TELECOMMUNICATIONS

CAREER PATHWAY MAPS

Tamkeen
تمكين

مهارات البحرين
Skills Bahrain

2021
2022

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Skills Bahrain created this Career Pathway Map based on consultations with organizations in the sector. It is the first draft of a sector map that will continuously evolve as the sector evolves. We welcome feedback on how we could improve this Career Pathway Map. See **www.tamkeen.bh** for more information.

INTRODUCTION

This publication compliments the Skills Bahrain Telecommunications Sector Skills report. It is also complimented by the Occupational Standards created for each job on the Career Pathway Map.

The Career Pathway Maps have been created to provide an overview of the jobs, skills and careers in the Telecommunications sector. This transparency will provide insight on the structure of jobs, the pathways between jobs in the sector and the emerging professions that will be needed to bring the sector into the future. Having established Career Pathways will equip individuals to make informed decisions about career choices and to be able to take responsibility for career planning and upgrading their skills. The following is how Skills Bahrain publications intend to support the following audiences:

Employees in the Sector

Those working in the sector can see their career pathway and understand the changing and emerging jobs in the sector

HR and Line Managers in the Sector

HR and Line Managers use the Occupational Standards and Skill descriptors for skills-based performance management and to support work-based learning and assessment

Training and Education Providers

Jobs and pathways are transparent to those leading learning in the sector. Learning is directly aligned to career growth and based on standards of achievement for specific skills

Students and Parents

Students in either high school or higher education can learn what the jobs in the sector are and how these jobs are declining or growing. They can make informed career choices

For more information on Skills Bahrain tools to compliment this publication, please see The Core Skills and Behavior Framework

THE PEOPLE MANAGER FUNCTION FOR EACH JOB FAMILY IN THE SECTOR

All Job Families have a number of jobs throughout the hierarchy for those managing people. Managers, Directors, and Executives are required to have people management and leadership skills in addition to the technical skills outlined in the Occupational Standard for each job.

For effective upskilling, reskilling and new skilling, people managers in the sector need strong skills in mentoring and supporting on the job learning.

Embedded within each job, those **managing people** are required the following skills:

▶ **Mentoring –** Leading and developing people by showing them how to do technical aspects of the job, but also mentoring appropriate workplace behavior

▶ **People Performance Manager –** Understanding the role of Leadership and Management in performance outputs in an organization. A key focus of this skill is in ensuring Managers know how to identify evidence of effective skill application in the workplace

▶ **Supporting Learning and Development -** Understanding principles of supporting learning in the workplace including the role of delegation to learning, the application of knowledge on the job, assessing and evidencing skills on the job.

> In the 2021 Skills Bahrain Employee Survey in the Telecommunications Sector - Employees stated their preferred method of training is 'on the job guidance and training such as mentoring' meaning employees prefer more job-related training (see the Skills Bahrain Sector Skills Report for more details)

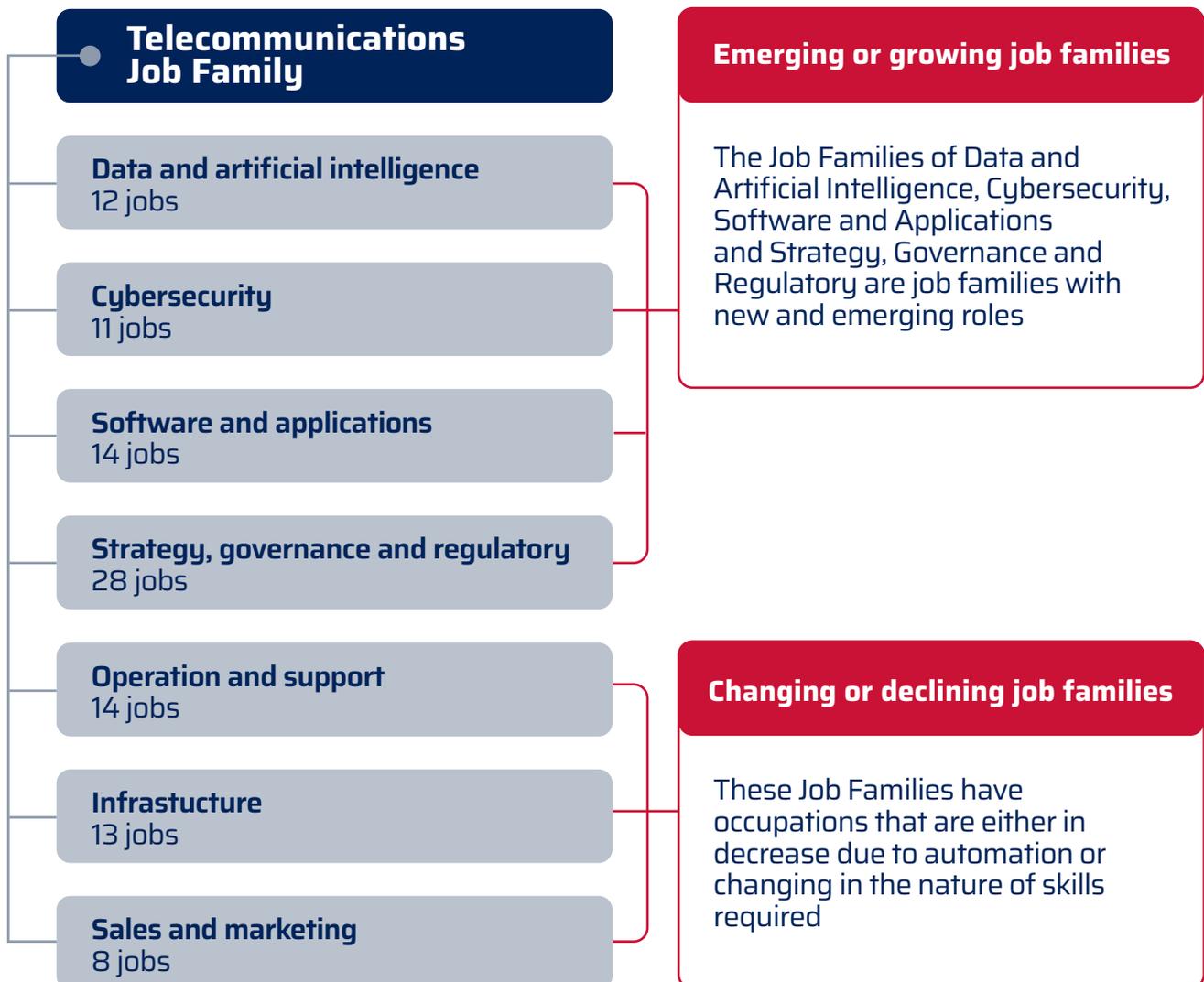## THE HUMAN RESOURCE FUNCTION TO SUPPORT EACH JOB FAMILY

The Human Resource (HR) teams in an organization are responsible for ensuring Performance Management is effectively implemented. For competency/skill-based performance, HR is responsible for supporting Line Managers in their role as mentors and *aligning talent strategy to business strategy*.

