SDAIA
الهيئة السعودية للبيانات والذكاء الاصطناعي
Saudi Data & AI Authority

National Occupational Standard Framework

for Data and Artificial Intelligence

بسم الله الرحمن الرحيم

1 INTRODUCTION

The Saudi Data & AI Authority (SDAIA) was established by Royal Order No. (A/471) issued on 1440/12/29 AH and The Saudi Data & AI Authority (SDAIA) is the competent authority in the Kingdom concerned with data and AI including big data. SDAIA is also the national reference in all matters related to the organization, development, and handling of data and AI; in addition, it has the original competence in all matters related to operation, research, and innovation in the field of data and AI.

The Kingdom of Saudi Arabia aims to become one of the global leaders in Data and AI. Supporting and developing national competencies is considered a key enabler for this direction. This focus is expressed through SDAIA's spearheading of many initiatives, programs and activities to develop human capital, build capabilities, provide support, enhance the sustainability of national competencies, and link them to future jobs to create a fertile landscape for national competencies capable of pushing Saudi Arabia to be one of the advanced countries in AI.

Given its national duty as an authority in data and AI, and its pursuit to regulate the sector, SDAIA issued the National Occupational Standard Framework for Data and Artificial Intelligence as a baseline reference for those interested in the sector, whether professionals or decision-makers in various organizations, in order to standardize and improve occupational practices and applications related to developing human capabilities.

2 An Overview of National Occupational Standards

National Occupational Standards are determinants of performance level that an individual must achieve when performing key job roles, including this performance's requirements of experience, knowledge and abilities that this particular individual needs to continue working at this occupational standard.

Figure 1: Basic elements of National Occupational Standards (National Occupational Standard (NOS))

The standards for each occupation define the key tasks of the job role, including tasks (key job activities), skills (competencies or acquired experiences), knowledge (academic backgrounds), and abilities (individual talents). The national frameworks provide a standard-setting instrument related to each occupation within the sector which serves as a reference guide for organizations and authorities in applications related to developing their human capabilities. These applications include several practices, such as recruiting and managing talents, developing job descriptions, workforce planning, professional guidance and development for individuals, performance evaluation, developing accredited professional licenses and certificates, and developing national occupational policies.

3 Methodology for Building the National Occupational Standard Framework for Data and Artificial Intelligence

The practices of building national standards for occupations are based on three key reference sources, foremost are subject matter experts (SMEs), followed by job postings, and reviewing the experiences of other authorities and countries that have previously built standards and occupational components.

There are several global methodologies for setting a framework for occupational standards, some of which focus solely on skills, while others are more comprehensive, as they are concerned with all the basic occupational components, from key tasks to skills, knowledge, and abilities, and this comprehensive methodology.

To build the National Occupational Standard Framework for Data and Artificial Intelligence, international best practices and methodologies were followed to develop a special methodology.

The following figure summarizes the most important stages of developing the national standard framework for such occupations.

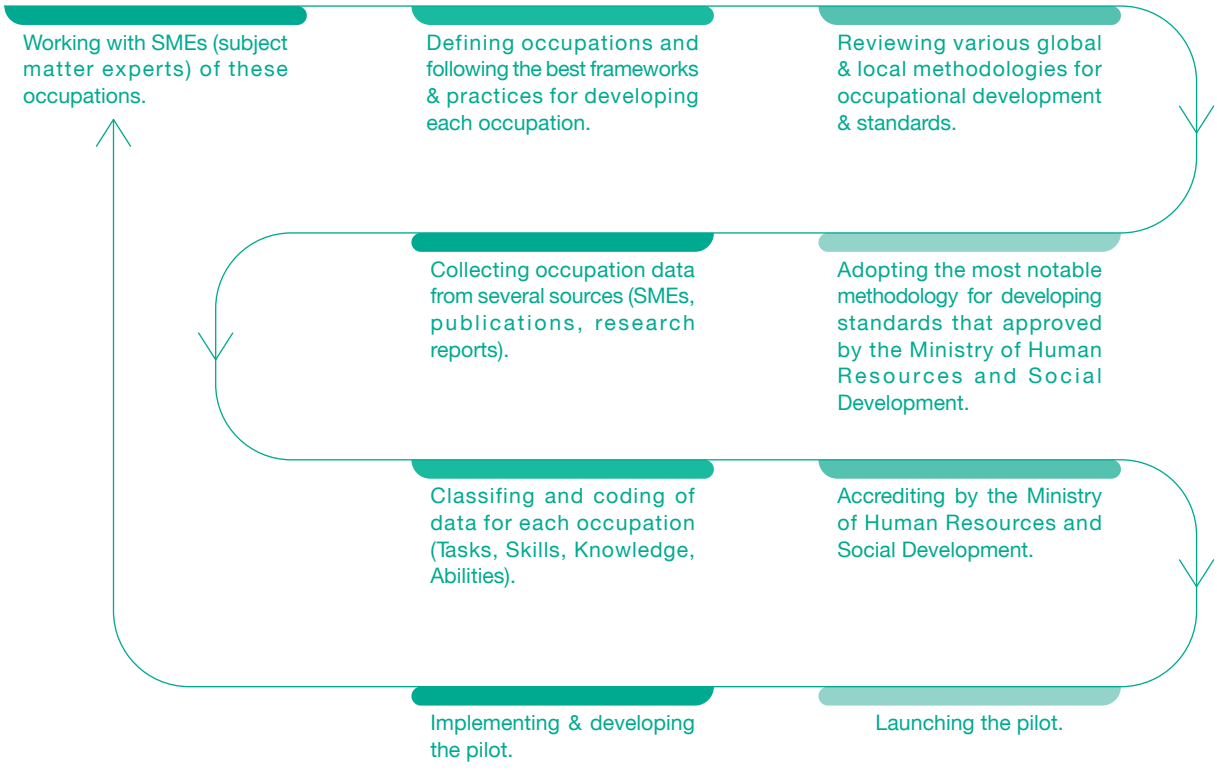


Figure 2: Stages of developing the National Occupational Standard Framework for Data and Artificial Intelligence

The framework methodology was determined to include the occupational components and to be consistent with the methodology followed by the Ministry of Human Resources and Social Development (as shown in Figure 3).

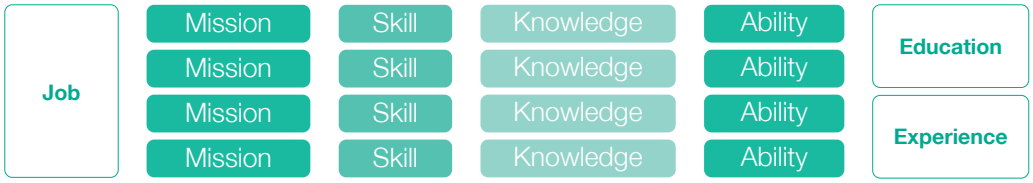


Figure 3: Comprehensive Methodology Used by the SDAIA Experts to Develop the National Occupational Standards

In addition to the experience of the Ministry of Human Resources and Social Development, other local practices concerned with developing occupations in various sectors were reviewed, such as:

- General Authority for Statistics.
- Saudi Commission for Health Specialties.
- Saudi Central Bank.
- National Cybersecurity Authority.
- Ministry of Communications and Information Technology.

The process of developing the occupational standards framework included reviewing international best practices, whether in the business sector, scholarly literature, or national experiences of other countries specifically related to developing occupations in data and artificial intelligence sectors.

In the business sector, the latest job postings for occupations in the data and artificial intelligence sectors, especially for major tech companies, were examined to benefit from them in developing occupational standards For example, but not limited to:

- Amazon
- IBM
- Workera
- EY
- Google
- LinkedIn
- Gartner

In scholarly literature, scholarly publications were reviewed and benefited from (such as books that summarized the experiences and models of some sector experts), and reports from research groups for emerging jobs (such as reports from the European Union for Data and AI, and competency frameworks for some data occupations at the WHO) Examples of such organizations:

- European Union
- World Health Organization
- Edison
- Taylor & Francis Organization
- O'Reilly Publications
- The Open Group
- Organization
- Arisa Organization
- Manning Publications

We benefited from the experiences of other countries that developed standards for some data and AI occupations, such as US, UK, Canada, Australia, and Singapore. In the UK experience, for example, the skills for data occupations published in its occupational standard framework known as the "Government Digital and Data Profession Capability Framework" have been used. Also, it was benefited from the Canada Job Bank in developing and setting the framework for some occupations in AI industry. Examples of those countries whose experiences were reviewed include:

- Canadian Jobs Bank
- US National Initiative for Cybersecurity
- Australian Government Jobs and Skills Australia
- US National Institute of Standards Techn
- Future Skills Initiative in Singapore
- UK Government Digital and Data Profession Capability Framework

Reviewing and studying all these experiences and practices contributed to the development of a national product that sets a framework for the occupational standards in data and AI sectors that the Saudi labor market needs.

The National Occupational Standard Framework for Data and Artificial Intelligence was developed to include five main classifications. These classifications were then branched into ten specialty areas, from which sixteen occupations emerged. A set of tasks for each occupation and a list of the skills, knowledge, and abilities necessary to perform each occupation were also developed. This resulted in sixteen cards for sixteen occupations that form the core of occupational standards for data and AI. This framework was developed by a group of SDAIA national experts specialized in the development of human capabilities.

The validation process took place in three stages to check, review and authenticate the content of the framework. The first stage was carried out by SDAIA SMEs in data and AI, and the second and third stages were carried out by national SMEs working in data and AI industry in the labor market within different sectors, such as: The digital, financial, health and education sectors, and their comments were reflected on the framework.

This release is a pilot for the purpose of testing the framework, receiving feedback from professional in the sector, and adding emerging occupations, and it will be updated regularly.

4 Classification of data and AI occupations

The process of classifying occupations can be defined as an inclusive and integral process aiming to frame data and AI occupations according to nature of work, task execution methods, and qualification requirements, which resulting in dividing and sorting the occupations in classifications from which specialty areas and occupations branch off respectively.

Data and AI occupations have been classified into five classifications, which include ten specialty areas for sixteen occupations. Each occupation is related to a set of key tasks, skills, knowledge, and abilities.

