

- Artificial Intelligence Application
- Quality Assurance

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Lead Game Programmer/ Game Technical Director

LOW

IN 3-5 YEARS

Job holders can leverage AI to generate basic game technical specifications based historical data and trends, allowing them to focus on directing overall game technical development and implementing suitable new gaming technologies and features to elevate the gameplay experience.

KEY TRENDS

AI & Analytics

FUTURE TASK-LEVEL VIEW

- AI will increase efficiencies in identifying technical requirements by generating basic rules and technical requirements of a game based on inputs from historical data, allowing job holders to focus on directing overall game technical development
- Job holders will remain key in driving project timelines and defining technical objectives and quality standards for deliverables
- Job holders can better focus on evaluating and implementing suitable new gaming technologies, oversee programming processes and maintenance, and adding new features/software updates post-game release

SKILLS ANALYSIS

CURRENT SKILLS GAP

- Game Technical Design

ADDITIONAL FUTURE SKILLS

- Creative Thinking
- Innovation Management
- Process Improvement And Optimisation
- Transdisciplinary Thinking

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Quality Assurance Tester/ Lead Quality Assurance Tester

HIGH

IN 3-5 YEARS

AI Testing Bots can take on game testing tasks and pick up errors while analytics algorithms can suggest appropriate testing required for game functions. Job holders will focus more on qualitative checks and evaluating complex game functions.

KEY TRENDS

AI & Analytics

FUTURE TASK-LEVEL VIEW

- Analytics algorithms will provide preliminary insights by analysing past user data from similar games to suggest appropriate testing required for each game function, helping job holders to shift their focus to evaluating complex game functions
- AI Bots will take on game testing tasks by providing analyzing game performance, design and functions, as well as pick up errors to discern if each game passes the overall testing criteria
- While AI is able to perform quantitative compliance checks, job holders are still required to perform qualitative checks and recommend improvements for existing processes based on their technical expertise in games

POSSIBLE JOBS TO MOVE INTO

Quality Assurance Tester

- Junior Designer (Easy)
- Assistant Producer – Games (Moderate)
- Junior Programmer (Moderate)

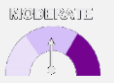
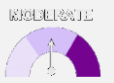
Lead Quality Assurance Tester

- Junior Designer (Easy)
- Producer – Games (Moderate)
- UX Designer (Moderate)

Click here to find out more on the programmes and support available to close skills gaps and gain future skills

Possible job roles to move into for:
Quality Assurance Tester

POSSIBLE MOBILITY OPPORTUNITIES

Junior Designer	Assistant Producer (Games)	Junior Programmer*
		

RATIONALE

Junior Designer	Assistant Producer (Games)	Junior Programmer*
▪ Job holders can use their experience in **gameplay design and concept** to transfer these skills into designing games. ▪ This move is also easier as a Quality Assurance Tester has tested the full game cycle and is aware of gameplay design requirements	▪ Job holders can use their knowledge of the **game development process and game quality standards** in this role as a game producer would need to be **familiar with the project cycle and understand customer behaviour and experience.**	▪ Job holders would have **basic programming language knowledge such as C++** to **test game codes**. They can transfer these skills to **write basic programming codes** as a Junior Programmer.

TOP SKILLS MATCH

Junior Designer	Assistant Producer (Games)	Junior Programmer*
▪ Game Concept Design ▪ Gameplay Design	▪ Nil	▪ Nil

TOP SKILLS GAP

Junior Designer	Assistant Producer (Games)	Junior Programmer*
▪ Lead Design ▪ Narrative Design	▪ Customer Experience Management ▪ Production Budget Management	▪ Game Artificial Intelligence Development ▪ Game Networking ▪ Game Porting ▪ Game Server Programming

 *Note that this role is a role that is not within the Skills Framework for Media

Click here to find out more on the programmes and support available to close skills gaps

Possible job roles to move into for:
Lead Quality Assurance Tester

POSSIBLE MOBILITY OPPORTUNITIES

Junior Designer	Producer (Games)	UX Designer*
		

RATIONALE

Junior Designer

- Job holders participate in the **game design and development stages and tests game designs**. They will have an understanding towards the **expectations of gameplay design and concept** to transfer these skills into designing games.

Producer (Games)

- Job holders can leverage their **knowledge of the game development process and game quality standards and** apply them in game production, which is also **less technical compared to game design and development roles.**
- This move would require the job holder to further develop competencies in **budgeting, negotiating licensing for game monetisation and game marketing**.