Therefore, an effective HR professional should have the following skills to support effective people management across the organization:

▶ **Principles of Learning in the Workplace –** Understanding how people learn at work and the formal and informal support required to ensure effective on the job learning

▶ **Designing work-based learning journeys –** Understanding how to utilise various learning tools, such as a Learning Management System (LMS), online courses, nano learning, face to face learning, to develop people in the workplace as a development journey, rather than a one-off training event

▶ **Using Occupational and Skill Standards for work-based performance development –** Understanding how occupational and skill standards can be used to develop soft skill, technical skill and work place behavior

▶ **Aligning Learning to Performance Management –** Supporting Line Managers and Employees with the evidencing and development of skills on the job and ensuring this is aligned, demonstrated, and measured as part of a formal Performance Management System

▶ **Skill-Based Recruitment –** Understanding the principles of recruiting for skills and skill-based development potential over qualifications

> According to the Skills Bahrain Telecommunications Sector Survey, 50% of organizations in the sector do not have qualified Learning and Development Professionals in their workplace.

THE CAREER PATHWAY MAP FOR TELECOMMUNICATIONS IN BAHRAIN

Telecommunications Job Family

Data and artificial intelligence
12 jobs

Cybersecurity
11 jobs

Software and applications
14 jobs

Strategy, governance and regulatory
28 jobs

Operation and support
14 jobs

Infrastucture
13 jobs

Sales and marketing
8 jobs

Emerging or growing job families

The Job Families of Data and Artificial Intelligence, Cybersecurity, Software and Applications and Strategy, Governance and Regulatory are job families with new and emerging roles

Changing or declining job families

These Job Families have occupations that are either in decrease due to automation or changing in the nature of skills required

THE CAREER PATHWAY MAP FOR TELECOMMUNICATIONS IN BAHRAIN

How to Read the Job Family Maps

The Telecommunications Sector Career Pathway Maps intend to represent the current and future jobs in the sector in Bahrain, not an organizational hierarchy. The map includes seven different job families, each with a variety of different job roles within it. The Telecommunications Sector Career Pathway Map has 100 jobs. This number will change as this map evolves as it will require ongoing consultation to ensure it remains current to the changing nature of the sector.

The jobs in the map are for the technical areas of business and do not represent the support function roles in the business.

As discussed previously, the business model of each business in the sector will determine how Data and Digital are dealt with by the business and whether they are a service function in a separate business unit, or if they are embedded within each of the current business units, or if those in each business unit upskill so the data and digital capacity sits within the jobs of the unit.

Occupational Standards

For each job on this Career Pathway Map, a Bahrain National Occupational Standard has been developed. This document outlines:

◗ A description of the job

◗ Key outputs/tasks of the job

◗ The core skills and behaviors required and at what level

◗ The technical skills required and at what level

◗ Career pathways into and out of the job

◗ Key education and training requirements

Skill and Behavior Descriptors

To compliment the required skills for each job, a competency proficiency description document outlines the knowledge and ability needed to perform this skill or demonstrate a behavior in the workplace.

See the *Skills Bahrain Core Skills and behaviors Framework* for more information.

A CHANGING SECTOR WITH CHANGING JOBS

Bahrain's Telecommunications market is small with saturated mobile subscription. Operators need to diversify their business models from telephony operators to service providers of technology. Digital service channels and the use of Artificial Intelligence (AI) powered service tools can offer more tailored products and services to customers by utilising data insights to map consumer behavior and focus on more individualisation of offerings.

Additionally, the roll out of 5G and Fibre across Bahrain provides 24/7 connectivity and paths the way to support a wide range of digital products and services from constant connectivity to the Metaverse to self-driving cars and various IoT smart devices. Beyond supporting infrastructure, the Telecommunications sector in Bahrain has the potential to offer a range of products and services that leverage their infrastructure.

In Bahrain, open banking and the progressive approach by the Central Bank of Bahrain (CBB) has enabled Telecommunications operators to utilise their subscriber base to provide mobile financial solutions, leading to some convergence with the Financial Services sector. This shift could fundamentally change the shape of the sector and the technical skills required to move the sector forward.
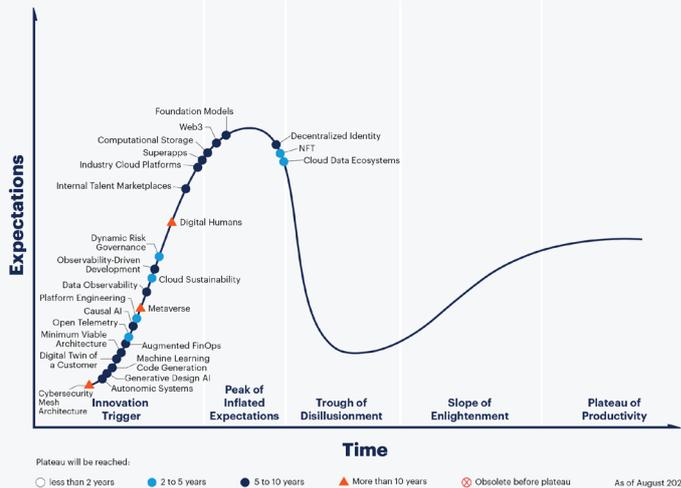
New business models and activities require skills beyond the traditional requirements for the sector. Skills are now required in areas like software and APP development, machine learning, artificial intelligence, cyber and network security, 5G, data science, and cloud computing. There is a need for rapid upskilling of the existing workforce, and graduates entering the sector should have these skills embedded within Higher Education programs. There is also the need for alternative pathways into the sector from High School that will allow skills to be developed job while also learning through a structure program such as a Apprenticeship.

The number and type of digital jobs created in the Bahrain Telecommunication sector depends on adoption and application of emerging technologies and the extend to which these are turned from hype into productivity tools. While there is increasing demand for specific technical skills to support emerging areas of the sector, the core skills to function effectively in the workplace are still fundamental to the ability to effectively utalise and apply technical skills. Research indicates that applying a technical skill without effective critical thinking and analysis does not allow the technical skill to be effectively utalised.