(Figure 4) shows the classifications, specialty areas, and occupations

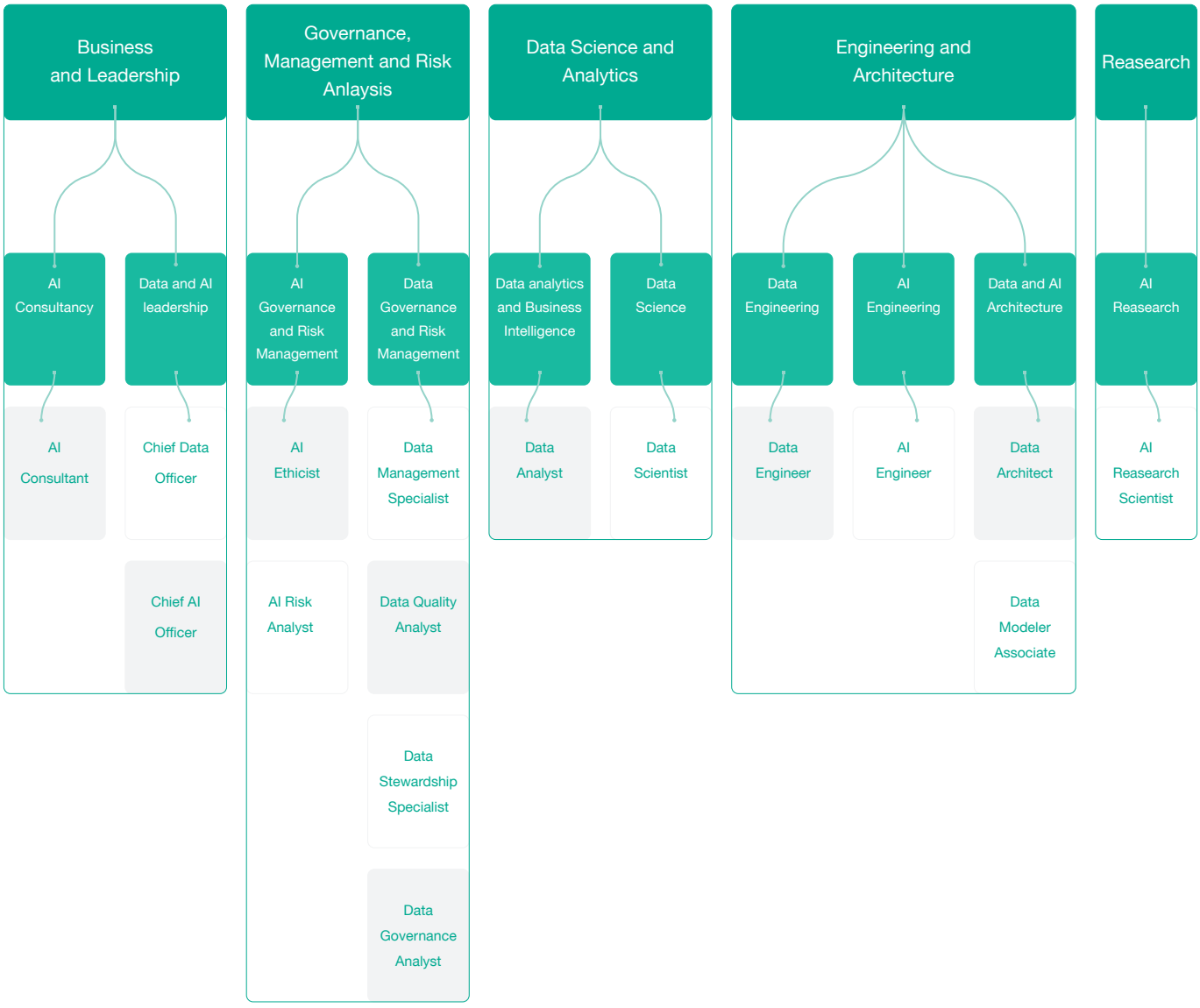


Table (1) shows the categorization in National Occupational Standard Framework for Data and Artificial Intelligence.

Table (1) the categorization in National Occupational Standard Framework for Data and Artificial Intelligence.

Category	Definition
Business and Leadership	Strategic leadership, business, organization directions and vision formulation to achieve the strategic objectives.
Governance Management & Risk Analytics	Governing, analyzing, and mitigating the effects to ensure the development of responsibilities and ethics of your use of data and AI technologies.
Date Science & Analytics	Collecting, organizing, and studying raw data and using the advanced analysis techniques to provide visions that help stakeholders to make decisions.
Engineering & Architecture	Designing, developing, executing, operating the AI solutions that the organization use.
Research	Researching, innovating, and developing to cope with the development in the AI fields.

Table (2) shows the specialty areas in the National Occupational Standard Framework for Data and Artificial Intelligence and the classifications they include.

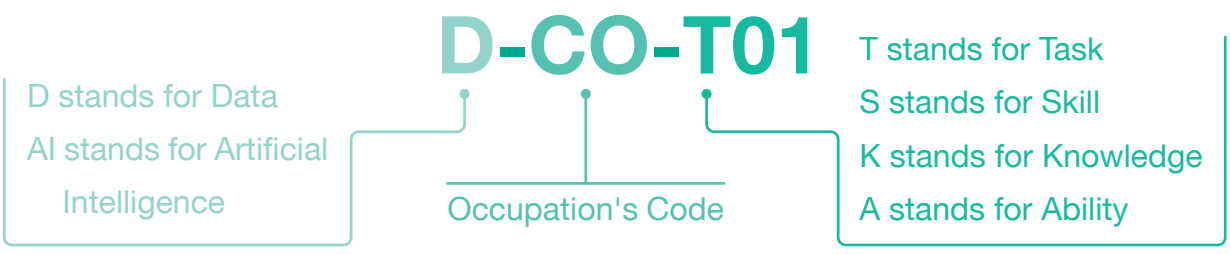
Table (2) specialty areas in the data and AI occupations.

Category	Specialty Area
Business and Leadership	Data & Artificial Intelligence (AI) Leadership
	Artificial Intelligence (AI) Consultancy
Governance Management & Risk Analytics	Artificial Intelligence (AI) Governance & Risk Management
	Data Governance & Management
Date Science & Analytics	Data Analytics & Business Intelligence
	Data Science
Engineering & Architecture	Data Engineering
	Artificial Intelligence (AI) Engineering
	Data & Artificial Intelligence (AI) Architect
Research	Artificial Intelligence (AI) Research

Table (3) illustrates the occupations of the National Occupational Standard Framework for Data and Artificial Intelligence and the specialty areas they include, since each occupation includes an identification symbol consisting of the initial letters of the occupation's name and the first letter of the field. The letter (D) stands for the data field, and the letters (AI) stands for the artificial intelligence field. For example, D-CO stands for Chief Data Office.

Ranking	SPECIALTY AREA	Occupation	Occupation Code
1	Data & Artificial Intelligence (AI) Leadership	CHIEF DATA OFFICER	D-CO
2		CHIEF AI OFFICER	AI-CO
3	Artificial Intelligence (AI) Consultancy	AI CONSULTANT	AI-C
4	Artificial Intelligence (AI) Governance & Risk Management	AI ETHICIST	AI-Eth
5		AI RISK ANALYST	AI-RA
6	Data Governance & Management	DATA MANAGEMENT SPECIALIST	D-MS
7		DATA QUALITY ANALYST	D-QA
8		DATA STEWARDSHIP SPECIALIST	D-SS
9		DATA GOVERNANCE ANALYST	D-GA
10	Data Analytics & Business Intelligence	DATA ANALYST	D-An
11	Data Science	DATA SCIENTIST	D-S
12	Data Engineering	DATA ENGINEER	D-En
13	Artificial Intelligence (AI) Engineering	AI ENGINEER	AI-En
14	Data & Artificial Intelligence (AI) Architect	DATA ARCHITECT	D-Ar
15		DATA MODELER ASSOCIATE	D-Ma
16	Artificial Intelligence (AI) Research	AI RESEARCH SCIENTIST	AI-R

Tasks, knowledge, skills, and abilities of each profession specifies the job card details, since tasks, knowledge, skills, and abilities represent the performance of each profession within the National Occupational Standard Framework for Data and Artificial Intelligence.



5 Job Card Details

5.1 Business and Leadership Category

Chief Data Officer

JOB CARD	WORK ROLE	Chief Data Officer
	OCCUPATION CODE	D-CO
	CATEGORY	Business and Leadership
	SPECIALTY AREA	Data and Artificial Intelligence (AI) Leadership

GENERAL JOB DESCRIPTION	Chief Data Officer (CDO) is a senior executive responsible for leading the organization's data strategy, governance, and operations to derive maximum value from its data assets. This job role is responsible for guiding the organization in becoming data-driven, leveraging data to improve decision-making, optimize operations, and achieve strategic objectives.

KEY TASKS	D-CO-T01 Develop an integrated data strategy aligned with the organization's business objectives.
	D-CO-T02 Align the organization's data strategy with its business strategy.
	D-CO-T03 Lead the functions of data engineering, analytics, reporting and data governance.
	D-CO-T04 Oversee the development and implementation of the Business Intelligence (BI) strategy within an organization and ensure BI systems meet organizational requirements.
	D-CO-T05 Work with stakeholders to develop data policies and associated documentation in alignment with the organization's data strategy.
	D-CO-T06 Ensure sound data ethics and principles are reflected in the organization's mission, vision and goals.
	D-CO-T07 Ensure that organizational data strategy is effectively addressed by data policies and related documents.
	D-CO-T08 Develop and maintain strategic plans.
	D-CO-T09 Create a strategic roadmap for the systematic deployment and integration of essential data capabilities.
	D-CO-T10 Oversee the design and construction of a robust data infrastructure.
	D-CO-T11 Set guidelines for appropriate structuring and enrichment of data.
	D-CO-T12 Design a governance roadmap that prioritizes data quality, data management standards, and security protocols.
	D-CO-T13 Create long-term data governance initiatives that serve to improve data quality across all systems over time.
	D-CO-T14 Provide guidance on best practices related to data, including BI, data governance and data analytic.
	D-CO-T15 Monitor and measure the effectiveness of data initiatives.
	D-CO-T16 Manage the regular review and maintenance of the organization's data policy and associated documentation.
	D-CO-T17 Build and manage a high-performing data team.
	D-CO-T18 Promote awareness of data policy and strategy as appropriate among the organization's management.
	D-CO-T19 Collaborate with stakeholders in the organization and with third parties when identifying future data strategy requirements and BI solutions.
	D-CO-T20 Determine key messages to communicate from analyses and oversee the creation of a narrative for storytelling.
	D-CO-T21 Effectively communicate financial aspects of data related activities to senior management.
	D-CO-T22 Acquire and manage the necessary resources, including leadership support, financial resources, and key data personnel, to support data governance goals and objectives and reduce overall organizational risk.
	D-CO-T23 Lead and oversee data budget, staffing, and contracting.
	D-CO-T24 Identify, recruit and manage appropriately skilled resources and high-performing data team.
	D-CO-T25 Supervise and effectively assign work to staff working on data related tasks.
	D-CO-T26 Work with others on policies, processes and procedures relating to data and privacy.
	D-CO-T27 Establish guidelines and criteria to direct historical data analytics, architecture, and technology.
	D-CO-T28 Advise on processes and procedures for gathering of operational data to examine past business performance
	D-CO-T29 Attend and present at international data events.
	D-CO-T30 Develop engagement and training programs to enhance the use of data-based technology within the organization.

KEY TASKS

- D-CO-T31 Stay current with best industry practices and new developments in data, research, competitive business intelligence, process improvement and business analytics.
- D-CO-T32 Stay current on emerging data trends and technologies.
- D-CO-T33 Develop use cases for utilizing data to solve organization's problems.
- D-CO-T34 Build and operate data warehouses and/or data lakes in the organization.
- D-CO-T35 Implement data governance regulations and policies and ensure organization's compliance.

Skills

- D-CO-S01 Skill in creating policies that reflect data objectives.
- D-CO-S02 Skill in designing and building data pipelines.
- D-CO-S03 Skill in building Business Intelligence (BI), data capabilities and skill sets across the organization.
- D-CO-S04 Skill in determining the normal operational state for data activities and how that state is affected by change.
- D-CO-S05 Skill to anticipate new data risks & identifying them in a timely manner.
- D-CO-S06 Skill in communicating with all levels of management including Board members (e.g., interpersonal skills, approachability, effective listening skills, appropriate use of style and language for the audience).
- D-CO-S07 Skill to use critical thinking to analyze organizational patterns and relationships.
- D-CO-S08 Skill in developing policies which reflect the organization's business and data strategic objectives.
- D-CO-S09 Skill in continually identifying new technologies & their potential impact on data requirements.
- D-CO-S10 Skill in mapping business problems to appropriate data technologies.
- D-CO-S11 Skill in deriving maximum value from the data available to the organization.