UX Designer*

- Job holders would develop an understanding of **customer experience and behaviour through game QA testing**, and this skills would be transferrable to a UX Designer who is required to **understand user preferences in terms of usability and functionality, as well as resolving any user experience issues** faced.
- This move may require the job holder to build more experiences in website and application development of user journeys, in which their existing UI/UX experience through games will be useful as a starting point to move into this field.

TOP SKILLS MATCH

Junior Designer

- Game Concept Design
- Gameplay Design

Producer (Games)

- Game Quality Assurance Testing
- Project Management

UX Designer*

- Project Management

TOP SKILLS GAP

Junior Designer

- Lead Design
- Narrative Design

Producer (Games)

- Customer Experience Management
- Production Budget Management
- Project Feasibility Assessment

UX Designer*

- Design Thinking Practice
- User Experience Design
- User Interface Design
- User Testing and Usability Testing

 *Note that this role is a role that is not within the Skills Framework for Media

Click here to find out more on the programmes and support available to close skills gaps

7 PLANNING FOR THE FUTURE

Support and resources to tap on

Planning for the future
Some examples of support, initiatives and resources to tap on

For organisations to keep up with the fast-changing ecosystem and technology advancements, organisations should look into adopting a proactive approach towards digitalisation, as there are tremendous benefits to gain from adopting technology and adapting to megatrends. Organisations should take stock of how they can adopt the relevant technology, redesign jobs, and upskill employees in common areas like AI, Automation and Agile methodology to leverage their benefits early. They can seek to do so by tapping on some of these resources below to help organisations kickstart their transformation journey.

Job Redesign Initiatives and Career Conversion Programmes for Employers

Job redesign entails altering the task requirements of a job role, including adding, modifying or removing tasks to include more value-adding components or increase productivity.

WSG – Job Redesign under Productivity Solutions Grant (PSG-JR):
Support for Job Redesign under Productivity Solutions Grant encourages enterprises to work with pre-approved Job Redesign (JR) consultants to redesign work processes, tasks and responsibilities. JR can support business transformation, help make jobs more productive and attractive for workers, and benefit enterprises by allowing them to hire and retain good workers to support the business

WSG - Career Conversion Programme (CCP):
The Career Conversion Programme (CCP) provides support for companies to reskill Singaporeans to take on jobs in growth areas or redesigned job roles

Reskilling Initiatives for Individuals

Reskilling seeks to enable practitioners to continue to stay abreast of the latest technology, meet the needs of the organisation and value-add their job tasks

IMDA – Critical Infocomm Technology Resource Programme PLUS (CITREP+):
The Critical Infocomm Technology Resource Programme Plus (CITREP+) is an initiative by IMDA to support ICT job roles to take up courses and certifications to keep in pace with technology shifts and proactive training of technical skills sets, in order to remain relevant and productive

SSG- MySkillsFuture Portal:
SkillsFuture is a one-stop online portal that enables Singaporeans to chart their own career and lifelong learning pathways, through access to industry information and tools to search for training programmes to broaden and deepen skill

WSG – MyCareersFuture.gov.sg:
A government portal to help Singaporeans with a fast and smart job search service to match them with relevant jobs based on their skills and competencies

Click on the respective programmes to find out more

8 APPENDICES

Industry Outreach
Stakeholders engaged

ORGANISATION
AISP
BANK OF SINGAPORE
BATTLEBREW PRODUCTIONS
BEACH HOUSE PICTURES PTE LTD
CITIBANK
CRIMSONLOGIC
DAYLIGHT STUDIOS PTE LTD
DBS BANK
ENVISION DIGITAL
FREMANTLE
GIC PTE LTD
GOVTECH
HBO (WARNERMEDIA)

ORGANISATION
HOODS INC
IBM
MCC INTERNATIONAL
Mediacorp
MM2
MONOCHROMATIC PICTURES
NANYANG POLYTECHNIC
NATIONAL UNIVERSITY OF SINGAPORE
OCBC
PSA
RED HARE STUDIOS
RICE MEDIA
SCS
SINGAPORE COMPUTING SOCIETY
SINGTEL

ORGANISATION
SPH
STARHUB LTD
TAIGER
TEMASEK POLYTECHNIC
THE MOVING VISUALS CO
THE SMART LOCAL
THIRD SIGHT
UBISOFT
UNITY TECHNOLOGIES
UOB BANK
VIDDSEE
WAWA PICTURES
XII BRAVES