THE RISE IN INTEREST IN AGILE CONCEPTS

According to McKinsey & Co., the remote working patterns adopted during COVID-19 have paved the way for potential agile working practices to become the 'new normal'. Agile as a concept is broader than just flexible working patterns. One of the core principles of agile is empowered flat structured teams, tribes, or networks of people from within the organization work cross functionally, based on the skills they offer.

This sees organizations moving from rigid Job Description-driven organizations to skill-based agile teams for specific organizational outputs or goals. The pandemic prompted this kind of working arrangement as jobs were redefined due to branch closures, department shifts or automation of tasks. People were redeployed into different areas of the business.

EMERGING TECHNOLOGY AND CHANGE

Hype Cycle for Emerging Tech, 2022

Foundation Models
Web3
Computational Storage
Superapps
Industry Cloud Platforms
Internal Talent Marketplaces
Decentralized Identity
NFT
Cloud Data Ecosystems

Dynamic Risk Governance
Observability-Driven Development
Data Observability
Platform Engineering
Causal AI
Open Telemetry
Minimum Viable Architecture
Digital Twin of a Customer
Cybersecurity Mesh Architecture

Digital Humans
Cloud Sustainability
Metaverse
Augmented FinOps
Machine Learning Code Generation
Generative Design AI
Autonomic Systems

Expectations

Innovation Trigger | Peak of Inflated Expectations | Trough of Disillusionment | Slope of Enlightenment | Plateau of Productivity

Time

Plateau will be reached:
○ less than 2 years   ● 2 to 5 years   ● 5 to 10 years   ▲ More than 10 years   ⊗ Obsolete before plateau   As of August 2022

gartner.com

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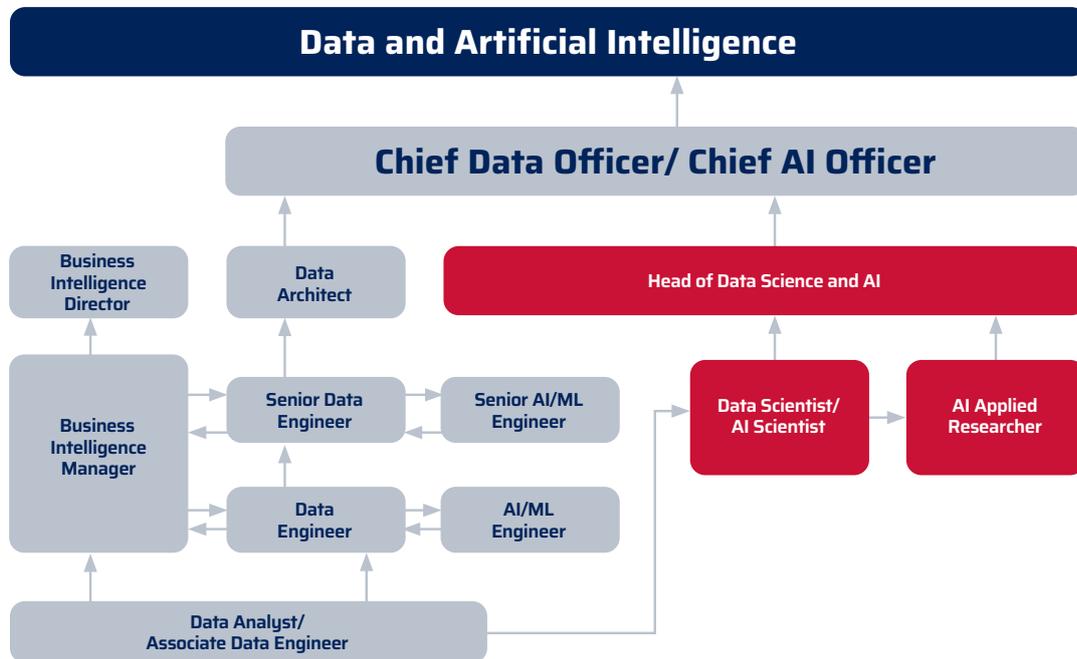# NEW BUSINESS MODELS AND TECH HYPE

Many businesses globally are watching the development and application of emerging technologies to gauge when to adopt and when to wait. With many technologies so new that their real business impact is difficult to assess, the Gartner Hype Cycle highlights the stages of adoption towards real business use of emerging technologies.

Gartner have positioned many emerging technologies as innovative trends that create expectations, but with limited real business use cases to assess the actual impact or potential. The timeframe from this part of the cycle to the 'plateau of productivity' phase where the technology is deemed as having demonstrated business impact varies from 2 years for some technologies (Cloud Data Ecosystems and NFT) and 5-10 years for many technologies (Machine

Learning or Decentralised ID). Some technologies are not likely to see the real business use for at least 10 years, such as the Metaverse and Digital Humans technologies.

Emerging technologies with real business impact, that are expected to rapidly experience mainstream adoption include technologies reducing the technical complexity of Data Science and Machine Learning. As technology make it easier to extract data for insights, products and decision making, the sourcing and use of data will become more widespread across business and not limited to specialist data units. This changes core skills in the sector to include higher levels of analysis from data and the application of those insights into business outcomes.

JOB FAMILY ONE:
DATA AND AI

Data and Artificial Intelligence

Chief Data Officer/ Chief AI Officer

- Business Intelligence Director
- Data Architect
- Head of Data Science and AI
- Business Intelligence Manager
- Senior Data Engineer
- Senior AI/ML Engineer
- Data Scientist/ AI Scientist
- AI Applied Researcher
- Data Engineer
- AI/ML Engineer
- Data Analyst/ Associate Data Engineer

Telecommunications is increasingly a digital domain. Voice calls are transmitted digitally, data services often outweigh voice service in importance and revenue, and each year more of the industry's infrastructure is digital and software driven. Furthermore, the Telecommunications sector is undergoing digital transformation throughout its value chain from marketing and sales to back-office operations. All of this is pushing an enormous demand for highly trained data professionals. This Job Family represents an area of growing importance for the sector where some of these roles will in the future be embedded within business units and not only as a service department.

Characteristics of the Job family
This job family has 12 different jobs that are highly technical roles that support a range of data demands for other functions. These job roles also play the role of creating a dedicated data function within Telecommunications companies. Given the exponential increase in data complexity, analysis and management of data is becoming a core skill for the sector. Senior Data Science roles would integrate all

data intelligence activities in a company merging business intelligence, projections, customer data insights, data for new product development and link it to the network analytics and cybersecurity. Data Engineers and Data Architects will specialize in defining the systems and structure for supporting data and Data Scientists will develop specialized areas such as Machine Learning and AI.