KNOWLEDGE

- D-CO-K01 Knowledge of data concepts, protocols, and methodologies.
- D-CO-K02 Knowledge of data warehousing concepts, data modeling techniques, & data warehouse platforms.
- D-CO-K03 Knowledge of data lake architectures, data ingestion and processing pipelines, and data lake management tools.
- D-CO-K04 Knowledge of data integration tools and techniques for extracting, transforming, and loading (ETL) data from various sources.
- D-CO-K05 Knowledge of data quality dimensions, data quality monitoring tools, and data cleansing techniques.
- D-CO-K06 Knowledge of data governance principles, frameworks, and tools for managing data access, security, and privacy.
- D-CO-K07 Knowledge of data analysis and visualization tools.
- D-CO-K08 Knowledge of statistical methods and techniques for data analysis.
- D-CO-K09 Knowledge of machine learning algorithms and techniques for predictive modeling and data classification.
- D-CO-K10 Knowledge of big data concepts and tools for analyzing large and complex datasets.
- D-CO-K11 Knowledge of data security best practices and tools for protecting data assets.
- D-CO-K12 Knowledge of data privacy principles, data security and privacy risks associated with data collection, storage, and use.
- D-CO-K13 Knowledge of the national data regulations & requirements relevant to the organization.
- D-CO-K14 Knowledge of relevant data regulations.
- D-CO-K15 Knowledge of best practices for data management, governance, stewardship and quality.
- D-CO-K16 Knowledge of emerging data-related issues and risks.
- D-CO-K17 Knowledge of data-related competitions as a way of developing skills by providing hands-on experience in simulated real-world situations.
- D-CO-K18 Knowledge of the industry landscape, competitive environment, and market trends.

ABILITIES

D-CO-A01 Ability to create clear, concise, and visually appealing data visualizations.	D-CO-A11 Ability to prioritize and allocate data resources correctly and efficiently.
D-CO-A02 Ability to influence & persuade stakeholders.	D-CO-A12 Ability to relate strategy, business, & technology in the context of organizational dynamics.
D-CO-A03 Ability to think strategically & translate data into actionable insights.	D-CO-A13 Ability to recognize organizational challenges from a business, management & technological perspective.
D-CO-A04 Ability to work in a fast-paced and dynamic environment.	D-CO-A14 Ability to understand technology, management, and leadership issues related to organization processes & problem solving.
D-CO-A05 Ability to develop strategy, policy and related documentation to support business strategy and maintain compliance with legislative, regulatory and contractual obligations.	D-CO-A15 Ability to understand the basic concepts and issues related to data and its organizational impact.
D-CO-A06 Ability to apply critical reading/thinking.	D-CO-A16 Ability to ensure data management processes are integrated with strategic and operational planning processes.
D-CO-A07 Ability to exercise judgment when policies are not well-defined.	D-CO-A17 Ability to engage with the organization's leadership to ensure data principles are applied in their areas of responsibility.
D-CO-A08 Ability to demonstrate critical comprehension of documentation.	
D-CO-A09 Ability to communicate technical & planning information at the same level as a stakeholder's understanding.	
D-CO-A10 Ability to interpret & apply laws, regulations, policies, & guidance relevant to organization data objectives.	

EDUCATION

- A bachelor's degree in computer science, computer systems engineering or a related discipline or completion of a college program in computer science is usually required.
- A master's or doctoral degree in data science, business management or a related field is usually preferred.

EXPERIENCE

- Experience in data related technology, knowledge management, risk management, research is usually preferred.
- Experience in a management or leadership role is usually required

Chief Artificial Intelligence (AI) Officer

JOB CARD

WORK ROLE	Chief Artificial Intelligence (AI) Officer
OCCUPATION CODE	AI-CO
CATEGORY	Business and Leadership
SPECIALTY AREA	Data and Artificial Intelligence (AI) Leadership

GENERAL JOB DESCRIPTION

The Chief Artificial Intelligence Officer (CAIO) is a C-suite executive responsible for leading the organization's artificial intelligence (AI) strategy, governance, and operations to unlock the transformative potential of AI across all aspects of the business. This work role guides the organization in becoming AI-driven, leveraging AI to automate tasks, optimize processes, enhance decision-making, and achieve strategic objectives.

KEY TASKS

AI-CO-T01	Acquire & manage the necessary resources, including leadership support, financial resources, and key artificial intelligence personnel, to support artificial intelligence goals and objectives and reduce overall organizational risk.
AI-CO-T02	Effectively communicate financial aspects of artificial intelligence related activities to senior management.
AI-CO-T03	Lead and oversee artificial intelligence budget, staffing, and contracting.
AI-CO-T04	Supervise and effectively assign work to staff working on artificial intelligence related tasks.
AI-CO-T05	Allocate resources to artificial intelligence roles.
AI-CO-T06	Develop and maintain strategic plans.
AI-CO-T07	Ensure that artificial intelligence requirements are aligned with the organization's artificial intelligence strategy.
AI-CO-T08	Develop and maintain an artificial intelligence strategy that aligns to the organization's business strategy.
AI-CO-T09	Obtain relevant resource to implement and maintain artificial intelligence solutions.
AI-CO-T10	Promote awareness of artificial intelligence policy and strategy as appropriate among the organization's management.
AI-CO-T11	Work with stakeholders to develop artificial intelligence policies and associated documentation in alignment with the organization's artificial intelligence strategy.
AI-CO-T12	Align the organization's artificial intelligence strategy with its business strategy.
AI-CO-T13	Work with others on policies, processes and procedures relating to artificial intelligence and privacy.
AI-CO-T14	Ensure sound artificial intelligence principles are reflected in the organization's mission, vision and goals.
AI-CO-T15	Work with others to implement and maintain an artificial intelligence risk management program.
AI-CO-T16	Perform an artificial intelligence risk assessment.
AI-CO-T17	Obtain resources to develop and implement effective processes to meet strategic artificial intelligence goals.
AI-CO-T18	Promote and demonstrate the value of artificial intelligence to stakeholders within an organization.
AI-CO-T19	Communicate effectively with third parties in the event of an artificial intelligence incident.
AI-CO-T20	Review the effectiveness of the organization's artificial intelligence controls against its strategic goals.
AI-CO-T21	Manage the regular review and maintenance of the organization's artificial intelligence policy and associated documentation.
AI-CO-T22	Ensure that appropriate actions are taken to mitigate the risk in the event of an artificial intelligence incident.
AI-CO-T23	Advocate artificial intelligence related topics with senior management, to ensure the organization's strategic goals include artificial intelligence.
AI-CO-T24	Ensure that organizational artificial intelligence strategy is effectively addressed by artificial intelligence policies and related documents.
AI-CO-T25	Ensure artificial intelligence requirements of all information technology systems are determined.
AI-CO-T26	Collaborate with stakeholders in the organization and with third parties when identifying future artificial intelligence strategy requirements.
AI-CO-T27	Identify and recruit appropriately skilled resources to address artificial intelligence activities within the organization.
AI-CO-T28	Attend and present at international artificial intelligence events.
AI-CO-T29	Develop engagement, rollout and training programs to enhance the use of AI-based technology within the organization.
AI-CO-T30	Stay current with best industry practices and new developments in artificial intelligence, research, competitive intelligence, process improvement and business analytics.

Skills		
	AI-CO-S01 Skill in creating policies that reflect artificial intelligence objectives.	AI-CO-S09 Skill in overseeing the artificial intelligence budget, resources, and infrastructure.
	AI-CO-S02 Skill in determining the normal operational state for artificial intelligence systems and how that state is affected by change.	AI-CO-S10 Skill in evaluating the artificial intelligence best practices & adopting the most suitable ones.
	AI-CO-S03 Skill to anticipate new artificial intelligence risks and identifying them in a timely manner.	AI-CO-S11 Skill in tackling the most challenging and critical artificial intelligence problems faced by the organization.
	AI-CO-S04 Skill in communicating with all levels of management including Board members (e.g., interpersonal skills, approachability, effective listening skills, appropriate use of style and language for the audience).	AI-CO-S12 Skill in overseeing all artificial intelligence projects and initiatives, ensuring they align with business objectives.
	AI-CO-S05 Skill to use critical thinking to analyze organizational patterns and relationships.	AI-CO-S13 Skill in building and maintaining relationships with external artificial intelligence organizations, partners, and communities.
	AI-CO-S06 Skill in evaluating the viability and legitimacy of suppliers and products.	AI-CO-S14 Skill in managing and reviewing the output of other AI teams.
	AI-CO-S07 Skill in developing policies which reflect the organization's business & artificial intelligence strategic objectives.	AI-CO-S15 Skill in leading a team of AI scientists and engineers.
	AI-CO-S08 Skill in continually identifying new technologies & their potential impact on artificial intelligence requirements.	AI-CO-S16 Skill in fostering a culture of innovation and excellence.
		AI-CO-S17 Skill in developing AI use cases to solve organization's problems.

KNOWLEDGE		
	AI-CO-K01 Knowledge of artificial intelligence concepts and methodologies.	AI-CO-K09 Knowledge of the likely operational impact on an organization of artificial intelligence risks.
	AI-CO-K02 Knowledge of artificial intelligence system design tools, methods and techniques.	AI-CO-K10 Knowledge of vulnerabilities in artificial intelligence applications & their likely impact.
	AI-CO-K03 Knowledge of the national artificial intelligence regulations and requirements relevant to the organization.	AI-CO-K11 Knowledge of public sources detailing common risks of artificial intelligence systems and mitigations.
	AI-CO-K04 Knowledge of national and organizational document and information classification and marking standards, policies and procedures.	AI-CO-K12 Knowledge of artificial intelligence and privacy principles.
	AI-CO-K05 Knowledge and understanding of risk assessment, mitigation and management methods.	AI-CO-K13 Knowledge of specific operational impacts of artificial intelligence lapses.
	AI-CO-K06 Knowledge of best practices for artificial intelligence risk management.	AI-CO-K14 Knowledge of emerging artificial intelligence issues and risks.
	AI-CO-K07 Knowledge of artificial intelligence aspects of business continuity and disaster recovery planning.	AI-CO-K15 Knowledge of artificial intelligence competitions as a way of developing skills by providing hands-on experience in simulated real-world situations.
	AI-CO-K08 Knowledge of relevant artificial intelligence aspects of legislative and regulatory requirements, relating to ethics and privacy.	

ABILITIES

AI-CO-A01	Ability to develop strategy, policy and related documentation to support business strategy and maintain compliance with legislative, regulatory and contractual obligations.
AI-CO-A02	Ability to apply critical reading/thinking.
AI-CO-A03	Ability to exercise judgment when policies are not well-defined.
AI-CO-A04	Ability to demonstrate critical comprehension of documentation.
AI-CO-A05	Ability to communicate technical & planning information at the same level as a stakeholder's understanding.
AI-CO-A06	Ability to interpret & apply laws, regulations, policies, & guidance relevant to organization artificial intelligence objectives.
AI-CO-A07	Ability to prioritize and allocate artificial intelligence resources correctly & efficiently.
AI-CO-A08	Ability to relate strategy, business, and technology in the context of organizational dynamics.
AI-CO-A09	Ability to recognize organizational challenges from a business, management & technological perspective.
AI-CO-A10	Ability to understand the basic concepts and issues related to artificial intelligence and its organizational impact.
AI-CO-A11	Ability to ensure artificial intelligence management processes are integrated with strategic & operational planning processes.
AI-CO-A12	Ability to engage with the organization's leadership to ensure artificial intelligence principles are applied in their areas of responsibility.

EDUCATION

- A bachelor's degree in computer science, computer systems engineering or a related discipline or completion of a college program in computer science is usually required.
- A master's or doctoral degree in artificial intelligence, machine learning, data science, business management or a related field is usually preferred.

EXPERIENCE

- Experience in a management or leadership role is usually required.

Artificial Intelligence (AI) Consultant

JOB CARD	
WORK ROLE	Artificial Intelligence (AI) Consultant
OCCUPATION CODE	AI-C
CATEGORY	Business and Leadership
SPECIALTY AREA	Artificial Intelligence (AI) Consultancy

GENERAL JOB DESCRIPTION

AI consultants use advanced programming & analytics technologies, including machine learning and predictive modelling, to support the identification of trends, scrape information from unstructured data sources and provide automated recommendations. They are employed by both private and public consulting firms & information technology departments to deal with big emerging data and new AI algorithms and tools. AI consultants work with multi-disciplinary teams to support clients in a wide range of data initiatives aiming to generate and present new, useful and actionable insights.

KEY TASKS

AI-C-T01	Identify and comprehend the specific needs and problems of clients.
AI-C-T02	Formulate artificial intelligence strategies aligned with business objectives.
AI-C-T03	Analyze the impact of solutions and providing guidance for improvement.
AI-C-T04	Research and learn about the latest technologies and tools in the field of data and artificial intelligence.
AI-C-T05	Collaborate with experts in the field of artificial intelligence to support and achieve business goals.
AI-C-T06	Assist and encourages the development of objectives, strategies and plans aimed at achieving clients satisfaction and the efficient use of organizations' resources.
AI-C-T07	Analyze data structures, quality, and patterns for artificial intelligence model development.
AI-C-T08	Create, customize, and implement machine learning models.
AI-C-T09	Evaluate model performance, test for accuracy, and validate results.
AI-C-T10	Work with clients to develop artificial intelligence policies and associated documentation in alignment with the organization's artificial intelligence strategy.
AI-C-T11	Review artificial intelligence operating procedures and advise on their alignment with the organization's procedures and standards.
AI-C-T12	Confer with clients to identify and document requirements related to AI projects.
AI-C-T13	Conduct business and technical studies.
AI-C-T14	Design, develop and implement artificial intelligence solutions.
AI-C-T15	Provide advice on artificial intelligence systems strategy, policy, management and service delivery.
AI-C-T16	Integrate artificial intelligence solutions into existing systems or processes.
AI-C-T17	Assess artificial intelligence risks to organization’s data and applications.
AI-C-T18	Develop policies, procedures and contingency plans to minimize the effects of artificial intelligence risks.
AI-C-T19	Conduct reviews to assess quality assurance practices, software products and artificial intelligence systems.
AI-C-T20	Analyze and evaluates current artificial intelligence systems and structures.
AI-C-T21	Discusses current artificial intelligence systems with staff and observes systems at all levels of organization.
AI-C-T22	Directs clients towards more efficient organization and develops solutions with artificial intelligence to solve organizational problems.
AI-C-T23	Directs clients towards obtaining resources to develop and implement effective processes to meet strategic artificial intelligence goals.
AI-C-T24	Stay current with best industry practices and new developments in artificial intelligence, research, competitive intelligence, process improvement and business analytics.
AI-C-T25	Continuously monitor artificial intelligence systems, update models, and maintain performance.
AI-C-T26	Educate clients on artificial intelligence technologies, their benefits, and provide ongoing support.

Skills

AI-C-S01	Skill in various artificial intelligence techniques, including machine learning algorithms, such as deep learning models and common programming languages in the field.
AI-C-S02	Skill in organizing and coordinating the activities of groups and individuals to align their activities with organizational objectives.
AI-C-S03	Skill in a examining & investigating problems, sites or objects to ensure compliance with safety standards, laws or regulations.
AI-C-S04	Skill in examining artificial intelligence activities to determine appropriate actions or recommendations.
AI-C-S05	Skill in analytical reasoning, problem solving and critical thinking.
AI-C-S06	Skill in investigating and trying-out new tools and technologies as they are released.
AI-C-S07	Skill in conveying technical advice & guidance to clients.
AI-C-S08	Skill in communicating & explaining complex artificial intelligence concepts to non-technical stakeholders, and the ability to work in a consulting capacity, understanding client needs & providing effective solutions.
AI-C-S09	Skill in building trust and rapport with clients, understanding their needs and concerns, and providing them with the best possible service.
AI-C-S10	Skill in providing guidance and advice to enable decision-making about tasks, situations, and processes.
AI-C-S11	Skill in preparing and delivering written, oral or visual material for the workplace that presents information.
AI-C-S12	Skill in developing alliances, contacts or partnerships, and exchanging information with others.
AI-C-S13	Skill in directing and monitoring the performance of others.
AI-C-S14	Skill in directing processes and procedures to ensure they add measurable value.
AI-C-S15	Skill in applying analytical methods including exploratory data analysis and statistical testing to a specific data set, to reach accurate and reliable conclusions.
AI-C-S16	Skill in customizing artificial intelligence solutions for different sectors based on understanding sector-specific requirements.
AI-C-S17	Skill in managing artificial intelligence projects effectively, including planning, resource allocation, and meeting project deadlines.
AI-C-S18	Skill in staying up to date with the latest developments in artificial intelligence, machine learning, and related technologies.
AI-C-S19	Skill in empathizing with customers/ stakeholders and understand their needs.

KNOWLEDGE

AI-C-K01	Knowledge of consulting, client interactions, and understanding client needs to provide tailored artificial intelligence (AI) solutions.
AI-C-K02	Knowledge of computer programming and coding languages used in artificial intelligence development.
AI-C-K03	Knowledge of ethical considerations in artificial intelligence development, ensuring fairness, transparency, and accountability in artificial intelligence systems.
AI-C-K04	Knowledge of statistical analysis, data manipulation, and data visualization tools.
AI-C-K05	Knowledge of computer vision and natural language processing techniques.
AI-C-K06	Knowledge of self-motivation tips for continuous development.
AI-C-K07	Knowledge of principles, techniques and tools applied in the development of precision technical plans, drawings & working models.
AI-C-K08	Knowledge of the benefits of applied mathematics and statistics in carrying out artificial intelligence tasks.
AI-C-K09	Knowledge of critique statistical analyses, & application of machine learning techniques & methodologies.
AI-C-K10	Knowledge of quantitative & qualitative analytics.
AI-C-K11	Knowledge of the principles and practices of managing businesses.
AI-C-K12	Knowledge of main concepts of deep learning.
AI-C-K13	Knowledge of national & related international regulations and policies related to AI.

ABILITIES

AI-C-A01	Ability to identify business problems and develop artificial intelligence (AI) solutions that address those issues effectively.
AI-C-A02	Ability to work in a consulting capacity, interview customers, understand customer needs and provide effective solutions.
AI-C-A03	Ability to collect, clean, and analyze data to derive meaningful insights.
AI-C-A04	Ability to design, develop, & optimize artificial intelligence models tailored to specific business needs.
AI-C-A05	Ability to work under tight timelines, in cases for multiple project deliveries.
AI-C-A06	Ability to work effectively within high-performing teams.
AI-C-A07	Ability to to analytically define problems and create effective artificial intelligence-driven solutions for business challenges.
AI-C-A08	Ability to contextualize & extract actionable insights from data.
AI-C-A09	Ability to effectively communicate complex technical concepts to non-technical stakeholders, including clients, management, or team members.
AI-C-A10	Ability to work in multidisciplinary teams, collaborating with data scientists, engineers, business analysts, & other professionals to deliver comprehensive artificial intelligence solutions.
AI-C-A11	Ability to travel and work abroad for international projects.
AI-C-A12	Ability to do advanced technical writing skills in Arabic and English (additional languages will be a plus).

EDUCATION

- A bachelor's degree in computer science, computer systems engineering or a related discipline or completion of a college program in computer science is usually required.
- A master's or doctoral degree in artificial intelligence, data science, or a related field is usually preferred.

EXPERIENCE

- Experience in providing artificial intelligence services is usually required.

5.2 Governance Management and Risk Analytics Category

Artificial Intelligence (AI) Ethicist

JOB CARD	
WORK ROLE	Artificial Intelligence (AI) Ethicist
OCCUPATION CODE	AI-Eth
CATEGORY	Governance, Management and Risk Analysis
SPECIALTY AREA	Artificial Intelligence (AI) Governance and Risk Management

GENERAL JOB DESCRIPTION	
	AI Ethicists are responsible for analyzing and evaluating the ethical implications of AI systems and making recommendations to ensure that our AI solutions are designed and used responsibly, fairly, and transparently.

KEY TASKS	
AI-Eth-T01	Set policies to ensure artificial intelligence (AI) development adheres to ethical principles and societal norms.
AI-Eth-T02	Conduct reviews to identify potential ethical issues and suggest remedies before an AI project goes live.
AI-Eth-T03	Conduct ethical impact assessments of AI systems, including identifying potential biases, discrimination, and negative impacts on individuals and society.
AI-Eth-T04	Evaluate potential risks associated with AI projects and ensure these projects comply with existing ethical guidelines and regulations.
AI-Eth-T05	Review AI algorithms and models to ensure they align with ethical principles and best practices.
AI-Eth-T06	Advise on the ethical implications of AI-related decisions and provide guidance to decision-makers.
AI-Eth-T07	Develop ethical guidelines and policies for developing, deploying, and using AI systems.
AI-Eth-T08	Develop and implement ethical guidelines and policies for AI development and deployment.
AI-Eth-T09	Stay up to date with the latest research, developments, regulations, and best practices in AI ethics and contribute to the wider AI ethics community.
AI-Eth-T10	Work with legal and regulatory teams to ensure compliance with relevant laws and regulations regarding AI and ethics.
AI-Eth-T11	Develop and deliver training and educational materials on AI ethics for internal and external audiences.
AI-Eth-T12	Engage with stakeholders, including customers, partners, and the public, to ensure AI systems align with their values and expectations.
AI-Eth-T13	Ensure the responsible and ethical use of data in AI systems, including protecting the privacy and confidentiality of sensitive data.
AI-Eth-T14	Leverage tools to improve AI's performance and trustworthiness throughout the AI lifecycle.
AI-Eth-T15	Collaborating with cross-functional teams to identify ethical concerns and propose solutions to mitigate them.
AI-Eth-T16	Participate in interdisciplinary teams to develop solutions to complex ethical challenges related to AI.
AI-Eth-T17	Work with business and technical stakeholders to identify and assess potential risks and impacts, recommend appropriate mitigations, and prevent harm.
AI-Eth-T18	Collaborate with cross-functional teams to integrate ethical considerations into the design & development of AI systems.

Skills

AI-Eth-S01 Skill in establishing policies for responsible artificial intelligence (AI) development.	AI-Eth-S07 Skill in supporting effectively other organizational members in implementing AI ethics.
AI-Eth-S02 Skill in developing AI ethics tools & translate theoretical principles into practice.	AI-Eth-S08 Skill in working with consequential or complex risks.
AI-Eth-S03 Skill in conducting ethics reviews of AI projects.	AI-Eth-S09 Skill in applying different risk methodologies in proportion to the risk.
AI-Eth-S04 Skill in assessing potential ethical risks and ensuring compliance.	AI-Eth-S10 Skill in building consensus between services or independent stakeholders.
AI-Eth-S05 Skill in educating and raising awareness of AI practices & ethics.	AI-Eth-S11 Skill in collaborating with cross-functional and interdisciplinary teams.
AI-Eth-S06 Skill in communicating effectively to explain and raise awareness of data & AI ethics issues, and to listen to, convene, advise, and mediate between various parts of the organization.	AI-Eth-S12 Skill in working with business stakeholders.
	AI-Eth-S13 Skill in ethical impact assessments, algorithmic bias, & societal implications of AI.
	AI-Eth-S14 Skill in defining ethics benchmarks for privacy and fairness.