Skill Requirements
The core skills for this highly technical job family are Critical Thinking, Agility, Analyzing, Finding and Using Data and Innovation and Creativity. Apart from the sorting, management and analysis of data including the use of AI and Machine Learning for automating complex data operations, jobs in this job family are also tasked with thinking of new or alternative approaches to products, customers, tasks, projects, or situations. Transforming new ideas into reality by supporting them with robust data for implementation is another key requirement as planning and risk management for new initiatives can be made efficient and predictable using data driven decisions

JOB FAMILY ONE:
DATA AND AI

Future of Jobs in this Family

Jobs in this family are already at the cutting edge of technology. With further advancements in robotic process automation, Machine Learning and AI with see Data Scientists specialising further into Machine Learning and AI. Entry level roles would see more automated workflows and would push the workers to move to more complex decision making while the data analytics would become more streamlined, and rule-based.

During the Skills Bahrain research, Line managers have also highlighted the importance of developing those data analytical skills within the business units instead of having them limited to employees in the information technology team within the organization. They noted the significance of the collaboration between the business users and the IT since the business users are responsible for analyzing the data and suggesting solutions based on the business needs. The key implications of the future of the job family for Data and AI is summarized in the following figure. With significant amounts of the tasks in this job family being automated, job roles will focus on more elaborate analytical insights to tailor product

offerings. The highly skilled technical people working in this job family will serve other business units with data intelligence for greater insights and business opportunities.

Line Manager
– Bahrain Operator

"Telecommunication companies by virtue of their increasingly digital operations have access to large datasets and such data can be analyzed and presented in a way that would help make informed decisions. However, there is a lack of analytical skills and skills related to the presentation of data"
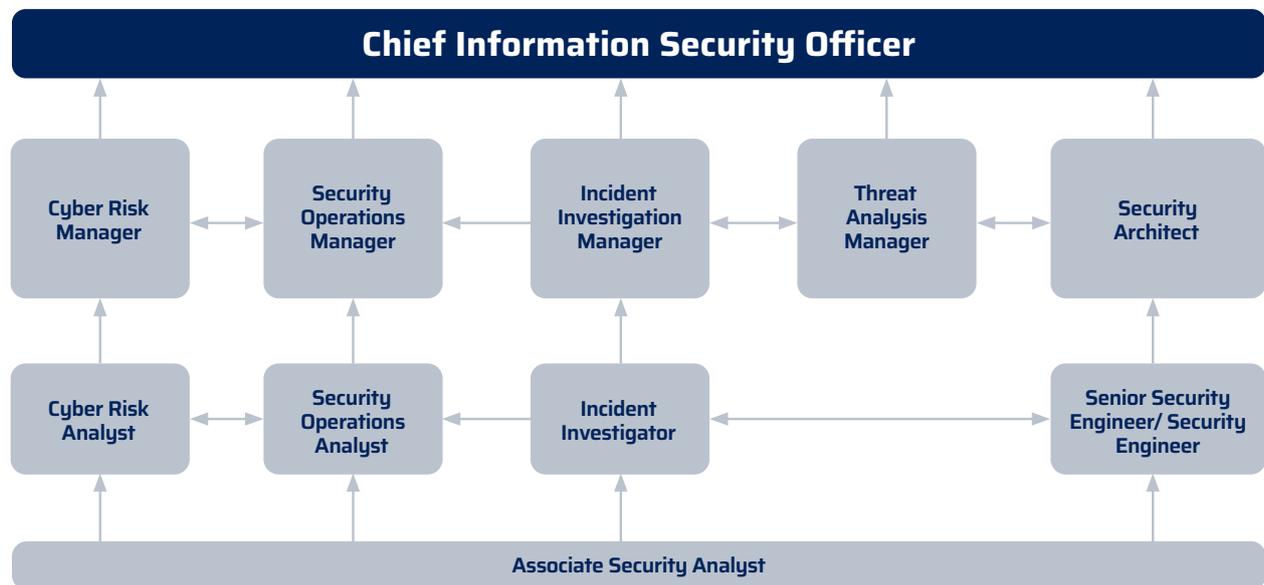
Spend less time on	Spend more time on
• Routine and manual tracking, sorting and monitoring of data.	❯ Developing data models for use of structures and unstructured business data.
• Collating and linking data for various business units to generate insights.	❯ Automating highly complex data analytics operations
	❯ Provide futuristic business intelligence for launching new products and strategies

JOB FAMILY TWO: CYBERSECURITY

Chief Information Security Officer				
Cyber Risk Manager	Security Operations Manager	Incident Investigation Manager	Threat Analysis Manager	Security Architect
Cyber Risk Analyst	Security Operations Analyst	Incident Investigator		Senior Security Engineer/ Security Engineer
Associate Security Analyst				

The Cybersecurity Job Family hosts some of Bahrain's most in demand job roles and an area of significant skills shortage. Bahrain is not alone with this challenge, there is a global shortage of Cybersecurity professionals. This has seen many alternative pathways into the profession as motivated individuals develop their own skills to transition from tradition ICT roles into specialist Cybersecurity roles.

Characteristics of the Job family
This job family has 11 different jobs that are primarily responsible for protecting company hardware, software, and networks from cybercriminals. From Risk Management, Vulnerability Assessment and Testing and Threat Analysis that support better planning and pre-empting any possible cyber-attacks to Operational and Investigation roles that help take action in case of a security breach. Roles often include and combine specialized technical/ IT skills. As the profession growth specialist job roles focusing on specific areas of Cybersecurity will emerge. Please see the Skills Bahrain National Occupational Standards for this Job Family to see more details about the specific job roles.

Skill Requirements
Telecommunications companies have often been forced to hire expats or rely on outsourced contractors to fill these specialized roles. The core skills for this Job Family tend to be the technical skills around the job roles. Critical Thinking is one of the core skills required to assess complex situations, conduct root cause analysis and to make decisions by applying a system thinking approach. Analyzing and Finding and Using Data are the other core skills required to make sense of complex data streams or make informed judgements in situations where data/information is very limited and/or inconsistent.

Future of Jobs in this Family
Many of the jobs on this Job Map are future jobs, with Cybersecurity generalists moving into specialist areas at different levels of expertise. The work of this Job Family can benefit significantly from data analytics and big data insights. Data can be mined to identify a significant number of different potential risk insights which can be used to prevent cyber-attacks in the first place. Artificial Intelligence

JOB FAMILY TWO: CYBERSECURITY

(AI) is increasingly becoming common in cybersecurity. By using sophisticated algorithms, AI systems are being trained to detect malware, run pattern recognition, and detect even the minutest behaviors of malware or ransomware attacks before it enters a Telecommunications network system.