KNOWLEDGE

AI-Eth-K01 Knowledge of policy, law, regulatory processes, & industry standards in artificial intelligence (AI) or related field.	AI-Eth-K06 Knowledge of relevant AI ethics frameworks and regulations.
AI-Eth-K02 Knowledge of ethical principles and theories and their applications to AI.	AI-Eth-K07 Knowledge of different values & ethics norms among different cultures, and adapt to local values and ethics norms.
AI-Eth-K03 Knowledge of how technology & AI products and services are built.	AI-Eth-K08 Knowledge of ethics guidelines for the research and development of artificial intelligence, such as Asilomar AI Principles.
AI-Eth-K04 Knowledge of social sciences & AI's impact on society.	
AI-Eth-K05 Knowledge of ethical principles and best practices related to AI, including fairness, transparency, accountability, and human rights.	

ABILITIES

AI-Eth-A01 Ability to share expertise in writing and verbally with other members of the team.	AI-Eth-A05 Ability to communicate complex AI ethics concepts clearly to stakeholders.
AI-Eth-A02 Ability to communicate & express technical viewpoints to senior stakeholders with succinctness and clarity.	AI-Eth-A06 Ability to engage with stakeholders at all levels.
AI-Eth-A03 Ability to analyze complex ethical issues and propose solutions.	AI-Eth-A07 Ability to think critically and analytically.
AI-Eth-A04 Ability to work independently and manage multiple projects & priorities simultaneously.	AI-Eth-A08 Ability to trace through complex AI technologies & data processes to determine the cause of harm.

EDUCATION

- A bachelor's degree in computer science, computer systems engineering or a related discipline or completion of a college program in computer science is usually required.
- A master's or doctoral degree in artificial intelligence (AI), data science or a related field is usually preferred.

EXPERIENCE

- Experience in artificial intelligence and ethics is usually preferred.

Artificial Intelligence (AI) Risk Analyst

JOB CARD	
WORK ROLE	Artificial Intelligence (AI) Risk Analyst
OCCUPATION CODE	AI-RA
CATEGORY	Governance, Management and Risk Analysis
SPECIALTY AREA	Artificial Intelligence (AI) Governance and Risk Management

GENERAL JOB DESCRIPTION

AI Risk Analysts specialize in identifying, evaluating, and mitigating potential risks associated with artificial intelligence (AI) systems. Their primary goal is to ensure the responsible and ethical development, deployment, and use of AI technologies.

KEY TASKS

AI-RA-T01	Ensure artificial intelligence (AI) risks are identified and managed appropriately through the organization's risk governance process.
AI-RA-T02	Support the AI governance process over the AI inventory, issue tracking, governance meetings & management reporting.
AI-RA-T03	Carry out an AI risk assessment.
AI-RA-T04	Use continuous monitoring tools to assess risk on an ongoing basis.
AI-RA-T05	Work with organizational officials to ensure continuous monitoring tool data provides situation awareness of risk levels.
AI-RA-T06	Regularly monitor AI systems in production to detect and address any emerging risks or issues.
AI-RA-T07	Perform risk analysis whenever an application or system undergoes a major change.
AI-RA-T08	Conduct an initial risk assessment of stakeholder assets and update the risk assessment on an ongoing basis.
AI-RA-T09	Provide input to the risk management framework and related documentation.
AI-RA-T10	Ensure that decisions relating to AI are based on sound risk management principles.
AI-RA-T11	Develop methods to effectively monitor and measure risk, compliance and assurance efforts.
AI-RA-T12	Develop risk mitigation strategies to effectively manage risk in accordance with organizational risk appetite.
AI-RA-T13	Devise strategies and protocols to minimize risks associated with AI, including developing robust testing methods and risk management frameworks.
AI-RA-T14	Contribute to development of the AI risk management program through independent learning, on job experience and collaboration with the team, AI application owners and other lines.
AI-RA-T15	Stay updated with regulations and standards related to AI ethics and ensuring that AI systems comply with these guidelines.
AI-RA-T16	Work with others to implement and maintain a AI risk management program.
AI-RA-T17	Cultivate relationships and channels of communication across all teams to build risk culture, promote AI risk management, share in best practices and provide independent perspective on initiatives and issues related to AI applications.
AI-RA-T18	Educate stakeholders and the public about AI risks, advocating for responsible AI practices, and contributing to the development of AI governance frameworks.

Skills		
	AI-RA-S01 Skill in performing artificial intelligence (AI) related impact and risk assessments.	AI-RA-S09 Skill in communicating with others on the required tasks assigned
	AI-RA-S02 Skill in using risk scoring to inform performance-based and cost-effective approaches to help an organization manage its artificial intelligence risk.	AI-RA-S10 Skill in using of critical thinking and problem solving skills
	AI-RA-S03 Skill in identifying potential risks inherent in AI systems, such as biases, safety concerns, security vulnerabilities, or ethical implications.	AI-RA-S11 Skill in working with stakeholders to identify AI risks.
	AI-RA-S04 Skill in assessing the AI risks.	AI-RA-S12 Skill in collaborating with domain experts to understand requirements and define project objectives.
	AI-RA-S05 Skill in working with consequential or complex risks.	AI-RA-S13 Skill in project management and delivery methodologies such as agile approach.
	AI-RA-S06 Skill in applying different risk methodologies in proportion to the risk.	AI-RA-S14 Skill in communicating risks & AI concepts to non-technical audiences
	AI-RA-S07 Skill in assessing AI solutions computation requirements to estimate of compute resources.	AI-RA-S15 Skill in evaluating the AI best practices and adopting the most suitable ones.
	AI-RA-S08 Skill in using best practices and tools to test, deploy, manage, and monitor AI models, systems and risks.	AI-RA-S16 Skill in building and maintaining relationships with external AI organizations, partners, and communities.
		AI-RA-S17 Skill in educating and raising awareness of AI risks.

KNOWLEDGE		
	AI-RA-K01 Knowledge of relevant artificial intelligence (AI) aspects of legislative and regulatory requirements, relating to ethics and privacy.	AI-RA-K07 Knowledge of the national AI and data regulations and requirements relevant to the organization.
	AI-RA-K02 Knowledge and understanding of risk assessment, mitigation and management methods.	AI-RA-K08 Knowledge of data classification standards and methodologies as they relate to the management of AI risk.
	AI-RA-K03 Knowledge of the principles of AI and risk management.	AI-RA-K09 Knowledge & application of privacy, security compliance, & ethical AI approaches
	AI-RA-K04 Knowledge of business practices within organizations.	AI-RA-K10 Knowledge of privacy and ethical AI approaches.
	AI-RA-K05 Knowledge of the Core AI disciplines such as CV, NLP, Deep Learning.	AI-RA-K11 Knowledge of risk scoring as part of a risk management process.
	AI-RA-K06 Knowledge of best practices for supply chain risk management.	

ABILITIES	AI-RA-A01 Ability to work with the organization's leadership to provide a comprehensive, organization - wide approach to address artificial intelligence (AI) risk.	AI-RA-A05 Ability to implement supply chain risk management standards.
	AI-RA-A02 Ability to work with the organization's leadership to share AI risk related information.	AI-RA-A06 Ability to apply techniques and tools for detecting risks AI.
	AI-RA-A03 Ability to work with the organization's leadership to provide oversight for all AI risk management related activities.	AI-RA-A07 Ability to comply with local and global data governance regulations
	AI-RA-A04 Ability to work with the organization's leadership to determine the organization's risk posture based on the aggregated risk from its operations and its use of systems.	AI-RA-A08 Ability to work independently with minimal supervision.
		AI-RA-A09 Ability to challenge and influence in a collaborative way.

EDUCATION	- A bachelor's degree in computer science, computer systems engineering or a related discipline or completion of a college program in computer science is usually required. - A master's or doctoral degree in machine learning, data science, or a related quantitative field is usually preferred.
EXPERIENCE	- Experience in artificial intelligence & managing risks techniques and methodologies is usually required.

Data Management Specialist

JOB CARD	
WORK ROLE	Data Management Specialist
OCCUPATION CODE	D-MS
CATEGORY	Governance, Management and Risk Analysis
SPECIALTY AREA	Data Governance and Management

GENERAL JOB DESCRIPTION

Coordinating, researching, and providing technical support in the field of data structuring and data integration encompasses various key responsibilities. This includes integrating descriptive data, managing and ensuring the controlled delivery of data, and capturing and modeling data requirements along with data definitions and business rules. This role is crucial for optimizing data utilization, ensuring data quality, and enabling seamless access to information, ultimately contributing to effective decision-making and organizational success.

KEY TASKS

- D-MS-T01 Analyze and plan for anticipated changes in data capacity requirements.
- D-MS-T02 Maintain data management systems software.
- D-MS-T03 Collaborate with other teams or systems administrators to maintain information exchanges through publish, subscribe, and alert functions that enable users to send and receive critical information as required.
- D-MS-T04 Manage the compilation, cataloging, caching, distribution, and retrieval of data.
- D-MS-T05 Monitor and maintain data management to ensure optimal performance.
- D-MS-T06 Implement data management standards, requirements, and specifications.

Skills

- D-MS-S01 Skill in conducting queries to analyze data structures.
- D-MS-S02 Skill in generating queries and reports.
- D-MS-S03 Skill in maintaining data management. (i.e., backup, restore, delete data, transaction log files, etc.).
- D-MS-S04 Skill in optimizing data management performance.

KNOWLEDGE

- D-MS-K01 Knowledge the foundations of computer networking concepts & protocols, & network security methodologies.
- D-MS-K02 Knowledge of risk management processes (e.g., methods for assessing & mitigating risk).
- D-MS-K03 Knowledge of laws, regulations, policies, and ethics as they relate to data and privacy.
- D-MS-K04 Knowledge of data administration and data standardization policies.
- D-MS-K05 Knowledge of data mining & data warehousing principles.
- D-MS-K06 Knowledge of data management systems, query languages, table relationships, & views.
- D-MS-K07 Knowledge of digital rights management.
- D-MS-K08 Knowledge of policy-based & risk adaptive access controls.
- D-MS-K09 Knowledge of query systems.
- D-MS-K10 Knowledge of sources, characteristics, & uses of the organization's data assets.
- D-MS-K11 Knowledge of the basics of database access application programming interfaces (e.g., Java Database Connectivity [JDBC]).
- D-MS-K12 Knowledge of database theory.

ABILITIES	D-MS-A01 Ability to maintain data management. (i.e., backup, restore, delete data, transaction log files, etc.).	D-MS-A02 Ability to multi-task, collaborate with peers, customers, and management to accomplish a variety of different tasks in a constantly changing environment.
EDUCATION	- A bachelor's degree in computer science, statistics, business information systems, information management or a related discipline is usually required. - A master's or doctoral degree in data science, economics, information management (if curricula contain data management) or a related field is usually preferred.	
EXPERIENCE	- Experience in data management techniques and methodologies is usually required.	

Data Quality Analyst

JOB CARD

WORK ROLE	Data Quality Analyst
OCCUPATION CODE	D-QA
CATEGORY	Governance, Management and Risk Analysis
SPECIALTY AREA	Data Governance and Management

GENERAL JOB DESCRIPTION

A Data Quality Analyst is responsible for ensuring that data is accurate, complete, and consistent. They develop and implement data quality standards and processes to ensure that data is clean and reliable. Data quality analysts work closely with data analysts to identify and resolve data quality issues, and they may also work with Data governance teams to develop policies and procedures for Data management.

KEY TASKS

D-QA-T01	Develop and implementing data quality standards and processes.
D-QA-T02	Collaborate with data management teams and business analysts to identify and define critical data
D-QA-T03	Conduct data quality assessments to identify issues.
D-QA-T04	Work to evaluate the impact resulting from data quality challenges
D-QA-T05	Work with Data governance teams to develop policies and procedures for data management.
D-QA-T06	Carry out analysis techniques for data inspection, exploration and visualization
D-QA-T07	Develop and implementing data quality metrics to measure the effectiveness of data quality processes.
D-QA-T08	Collaborate with data analysts to identify and resolve data quality issues.
D-QA-T09	Ensur compliance with data Privacy regulations.

Skills

D-QA-S01 Skills in building business-specific standards and common data models.	D-QA-S05 Skill in communicating & collaborating with other data teams.
D-QA-S02 Skill in designing a data analysis structure (i.e., the types of data a test must generate and how to analyze that data).	D-QA-S06 Skill in utilizing data governance frameworks and privacy tools.
D-QA-S03 Skill in conducting data quality assessments using statistics, data visualization, exploratory data analysis, and anomaly detection.	D-QA-S07 Skill in applying master data management models & privacy principles to organizational requirements (relevant to confidentiality, integrity, availability, authentication, non-repudiation).
D-QA-S04 Skill in structured query language and data collection and presentation tools.	

KNOWLEDGE

D-QA-K01 Knowledge of risk management processes (e.g., methods for assessing and mitigating risk).	D-QA-K04 Knowledge of data and privacy principles and organizational requirements (relevant to confidentiality, integrity, availability, authentication, non-repudiation).
D-QA-K02 Knowledge of laws, regulations, policies, and ethics as they relate to data governance, compliance and privacy.	D-QA-K05 Knowledge of the data maturity assessment models and metrics.
D-QA-K03 Knowledge of organization's data schemes and validation tools and techniques.	D-QA-K06 Knowledge of data quality standards and processes.
	D-QA-K07 Knowledge of the data governance principles.

ABILITIES	D-QA-A01 Ability to identify data quality issues.	D-QA-A05 Ability to apply data and privacy principles to organizational requirements (relevant to confidentiality, integrity, availability, authentication, non-repudiation).
	D-QA-A02 Ability to analyze data quality issues.	
	D-QA-A03 Ability to collect, verify, and validate test data.	D-QA-A06 Ability to multi-task, collaborate with peers, customers, and management to accomplish a variety of different tasks in a constantly changing environment.
	D-QA-A04 Ability to translate data and test results into evaluative conclusions.	

EDUCATION	- A bachelor's degree in computer science, information technology , cybersecurity, managment information systems, or a related discipline is usually required. - A master's or doctoral degree in data science, economics, information technology (if curricula contain data quality) or a related field is usually preferred.

EXPERIENCE	- Experience in data quality assurance techniques and methodologies is usually required.

Data Stewardship Specialist

JOB CARD	
WORK ROLE	Data Stewardship Specialist
OCCUPATION CODE	D-SS
CATEGORY	Governance, Management and Risk Analysis
SPECIALTY AREA	Data Governance and Management

GENERAL JOB DESCRIPTION

A data stewardship specialists are accountable for data assets and resources from a strategic perspective. They are responsible for ensuring that the data acquisition, entry, quality, interoperability, and overall management supports the needs of consumers, citizens, enterprises, organizations, or governments, while also ensuring adherence to social license, legislative, and regulatory requirements. They work with stakeholders and other deliberative or advisory bodies to develop definitions, standards, and data controls, and perform key functions in the ideation and implementation of data policies that are scalable, sustainable, and significant.

KEY TASKS

D-SS-T01	Develop an understanding of customer requirements; recommend specific data sources and types to satisfy mission needs.
D-SS-T02	Identify issues and necessary changes to data systems.
D-SS-T03	Perform data conditioning techniques and processes for data management purposes.
D-SS-T04	Synchronize data from numerous sources; develop data taxonomy to support integration into intelligence products.
D-SS-T05	Nominate and implement data standards and ontology, and actively participates in the development of standards through working groups.
D-SS-T06	Create and maintain metadata to quality specifications, and ensure data documentation is developed and maintained.
D-SS-T07	Provide oversight during development of data for visualization/analytic projects and develop schemas to ensure the data needs and requirements are documented.
D-SS-T08	Ensure service interoperability and works to develop taxonomies where there are deficiencies in data standards.
D-SS-T09	Determine requirements to collect data and identify existing data stores, disparate data, or data collection parameters, and ensures the data collected are consistent with data models to dissolve any data silos.
D-SS-T10	D-SST10. Research data issues and inquiries and implements process for data transformations, to resolve data issues, collaboration on system changes, and the integrity and quality of data personally created/updated.
D-SS-T11	Conduct data validation and reconciliation processes following completion of data movement, and enforces processes for data quality issue resolution
D-SS-T12	Ensure versions of data are maintained along with the history of changes, so that data content and changes can be audited.
D-SS-T13	Collaborate with data scientists to apply data science principles to dataset interoperability.
D-SS-T14	Collaborate with data engineers to employ parallel processing and GPUs and/or cloud computing to increase operational efficiencies of data query and use.
D-SS-T15	Collaborate with data stewards and related teams to implement approved changes.
D-SST16	Understand data standards and extraction specifications along with comprehension of how analysts currently utilize data and how they might expect to use content in the future.
D-SS-T17	Interrogate, prepare data to deliver results and/or deploy automated processes using related programming languages.
D-SS-T18	Employ organization's data-related software for data analysis and data management.
D-SS-T19	Communicate technically both orally and in writing and to constructively resolve data-related issues by leading and/or working as a member of a team.
D-SS-T20	Evaluate and utilize data services and applications to institute improvements to data content and structure, metadata, data models, data quality, accessibility and dissemination.
D-SS-T21	Ensure established metadata policies & processes are adhered to for increased integration, access, efficiency, and discoverability.
D-SS-T22	Build data schemas and/or data profiles to enable multiple mission use of data.
D-SS-T23	Apply knowledge of databases, data file formats, commercial imagery data, digital image processing techniques, and organization's data-related software.

Skills	D-SS-S01 Skill in designing, implementing, monitoring, and/or maintaining databases.	D-SS-S04 Skill in analyzing data, and/or reconciling differences and redundancies to ensure consistency.
	D-SS-S02 Skill in developing data set processes for data discovery, modeling, mining, and/or production.	D-SS-S05 Skill in a variety of computing languages and tools e.g., scripting languages.
	D-SS-S03 Skill in acquiring, validating, integrating, and/or maintaining data within databases.	D-SS-S06 Skill in data tools in the extraction and attribution, preparation, management and/or analysis of spatial data.
KNOWLEDGE	D-SS-K01 Knowledge of data extraction, final product and metadata specifications.	D-SS-K05 Knowledge of laws, regulations, policies, and ethics as they relate to cybersecurity and privacy.
	D-SS-K02 Knowledge of integrating data from various sources and ensuring compatibility and smooth interaction between different systems.	D-SS-K06 Knowledge of data protection laws, industry regulations, and compliance standards related to data handling and privacy.
	D-SS-K03 Knowledge of exploratory and confirmatory data analysis.	D-SS-K07 Knowledge of the fundamental principles and practices of data governance, including data ownership, accountability, and policies.
	D-SS-K04 Knowledge of risk management processes (e.g., methods for assessing & mitigating risk).	
ABILITIES	D-SS-A01 Ability to communicate complex information, concepts, or ideas in a confident and well-organized manner through verbal, written, and/or visual means.	D-SS-A06 Ability to focus research efforts to meet the customer's decision-making needs.
	D-SS-A02 Ability to develop or recommend analytic approaches or solutions to problems and situations for which information is incomplete or for which no precedent exists.	D-SS-A07 Ability to function effectively in a dynamic, fast-paced environment.
	D-SS-A03 Ability to evaluate information for reliability, validity, and relevance.	D-SS-A08 Ability to function in a collaborative environment, seeking continuous consultation with other analysts and experts—both internal and external to the organization—to leverage analytical and technical expertise. Ability to think critically.
	D-SS-A04 Ability to evaluate, analyze, and synthesize large quantities of data (which may be fragmented & contradictory) into high quality, fused targeting/intelligence products.	D-SS-A09 Ability to understand objectives and effects.
	D-SS-A05 Ability to exercise judgment when policies are not well-defined.	D-SS-A10 Ability to multi-task, collaborate with peers, D-SS-A11 customers, and management to accomplish a variety of different tasks in a constantly changing environment.

EDUCATION	- A bachelor's degree in computer science, statistics, information technology, software engineering, managment information systems, applied mathematics, or a related discipline is usually required. - A master's or doctoral degree in data science, economics, information technology (if curricula contain data stewardship) or a related field is usually preferred.
EXPERIENCE	- Experience in data stewardship techniques and methodologies is usually required.

Data Governance Analyst

JOB CARD	
WORK ROLE	Data Governance Analyst
OCCUPATION CODE	D-GA
CATEGORY	Governance, Management and Risk Analysis
SPECIALTY AREA	Data Governance and Management

GENERAL JOB DESCRIPTION

Coordinating, researching, and providing support in data governance efforts, framing workflow procedures, policy development, and monitoring with representatives and data experts in the business. Ensuring awareness dissemination and employee training in data management areas, as well as elevating data management and governance maturity levels. Analyzes data/information from one or multiple sources to conduct preparation of the environment, respond to requests for information, and submit intelligence collection and production requirements in support of planning and operations.

KEY TASKS

D-GA-T01	Assist in the coordination, validation, and management of all-source collection requirements, plans, and/or activities.
D-GA-T02	Maintain information exchanges through publish, subscribe, and alert functions that enable users to send and receive critical information as required.
D-GA-T03	Coordinate with cybersecurity teams to maintain awareness of internal & external cyber organization structures, strengths, and employments of staffing and technology.
D-GA-T04	Implement data management standards, requirements, and specifications.
D-GA-T05	Evaluate threat decision-making processes.
D-GA-T06	Identify threat vulnerabilities and how to protect the data (eg. laws and regulations..etc).
D-GA-T07	Create requests for information and share data with relevant parties.
D-GA-T08	Identify threat tactics and methodologies that are relevant to the data use.
D-GA-T09	IIdentify and evaluate threat critical capabilities, requirements, and vulnerabilities that are relevant to the data use.
D-GA-T10	Provide analyses and support for effectiveness assessment.
D-GA-T11	Provide current intelligence support to critical internal/external stakeholders as appropriate.

Skills

D-GA-S01	Skill in developing or recommending analytic approaches or solutions to problems and situations for which information is incomplete or for which no precedent exists.
D-GA-S02	Skill in generating queries and reports.
D-GA-S03	Skill in evaluating information for reliability, validity, and relevance.
D-GA-S04	Skill in tailoring analysis to the necessary levels (e.g., classification & organizational).
D-GA-S05	Skill in assessing a variety of data analytics techniques (such as data mining and prescriptive and predictive analytics) for complex data analysis through the whole data life cycle.
D-GA-S06	Skill in writing, reviewing and editing data governance procedures and policies.
D-GA-S07	Communication and presentation skills.

KNOWLEDGE

D-GA-K01	Knowledge of information extraction.
D-GA-K02	Knowledge of digital rights management.
D-GA-K03	Knowledge of exploratory and confirmatory data analysis.
D-GA-K04	Knowledge of risk management processes (e.g., methods for assessing & mitigating risk).
D-GA-K05	Knowledge of laws, regulations, policies, and ethics as they relate to cybersecurity and privacy.
D-GA-K06	Knowledge of data and privacy principles.