AI allows for superior predictive intelligence with Natural Language Processing (NLP) which curates data on its own by scraping through articles, news, and studies on cyber threats. An AI-enabled response for Cybersecurity is necessary because cyber criminals are already leveraging AI technology to execute cyberattacks making them faster, more targeted, and tough to identify. Thus, there are likely to be overlaps between the Cybersecurity job family and Data and AI. Survey results point to a growing talent gap for Cybersecurity and AI. Line Managers are increasingly open to working with outsourced contractors in order to ensure that specialized skills are available.

Bahrain has seen increased awareness in the importance of professionals to support national Cybersecurity with the Higher Education and Training ecosystem responding with Professional Certificates, training courses and Degree programs in Cybersecurity. Despite these efforts, international research would indicate the quickest way to fill a Cybersecurity skills gap is with Apprenticeship programs where people learn on the job while attending a structured education program. These can be offered from Diploma to Degree level.

The key implications of the future of the Job Family for Cybersecurity are summarized in the following. With significant amounts of the tasks in this Job Family being automated especially with the use of AI.

Cybersecurity expert

"We do not need Cybersecurity experts who can write policy documents, we need experts who can protect our systems and act on data"

Spend less time on		Spend more time on
• Manual monitoring and threat detection, pattern recognition	>	AI driven risk assesments, real time monitoring and intrusion detection reports
• Reactive responses and security operations	>	Data driven insights foir fast and accurate threat analysis for predictive automated responses
• Reviewing data		
• Initiating complex modelling	>	Complex problem solving, design algorithms for data analysis and output

JOB FAMILY THREE:
SOFTWARE AND APPLICATIONS

Software and Applications

Chief Information Officer	Chief Technology Officer

Head of Software Engineering

Software Architect	Software Engineering Manager	Embedded Systems Engineering Manager	Lead UI Designer

Software Engineer	DevOps Engineer	Embedded Systems Engineer	UI Designer

Associate Software Engineer		Associate Embedded Systems Engineer	Associate UI Designer
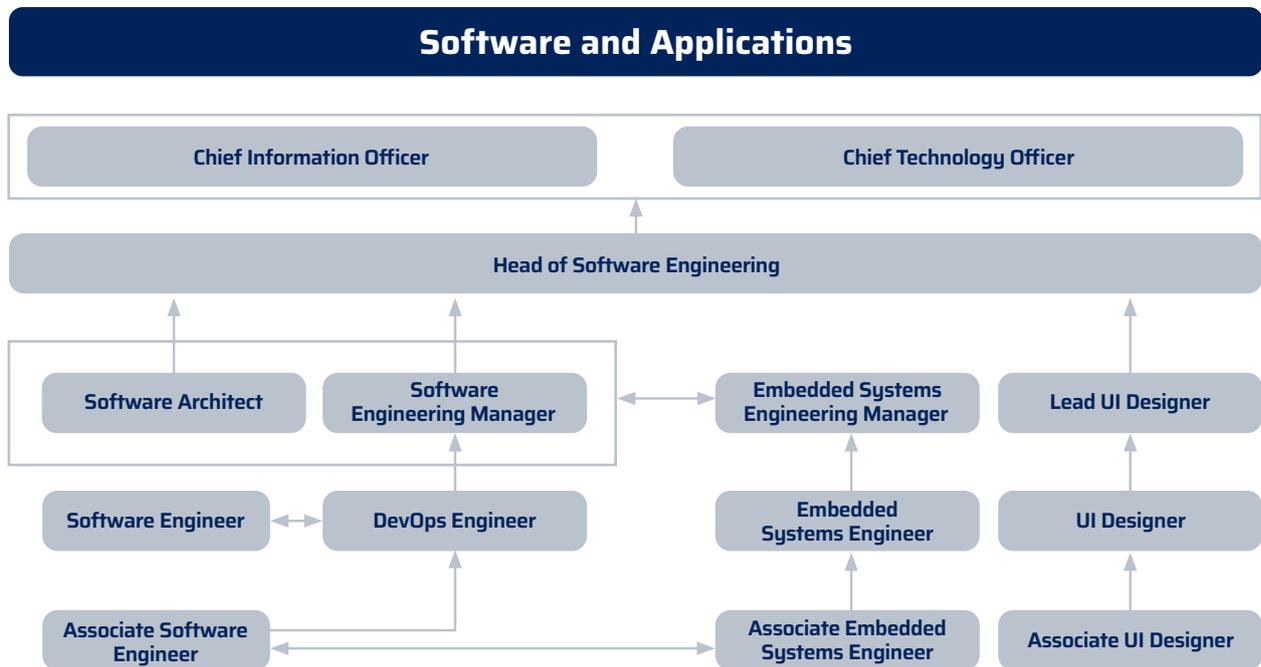
With the boundaries between Telecommunications and IT blurring rapidly and the increased use of software applications in every aspect of Telecom, internal as well as external facing, has led to the increased importance of this job family. Many Telecommunications companies have ramped up their 'Software and Applications' divisions to create not only consumer facing apps as well as develop tools for managing and monitoring internal processes and network functions. The digital transformation and virtualisation of Telecommunications networks has in turn created a huge demand of smart and autonomous network management and optimization tools that are critical for the work of network infrastructure engineers featured in the Infrastructure Job Family.

Characteristics of the Job family
This job family has 14 different jobs that are primarily responsible for development, testing and deployment of various software tools and solutions related to various aspects of the network operations. This also includes the development of applications and tools for the

Telecommunications users (both retail and enterprise). Telecommunications software development typically includes creation of custom Telecommunications software, including Operations Support Systems (OSS), Business Support Systems (BSS), Network Functions Virtualization (NFV), Software-Defined Networking (SDN), Web & Video Conferencing platforms, and network management applications for both on-site and cloud-based IT infrastructure among others.

Telecommunications network management software helps manage Telecommunications network functions for front-end and back-end, including network configuration & provisioning, network inventory management, order management, CRM, charging & billing systems etc.

Skill Requirements
Job roles in this family are highly technical and combine knowledge of advanced computer programming languages and network hardware. Key skills required include Critical Thinking, Innovation and Creativity and Analyzing for assessing complex requirements and creating

JOB FAMILY THREE:
SOFTWARE AND APPLICATIONS

software solutions. Finding and Using Data combined with Commercial Awareness are the other core skills that help create relevant tools for solving problems within the context of the business operations of the organization as well as their customers.