ABILITIES	D-GA-A01 Ability to communicate complex information, concepts, or ideas in a confident and well-organized manner through verbal, written, and/or visual means.	D-GA-A04 Ability to evaluate, analyze, and synthesize large quantities of data (which may be fragmented & contradictory) into high quality, fused targeting/intelligence products.
	D-GA-A02 Ability to collaborate with data engineers/ analytics teams to develop or recommend analytic approaches or solutions to problems and situations for which information is incomplete or for which no precedent exists.	D-GA-A05 Ability to function effectively in a dynamic, fast-paced environment.
	D-GA-A03 Ability to evaluate information for reliability, validity, and relevance.	D-GA-A06 Ability to think critically.
		D-GA-A07 Ability to think like threat actors.
		D-GA-A08 Ability to understand objectives and effects.
		D-GA-A09 Ability to multi-task, collaborate with peers, customers, and management to accomplish a variety of different tasks in a constantly changing environment.

EDUCATION	- A bachelor's degree in computer science, law, mathematics, managment information systems, or a related discipline is usually required. - A master's or doctoral degree in data science, economics, information technology (if curricula contain data manament) or a related field is usually preferred.
EXPERIENCE	- Experience in data governance techniques and methodologies is usually required.

5.3 Date Science and Analytics Category

Data Analyst

JOB CARD

WORK ROLE	Data Analyst
OCCUPATION CODE	D-An
CATEGORY	Data Science and Analytics
SPECIALTY AREA	Data Analytics and Business Intelligence

GENERAL JOB DESCRIPTION

Examines data from multiple disparate sources with the goal of providing security and privacy insight. Designs and implements custom algorithms, workflow processes, and layouts for complex, enterprise-scale data sets used for modeling, data mining, and research purposes. A data analyst collects, organizes and studies data to provide business insight.

KEY TASKS

D-An-T01	Analyze and define data needs, including current requirements and specification as well as plan with the DBA for future capacity demands.
D-An-T02	Support data governance/quality teams to develop data standards, policies, and procedures.
D-An-T03	Collaborate with data engineers to manage the compilation, cataloging, caching, distribution, and retrieval of data including managed flow of relevant information (via web-based portals or other means) based on mission requirements.
D-An-T04	Provide recommendations on new data management technologies and architectures.
D-An-T05	Analyze data sources to provide actionable recommendations.
D-An-T06	Assess the validity of source data and subsequent findings.
D-An-T07	Collect metrics and trending data.
D-An-T08	Apply analytical methods including exploratory data analysis and statistical testings for data inspection, exploration and visualisation.
D-An-T09	Confer with systems analysts, engineers, programmers, and others to design application.
D-An-T10	Identify, collect, and preprocess data from various sources to prepare it for analysis.
D-An-T11	Apply appropriate statistical techniques to available data to discover new relations and offer insights, helping to improve organizational processes and support decision making.
D-An-T12	Utilize open source tools to deal with data files & apply quantitative techniques (e.g., descriptive and inferential statistics, sampling, experimental design, parametric and non-parametric tests of difference, ordinary least squares regression, general line).

Skills

D-An-S01	Skill in conducting queries and developing algorithms to analyze data structures.
D-An-S02	Skill in creating and utilizing mathematical or statistical models.
D-An-S03	Skill in generating queries and reports.
D-An-S04	Skill in using programming and data tools to collect, preprocess, and analyze data from various sources.
D-An-S05	Skill in identifying hidden patterns or relationships.
D-An-S06	Skill in performing analytical methods including exploratory data analysis, statistical testing, sensitivity analysis, outlier identification and removal techniques.
D-An-S07	Skill in developing machine understandable semantic ontologies.
D-An-S08	Skill in Regression Analysis (e.g., Hierarchical Stepwise, Generalized Linear Model, Ordinary Least Squares, Tree-Based Methods, Logistic).
D-An-S09	Skill in using basic descriptive statistics and techniques (e.g., normality, model distribution, scatter plots).
D-An-S10	Skill in the use of design modeling (e.g., unified modeling language).
D-An-S11	Skill in data mining techniques (e.g., searching file systems) and analysis.
D-An-S12	Skill to identify sources, characteristics, and uses of the organization's data assets.

KNOWLEDGE

D-An-K01 Knowledge of computer networking concepts & protocols, and network security methodologies.	D-An-K06 Knowledge of sources, characteristics, and uses of the organization's data assets.
D-An-K02 Knowledge of computer programming principles.	D-An-K07 Knowledge of the capabilities & functionality associated with various technologies for organizing and managing information (e.g., databases, bookmarking engines).
D-An-K03 Knowledge of data administration and data standardization policies.	D-An-K08 Knowledge of advanced data remediation security features in databases.
D-An-K04 Knowledge of data mining and data warehousing principles.	D-An-K09 Knowledge of database access application programming interfaces.
D-An-K05 Knowledge of database management systems, query languages, table relationships, and views.	D-An-K10 Knowledge of applications that can log errors, exceptions, and application faults & logging.

ABILITIES

D-An-A01 Ability to carry out data quality control, validation and linkage.	D-An-A06 Ability to use data visualization tools (e.g., Flare, HighCharts, AmCharts, D3.js, Processing, Google Visualization API, Tableau, Raphael.js).
D-An-A02 Ability to produce clear graphical representations and data visualisations.	D-An-A07 Ability to accurately and completely source all data used in intelligence, assessment and/or planning products.
D-An-A03 Ability to work with complex data structures using high-level programming languages.	D-An-A08 Ability to multi-task, collaborate with peers, customers, and management to accomplish a variety of different tasks in a constantly changing environment.
D-An-A04 Ability to dissect a problem and examine the interrelationships between data that may appear unrelated.	
D-An-A05 Ability to identify basic common coding flaws at a high level.	

EDUCATION

- A bachelor's degree in computer science, statistics, business information systems, information managment or a related discipline is usually required.
- A master's or doctoral degree in data science, economics, science (if curricula contain data analysis) or a related quantitative field is usually preferred.

EXPERIENCE

- Experience in data analysis techniques and statistical methodologie is usually required.

Data Scientist

JOB CARD

WORK ROLE	Data Scientist
OCCUPATION CODE	D-S
CATEGORY	Data Science and Analytics
SPECIALTY AREA	Data Science

GENERAL JOB DESCRIPTION

Data scientists use advanced analytics technologies, including machine learning and predictive modelling, to support the identification of trends, scrape information from unstructured data sources and provide automated recommendations.

KEY TASKS

D-S-T01	Resolve problems using applied mathematics, statistical methods and probability concepts such as processing data using descriptive statistics, applying probability concepts in random situations, quantifying relationship between variables
D-S-T02	Apply analytical methods including exploratory data analysis and statistical testings for data inspection, exploration and visualisation.
D-S-T03	Solve complex problems by applying tensor-based analysis techniques such as using systems of multi-linear equations, determining the results of tensor operations.
D-S-T04	Use analytical methods, visualization, and statistical testing to find patterns and draw conclusions.
D-S-T05	Apply performance metrics and hypothesis testing to ensure model accuracy and effectiveness.
D-S-T06	Identify, collect, and preprocess data from various sources to prepare it for analysis.
D-S-T07	Build and evaluate statistical models and machine learning models to derive actionable insights and predictions.
D-S-T08	Collaborate with ML engineers and MLOps Specialists to deploy machine learning models for various business-related applications, such as recommendation systems, fraud detection, and demand forecasting.
D-S-T09	Work on data preparation, implement reusable cleaning processes, and utilize diverse data architectures and tools.

Skills

D-S-S01	Skill in mastering statistical methods and diverse data analytics techniques (data mining, predictive/prescriptive analytics) to tackle complex data throughout its lifecycle.
D-S-S02	Skill in employing various performance and accuracy metrics for thorough statistical assessment, model validation, & hypothesis testing.
D-S-S03	Skill in applying analytical methods including exploratory data analysis & statistical testing to a specific data set, to reach accurate and reliable conclusions.
D-S-S04	Skill in translating complex statistical output into clear, actionable insights for diverse audiences.
D-S-S05	Skill in developing effective machine learning and statistical models to extract valuable insights from data.
D-S-S06	Skill in comparing selected applied mathematics & statistical methods & identify their differences
D-S-S07	Skill in leveraging parallel and distributed computer architecture to handle large datasets efficiently.

KNOWLEDGE

D-S-K01	Knowledge of applied & discrete mathematics, and graph theory.
D-S-K02	Knowledge of statistical paradigms (such as regression, time series, dimensionality, clusters).
D-S-K03	Knowledge of inferential & predictive statistics.
D-S-K04	Knowledge of information retrieval techniques.
D-S-K05	Knowledge of advanced analytics techniques as well as machine learning & deep learning algorithms.
D-S-K06	Knowledge of a broad range of statistical, mathematical and advanced analytics tools that support organization.
D-S-K07	Knowledge of probabilistic representations (causal networks, Bayesian analysis, Markov nets)
D-S-K08	Knowledge of exploratory & confirmatory data analysis.
D-S-K09	Knowledge of quantitative and qualitative analytics.

ABILITIES

D-S-A01	Ability to interpreting statistical output effectively and accurately.
D-S-A02	Ability to applied mathematics and statistics, and can use this knowledge to carry out data science tasks.
D-S-A03	Ability to extract information.
D-S-A04	Ability to explore and confirm data analysis.
D-S-A05	Ability to multi-task, collaborate with peers, customers, and management to accomplish a variety of different tasks in a constantly changing environment.

EDUCATION

- A bachelor's degree in statistics, mathematics, computer science, computer systems engineering or a related discipline is usually required.
- A master's or doctoral degree in machine learning, data science, or a related quantitative field is usually required.

EXPERIENCE

- Experience in programming is usually required.
- Experience in statistical modelling or machine learning is usually required.

5.4 Engineering and Architecture Category

Data Engineer

JOB CARD	
WORK ROLE	Data Engineer
OCCUPATION CODE	D-En
CATEGORY	Engineering and Architecture
SPECIALTY AREA	Data Engineering

GENERAL JOB DESCRIPTION

A data engineer is an IT worker whose primary job is to prepare data for analytical or operational uses. These software engineers are typically responsible for building data pipelines to bring together information from different source systems. They integrate, consolidate and cleanse data and structure it for use in analytics applications. They aim to make data easily accessible and to optimize their organization's big data ecosystem.

KEY TASKS

D-En-T01	Design, implement, and manage data pipelines for acquiring, storing, and transforming large volumes of data.
D-En-T02	Build and maintain data lakes, data warehouses and databases to ensure data availability and reliability.
D-En-T03	Ensure data quality and integrity through data validation and cleaning processes.
D-En-T04	Develop and implement data governance, privacy, and security measures to protect sensitive information.
D-En-T05	Optimize data infrastructure for performance, scalability, and cost efficiency.
D-En-T06	Troubleshoot and resolve issues related to data pipelines and data infrastructure.
D-En-T07	Implement extraction-transformation-loading (ETL) processes and optimize data retrieval.
D-En-T08	Engage in the most complex data challenges and solutions.
D-En-T09	Source system analysis from a complex single or multiple data sources in a conformed model for analysis.
D-En-T10	Design, build and test data products based on feeds from multiple systems, using a range of different storage technologies, access methods or both.
D-En-T11	Work with metadata repositories to complete complex tasks such as data and systems integration impact analysis.
D-En-T12	Manage the compilation, cataloging, caching, distribution, and retrieval of data.
D-En-T13	Make dataset for predictive and prescriptive modeling.
D-En-T14	Access to representative features that can describe a model.
D-En-T15	Build data pipelines for different requirments.