Future of Jobs in this Family
Jobs in this family are impacted by the changing technology landscape. 5G combined with Edge Computing is boosting network capacities to offer streaming data and analytics, Industrial IoT, AR, VR etc. Building on this, a range of digital services may be offered by Telecommunications companies for domains such as Digital Marketing, Ecommerce, Mobility, Industrial Robotics and Automation etc. Third party software integrations using APIs is another trend that is helping develop Telecommunications software solutions with the lowest possible costs and time. As already outlined earlier, use of AI and ML is becoming ubiquitous and pushing the need for new skills and competencies. There are likely to be some overlaps between this job family and ones on Infrastructure and Operations & Support as several job roles in these job families also rely on software development.

Software and Applications is a focal point within the Telecommunications industry. As mentioned, software integrations and solution development play a pivotal role in the launch of new services and solutions that are becoming the norm in the industry. This came out strongly in the focus groups from the line managers, HR managers and executives' perspectives.

The key implications of the future of the job family for Software and Applications is summarized in the following. With new technologies and standards such as 5G and Edge computing pushing new applications for various industries.

Line Manager

"The ability for us to seamlessly implement integrations and software updates is becoming the focus of our overarching IT infrastructure. Flexibility, Agility and Speed will determine our success."

Spend less time on	Spend more time on
• Labor and code intensive software and app development	• Low code apps with more focus on use experience and rich visualization
• Manual software testing and bug detection	• QA automation an AI-based bug removal
• Planning bandwidth and latency issues	• Harnessing the advantages offered by 5G and Edge in low latency and high bandwight environments

JOB FAMILY FOUR: STRATEGY, GOVERNANCE AND REGULATORY

The Strategy, Governance and Regulatory job family combines enterprise solutions, product development and management, quality assurance, data protection as well as regulatory and compliance jobs.

Characteristics of the Job family
This job family has 28 different jobs that are primarily responsible for integrating the business solutions and product development needs with data safety, regulatory and legal requirements. Job roles range from business solutions architect and product development managers to quality assurance engineers and IT auditors. Depending on the business model of institutions, some of these jobs may be outsourced to expert vendors or some may be embedded within the business units.

Skill Requirements
The key skills requirements for this job family are technical product development skills combined with a broad understanding of business processes and operations. Apart from Critical Reasoning, Analyzing and Finding and Using Data, skills for this job family also include

Commercial Awareness and Collaboration. The job holders of this job family need to understand the business well enough to ensure the data insights offered meet the business needs. Given the breadth of the job family, it is also important to apply agile tools to contribute to innovation and project implementation across the organization. Given the pace of technology change, combining regulatory and legal perspective with product development and data protection functions, can help flag potential roadblocks, market entry, and new investments in a more efficient manner.

Future of Jobs in this Family
Regulatory and legal compliance requirements are changing rapidly in the sector. This is due to two basic factors. First, Telecommunications is merging with other sectors such as finance, to offer products and services that are already governed by a set of regulations. Second, with a plethora of new products and apps, there is an exponential increase in the data traffic and the sector has to deal with open-source customer data which opens up a range of data protection issues.

JOB FAMILY FOUR: STRATEGY, GOVERNANCE AND REGULATORY

Finally, the new ESG reporting requirements require new areas of evaluation and reporting for the sector to ensure compliance and consideration for when compliance and reporting on ESG becomes mandatory.

The work of this job family can benefit significantly from data analytics and big data insights. Use of complex data models to simulate cost-benefit, market entry, competition analysis and scale up etc can help Telecommunications companies to create more effective business strategies. Use of Artificial Intelligence (AI) is increasingly becoming common in building such simulation models and to conduct smart audits.

The key implications of the future of the job family for Strategy and Governance is summarized in the following graphic. With the blurring of boundaries between Telecommunications and Finance, applications of big data analytics and the use of AI, job roles are being automated and will...
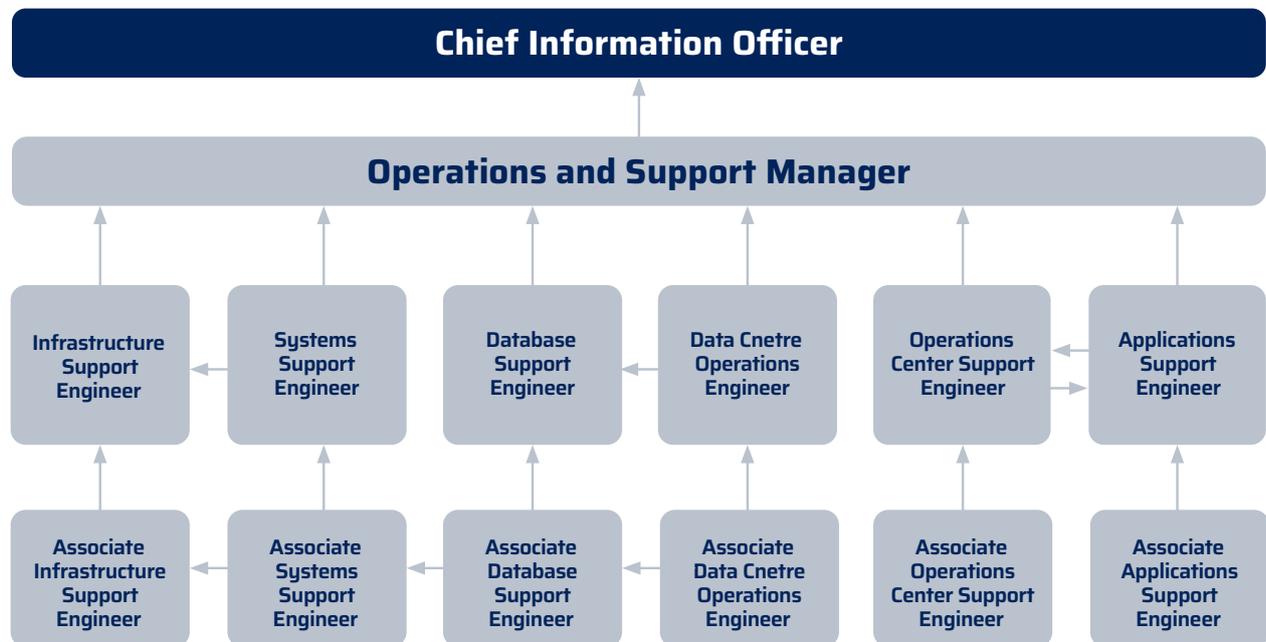
Spend less time on		Spend more time on
• Manual research and product planning	>	• Data driven product development with inputs from multiple business units
• Data review, risk assessment analysis	>	• Real time monitoring of data an AI driven risk assessment; pattern recognition, trend analysis and simulation models using big data algorithms
• Tracking and monitoring for product performance and quality assurance	>	• Automated QA and reporting of regulatory data

JOB FAMILY FIVE: OPERATIONS AND SUPPORT

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                        Chief Information Officer

                     Operations and Support Manager

Infrastructure    Systems      Database     Data Cnetre    Operations      Applications
Support           Support      Support      Operations     Center Support  Support
Engineer          Engineer     Engineer     Engineer       Engineer        Engineer

Associate         Associate    Associate    Associate      Associate       Associate
Infrastructure    Systems      Database     Data Cnetre    Operations      Applications
Support           Support      Support      Operations     Center Support  Support
Engineer          Engineer     Engineer     Engineer       Engineer        Engineer
```

Characteristics of the Job Family

This job family has 14 different jobs that are primarily responsible for providing back-office support for different functions typically part of Telecommunications sector company operations. The job roles contained in the job family help provide on-going support to various functions such as Network Infrastructure, Data Storage and Security, Customer Service and applications support etc. Digital transformation is combining various business, technology, and network functions in Telecommunications sector to allow for the integration of Robotic Process Automation (RPA), AI and other digital tools to enhance the streamlining of processes for greater efficiency.

Skills Requirements

One of the core skills required for this job family is Process Optimization. Having a process-oriented mindset of observing and analyzing processes is a pre-requisite which is then further enhanced by developing practical skills to re-engineer processes by applying business knowledge to quantify the impact of processes on the business. Eventually, the aim for job holders in the job family would be to move to a strategic, end to end understanding of various processes and be able to redesign processes with the aim to automate and create efficiency. Other important skills include Analyzing and Agility to ensure that flexible and impactful project management principles can be applied across various operations and support roles thereby minimizing bureaucracy and increasing efficiency. Better analysis of relevant data would help make evidence-based decisions for process improvement.

JOB FAMILY FIVE:
OPERATIONS AND SUPPORT

Future of Jobs in this Family

The work of this job family can benefit significantly from data analytics and big data insights along with robotic process automation. Since job roles in this family are heavily process oriented, tremendous savings on time and effort could be made by automating collection, verification and analysis of data thereby reducing repetitive, manual tasks.

Applications of AI is helping detect faults and bugs in code, reduce network downtime, prevent frauds, and even automate resolution of queries and provide support for application development. Data center operations can be optimised with AI to balance workloads and reduce energy consumption. Moreover, a big picture view and comparison of processes along with data insights and evidence can be critical in supporting the redesigning of processes. The key implications of the future of the job family for Operations and Support is summarized in the following. With significant amounts of the tasks in this job family being automated especially with the use of AI, RPA and big data analysis.
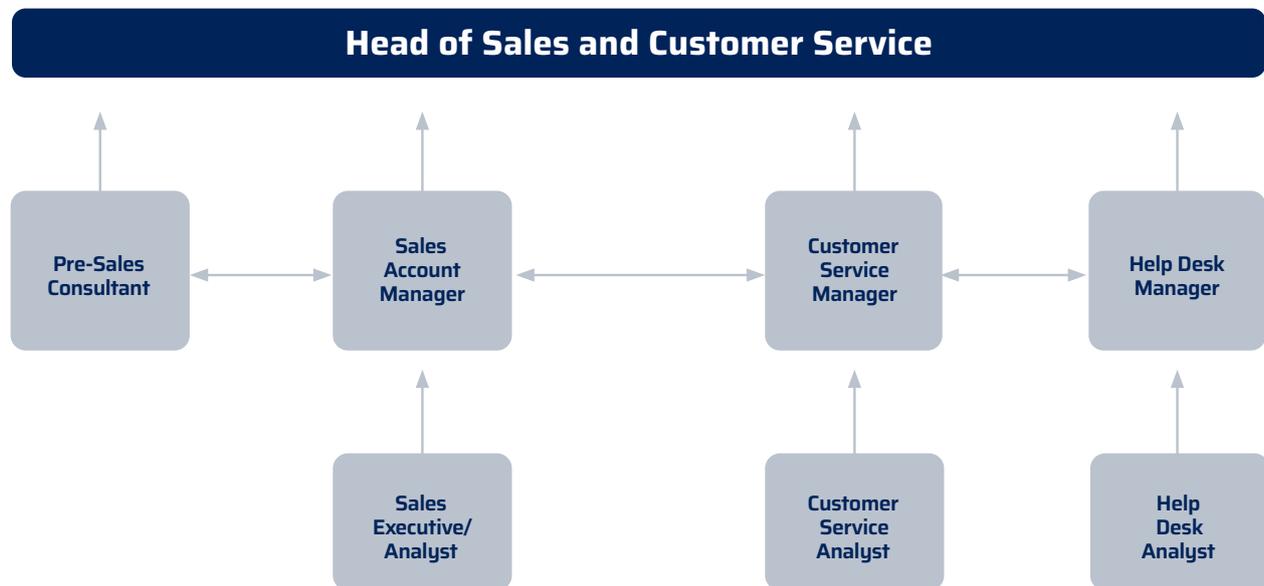
Spend less time on

- Manual processing and verification of documents
- Review and monitor data collection
- Reactive responses and security operations
- Configuring and overseeing network performance, data center operations
- Redesign process ased on data collection from various business units

Spend more time on

- AI driven recognition and verification of documents
- Design algorith for data analysis and ouput
- Predictive and automated response models
- Optimising models for AI driven smart network management
- Smart, algorithm-based data center management systems
- Process redesign models based on automated big data analysis

JOB FAMILY SIX: SALES & MARKETING

Head of Sales and Customer Service

Pre-Sales Consultant	Sales Account Manager	Customer Service Manager	Help Desk Manager
	Sales Executive/ Analyst	Customer Service Analyst	Help Desk Analyst

Characteristics of the Job Family

This job family has eight different jobs that span various sales and marketing roles based on the business model and type of customers. Customer success seems to be an important segment of jobs that have emerged in the sector; to show the focus Telecommunications companies are placing on customer experience, and on ensuring that their products and services eventually help customers to reach their desired outcomes. This requires a deeper engagement as it may include involvement in the purchase decision, implementation and use of products or services and customer support.

Skills Requirements

Many of the jobs in this Job Family require high levels of proficiency in skills and behaviors in interpersonal skills and dealing with people. Therefore, the Professional Occupational Standards for all these jobs include Emotional Intelligence as a key core skill. Additionally, Commercial Awareness is a core skill required to understand the Telecommunications products and services to cater for customer needs. Finding and Using Data is another important skill as it is not only important to understand how emerging technology is changing business and principles of the 4th industrial revolution, but also to support customers to make evidence-based decisions for their business goals. Sales personnel need to be adept at 'Data storytelling' and communicate solutions to complex business problems through simple visuals and data analysis.

JOB FAMILY SIX:
SALES & MARKETING

Future of Jobs in this Family

Entry level jobs in this job family may be susceptible to disruption with increasing levels of automation and use of AI with chatbots, smart assistants, AI-driven customer care etc. While the human element is essential, technology is supporting repetitive, and analysis driven tasks.

The concept of omnichannel, in which various distribution channels are truly integrated, is finally becoming a reality now that mobile and web are seamlessly connected, and automation and personalization are possible with advanced analytics. These factors present a chance to take customer engagement to a new level, and typically require cross functional teams to adopt agile working methods to ensure that data, decision making, design, and distribution are optimised.[1] Therefore, digital and data skills are going to play a fundamental role in transforming all jobs in the job family.

The key implications of the future of the Job Family for Sales and Marketing is summarized in the following. With significant amounts of the tasks in this Job Family being automated Job role will:

Line Manager

"Telecom sector needs to undergo a fundamental digital marketing and sales transformation...it's not an option anymore as companies must adopt digital marketing tools and approaches to understand and target the customer in new ways."

Spend less time on	Spend more time on
• Routine and maual tracking, sorting and monitoring of data	• Developing data models for use of structured and unstructured nusiness data
• Collecting and linking data for various business units ti generate insights	• Automating highly complex data analytics operations
	• Provide futuristic business intelligence

[1] https://www.mckinsey.com/industries/technology-media-and-Telecommunications/our-insights/a-new-path-for-telco-customer-engagement

JOB FAMILY SEVEN: INFRASTRUCTURE

Chief Information Officer

Chief Technology Officer

Head of Infrastructure

Infrastructure Architect

Infrastructure Engineering Manager

Infrastructure Engineer

SysOps Engineer

Associate Infrastructure Engineer

Radio Frequency Engineer

Network Engineer

Autonation & Orcgestration Engineer

Associate Radio Frequency Engineer

Associate Network Engineer

In order to provide seamless digital services and high quality, uninterrupted customer experience Telecommunications companies must continuously invest in management, upkeep and upgradation of the Telecommunications infrastructure.

Characteristics of the Job Family
This job family has 13 different jobs that are primarily responsible for overseeing the performance of Telecommunications networks including all physical and software assets that regulate, automate, and monitor various network functions.

Job roles span a wide spectrum including the strategic planning and design of Telecommunications infrastructure and/or network components and analyzing the short-term and long-term network capacity needs for current and future network requirements, as well as technology planning across multiple layers with the aim of introducing new technologies into the network for rolling out new services, better network efficiency etc. Other important tasks include, designing the network architecture and performing technical analysis of software, hardware, and network systems, analyzing the traffic flows and trends, route planning, network optimization, routing solutions and forecast of traffic. Some of the job roles may require interfacing with the product teams to understand market forecast/ trends, and with relevant teams and vendors to discuss solutions and cost estimates for capital expenditure optimization. Personnel working in this job family may also be responsible for equipment planning by working closely with commercial teams to launch and evaluate requests for proposals.

Skills Requirements
Core skills for this job family tend to be a combination of the technical and commercial skills that can support the long-term planning and scale up of the Telecommunications networks for the success of the business model adopted by the organization. Critical Thinking, Analyzing and Finding and Using Data are the key skills that help in making sense of complex problems, utilise data to make future projections and evaluate the impact of investment decisions made to improve network operations.

Moreover, the critical thinking and analysis skills need to be complemented with Commercial Awareness and Process Optimization. Commercial Awareness enables a deep understanding of the changing nature of the sector, new commercial models, and performance drivers and to ensure that strategic decisions especially those related to network infrastructure led to improved business performance. Process Optimization skills support end to end understanding of processes and the re-design of processes to automate and create efficiency.

JOB FAMILY SEVEN: INFRASTRUCTURE

Such a combination of skills is much in demand and difficult to source and therefore, Telecommunications companies typically hire expats to fill these specialized roles or rely on outsourced contractors.

Future of Jobs in this Family
Like other job families, digitalisation and increased use of data are the primary drivers of rapid change in this job family too. Jobs in this family are changing due to increased application of AI and machine learning, use of big data analytics and Internet of Things (IoT) and cloud computing.

AI and machine learning is enabling predictive maintenance in the Telecommunications sector by identifying patterns in historical data through algorithms and predicting possible hardware failures. Big Data is adding considerable value to the decision-making process by providing accurate and actionable insights for Telecommunications companies. For instance, companies can use network traffic data to better understand user behavior, which can ultimately help improve the delivery of media content and the overall customer experience. IoT has implications in improving infrastructure management in Telecommunications as it provides an intelligent platform for achieving increased efficiency. IoT also provides data for predictive, diagnostics, and prescriptive analytics services for Telecommunications companies. Thus, with this kind of digital transformation taking place there are likely to be important changes in the core skills requirements for the job family with technical skills complemented by commercial awareness and Process Optimization skills.

Infrastructure is the central core of the Telecommunications industry and drives new technologies that will have a profound impact on digital technologies. This was evident from the focus groups with managers outlining the impact new technologies will have on infrastructure and the industry as a whole.

As infrastructure technology changes rapidly, there is a tendency to outsource critical engineering roles to third parties and / or technology vendors. It is essential to ensure that the relevant skill sets are developed to minimise dependency. The relationship between infrastructure and other job families is also important to develop, to ensure demand is met and customer satisfaction, both internal and external, remains high.

The key implications of the future of the job family for Infrastructure are summarized in the following. With significant amounts of the tasks in this job family changing due to the application of digital technologies and data.

Line Manager

"Telecommunication infrastructure is changing rapidly, with the rollout of 5G enabling a host of new solutions from Machine 2 Machine and Artificial intelligence. We need to continue to develop and upgrade our infrastructure to cater to this demand."

Spend less time on	Spend more time on
• Network fault detection and management	• AI predictive fault detection and maintenance
• Reactive responses and operations	• Data informed proactive responses and operations
• Process creation	• Optimization and streamlining of automated processes
• Outsourced jobs	• Insourced jobs
• Network infrastructure	• Network traffic monitoring for customer insights
	• Cloud based infrastructure

ACKNOWLEDGEMENT

Skills Bahrain would like to extend acknowledgement to the following organizations who contributed to the development of the Career Maps. We are grateful for your input and continuous support as Skills Bahrain helps to develop a profile of the jobs in the sector.

- **Batelco**
- **Bnet**
- **Benefit**
- **STC**
- **Telecommunication Regulatory Authority**
- **Teleserv Telecom Services W.L.L.**
- **Zain**

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