Skills

D-En-S01	Skill in designing, coding, testing, correcting & documenting simple-to-complex programs and scripts from agreed specifications and subsequent iterations.
D-En-S02	Skill in undertaking data profiling & sourcing system analysis.
D-En-S03	Skill in maintaining a repository to ensure information accuracy and quality.
D-En-S04	Skill in seting up robust governance and security processes to keep repositories up to date.
D-En-S05	Skill in knowing how to best to optimize data infrastructure.
D-En-S06	Skill in explaining the types of problems in databases, data processes, data products and services.
D-En-S07	Skill in extraction-transformation-loading (ETL) process.
D-En-S08	Skill in identifying technical solutions for complex data.
D-En-S09	Skill in designing, building and testing data products that are complex or large scale
D-En-S10	Skill in data integration methods and frameworks.
D-En-S11	Skill in producing synthetic data and use it for data analytics.

KNOWLEDGE

D-En-K01	Knowledge of general principles, concepts and practices in Data Management and organization.
D-En-K02	Knowledge of data warehousing and data mining.
D-En-K03	Knowledge of main concepts in data processing (such as data cleaning, data validation, data verification and data transformation).
D-En-K04	Knowledge of data security and protection.
D-En-K05	Knowledge of infrastructure and platforms for data science applications.
D-En-K06	Knowledge of data Infrastructure: services and components, including data storage infrastructure.
D-En-K07	Knowledge of data processing models (batch, steaming, parallel)
D-En-K08	Knowledge of navigating solutions for complex data.
D-En-K09	Knowledge of big data solutions for large scale data processing.
D-En-K10	Knowledge of large and ultra-large scale software systems organization & warehouse platforms.
D-En-K11	Knowledge of metadata registries, publishing metadata, and systems integration.
D-En-K12	Knowledge of computer networking concepts and protocols, and network security methodologies.

ABILITIES

D-En-A01	Ability to deal with complex technical problem.
D-En-A02	Ability to work with one of the well-known big data analytics platforms and tools (such as Hadoop, Spark, and cloud based big data services).
D-En-A03	Ability to build complex data structures and high-level programming languages.
D-En-A04	Ability to dissect a problem and examine the interrelationships between data that may appear unrelated.
D-En-A05	Ability to use and understand complex mathematical concepts (e.g., discrete math).
D-En-A06	Ability to multi-task, collaborate with peers, customers, and management of oneself or others to accomplish a variety of different tasks in a constantly changing environment.

EDUCATION

- A bachelor's degree in computer science, statistics, software engineering information technology or a related discipline is usually required.
- A master's or doctoral degree in data science, machine learning, economics, science (if curricula contain data analysis) or a related quantitative field is usually preferred.

EXPERIENCE

- Experience in data engineering techniques and methodologie is usually required.

Artificial Intelligence (AI) Engineer

JOB CARD

WORK ROLE	Artificial Intelligence (AI) Engineer
OCCUPATION CODE	AI-En
CATEGORY	Engineering and Architecture
SPECIALTY AREA	Artificial Intelligence (AI) Engineering

GENERAL JOB DESCRIPTION

AI Enginees are responsible for designing, developing, and implementing artificial intelligence and machine learning solutions. They revolve around creating AI models, algorithms, and applications that can analyze and interpret complex data to deliver actionable insights and predictions. They collaborate with cross-functional teams, including data scientists, software engineers, and domain experts, to integrate AI capabilities into various products and services.

KEY TASKS

AI-En-T01	Implement and deploy artificial intelligence (AI) algorithms, including training machine learning (ML) models such as neural networks, to solve business problems and optimize processes.
AI-En-T02	Develop backend services and APIs to interface with machine learning (ML) models.
AI-En-T03	Build and deploy inference pipelines to productionize ML models.
AI-En-T04	Develop scripts to process structured and unstructured data.
AI-En-T05	Implement natural language processing (NLP) and computer vision techniques to extract insights from unstructured data sources.
AI-En-T06	Utilize tools and frameworks for data exploration, feature engineering, and model evaluation.
AI-En-T07	Optimize AI models for performance, scalability, and accuracy.
AI-En-T08	Design ML/DL systems and infrastructure.
AI-En-T09	Cooperate to integrate AI and ML capabilities into existing applications.
AI-En-T10	Assess, evaluate and validate the model performance bias.
AI-En-T11	Oversee and set-up MLOps (machine learning operations) pipelines required for the delivery of artificial intelligence services on the platform.
AI-En-T12	Determine scheduling of compute resources and inference schedules based on prediction requirements (batch vs real time inferences vs offline, etc.).
AI-En-T13	Monitor the performance of deployed models and watch for concept drifting.

Skills

AI-En-S01	Skill in training machine learning (ML) algorithms to obtain an ML model.
AI-En-S02	Skill in a high-level programming language.
AI-En-S03	Skill in turning ML models into APIs in a high-level programming language.
AI-En-S04	Skill in preprocessing and cleaning large datasets to ensure data quality and prepare them for analysis.
AI-En-S05	Skill in the core artificial intelligence (AI) disciplines such as computer vision (CV), natural language processing (NLP), deep learning (DL).
AI-En-S06	Skill in ensuring continuous improvement of AI models by reviewing and validating the model monitoring capabilities and model retraining workflows.
AI-En-S07	Skill in ensuring continuous improvement of artificial intelligence (AI) models by reviewing & validating the model monitoring capabilities and model retraining workflows.
AI-En-S08	Skill in when to apply which ML algorithm & select the most appropriate ML model for the data at hand.
AI-En-S09	Skill in using Machine Learning Operations (MLOps) concepts & tools to monitor, optimize, improve & deploy AI-enabled solutions.
AI-En-S10	Skill in identifying artificial intelligence solutions computation requirements to define needed compute resources.
AI-En-S11	Skill in using best practices and tools to test, deploy, manage, and monitor ML models in real-world production (ex. MLOps tools).
AI-En-S12	Skill in using of critical thinking and problem solving skills to scale and productionize ML models.
AI-En-S13	Skill in working with stakeholders to identify opportunities to solve business problems.
AI-En-S14	Skill in communicating clearly with seniors and fellow analysts on the required tasks assigned.

Skills

AI-En-S15 Skill in collaborating with data scientists and domain experts to understand requirements and define project objectives.	AI-En-S17 Skill in communicating machine learning and artificial intelligence concepts to non-technical audiences.
AI-En-S16 Skill in project management and delivery methodologies such as agile approach.	AI-En-S18 Skill in fine-tuning & prompt engineering to adapt a general-purpose large language model (LLM).

KNOWLEDGE

AI-En-K01 Knowledge of core ML algorithms and modelling and data science workflows.	AI-En-K06 Knowledge in ML architecture (ex. framing and architect ML solutions).
AI-En-K02 Knowledge of data science workflows for structured and unstructured data bases.	AI-En-K07 Knowledge of communication and teamwork skills.
AI-En-K03 Knowledge of the Core AI disciplines such as CV, NLP, Deep Learning.	AI-En-K08 Knowledge & application of privacy, security compliance, and ethical AI approaches in ML system design.
AI-En-K04 Knowledge of planning, design, testing, and monitoring of various aspects of the AI system, such as data, architecture, infrastructure, and algorithms.	AI-En-K09 Knowledge of application of agile delivery methodologies and concepts.
AI-En-K05 Knowledge of the artificial intelligence solutions requirements to contribute to the definition of production plans, deployment requirements & frameworks, tools, software, hardware, virtualization, and scheduling of compute resources.	AI-En-K11 Knowledge of coaching and mentoring best practices.
	AI-En-K12 Knowledge of privacy and ethical artificial intelligence approaches in ML system design.
	AI-En-K13 Knowledge of the basic concepts, issues and risks related to artificial intelligence and its organizational impact.

ABILITIES

AI-En-A01 Ability to package & deploy digital solutions.	AI-En-A06 Ability to identify dataset size and storage requirements to cater for computing capacity and model scaling requirements as part of the ML system design.
AI-En-A02 Ability to apply critical thinking.	AI-En-A07 Ability to identify AI solutions requirements to contribute to the scheduling of compute resources.
AI-En-A03 Ability to code high & low level object oriented programming languages to a mature level.	AI-En-A08 Ability to comply with local and global data governance regulations.
AI-En-A04 Ability to understand structured and unstructured data bases.	AI-En-A09 Ability to develop ideas from concept to product.
AI-En-A05 Ability to work with application development languages, tools, and frameworks.	

EDUCATION

- A bachelor's degree in computer science, computer systems engineering or a related discipline or completion of a college program in computer science is usually required.
- A master's or doctoral degree in machine learning, data science, or a related quantitative field is usually required.

EXPERIENCE

- Progression to software engineer is possible with experience.
- Experience in statistical modelling or machine learning is usually required.

Data Architect

JOB CARD

WORK ROLE	Data Architect
OCCUPATION CODE	D-Ar
CATEGORY	Engineering and Architecture
SPECIALTY AREA	Data and Artificial Intelligence (AI) Architecture

GENERAL JOB DESCRIPTION

A Data Architect is responsible for designing and implementing an organization's data Architecture, including data models, data integration, data storage, and Data management systems. They work closely with business stakeholders and IT teams to ensure that data solutions align with business objectives and comply with regulatory requirements. They set the vision for the organization's use of data, through data design, to ensure that data is managed properly and meets the organization's needs.

KEY TASKS

D-Ar-T01	Design data architecture that effectively addresses specific business problems while adhering to enterprise-wide standards and principles.
D-Ar-T02	Design & implement data models & integration solutions as well as applications that ensure accuracy, reliability, and scalability.
D-Ar-T03	Develop data storage & management strategies that enable efficient access, analysis, and governance of large datasets.
D-Ar-T04	Ensure that acquired or developed system(s) & architecture(s) are consistent with organization's data architecture guidelines.
D-Ar-T05	Identify and prioritize critical business functions in collaboration with organizational stakeholders.
D-Ar-T06	Collaborate with business stakeholders and IT teams to understand business requirements and design data solutions accordingly.
D-Ar-T07	Collaborate with data scientists and software engineers to develop and deploy data-related solutions.
D-Ar-T08	Design data architectures that integrate security principles and align with security policies, ensuring data confidentiality, integrity, and availability.
D-Ar-T09	Evaluate and select data management tools and technologies.
D-Ar-T10	Evaluate data & security architectures & designs to determine the adequacy of security design & architecture proposed or provided in response to requirements contained in acquisition documents.
D-Ar-T11	Undertake data profiling and source system analysis.
D-Ar-T12	Present clear insights to colleagues to support the end use of the data.
D-Ar-T13	Take responsibility for the assurance of data solutions and make recommendations to ensure compliance.
D-Ar-T14	Document and update as necessary all definition and data architecture activities.
D-Ar-T15	Document how the implementation of a new system or new interface between systems impacts the current and target environment including but not limited to security posture.
D-Ar-T16	Produce, maintain and update relevant data models for an organisation's specific needs.
D-Ar-T17	Extract and document data models from existing systems.
D-Ar-T18	Analyze where data standards have been applied or breached, and undertake an impact analysis of that breach.
D-Ar-T19	Work with metadata repositories to complete complex tasks such as data & systems integration impact analysis.

Skills

D-Ar-S01	Skill to apply data and privacy principles to organizational requirements (relevant to confidentiality, integrity, availability, authentication, non-repudiation).
D-Ar-S02	Skill in design modeling and building use cases (e.g., unified modeling language).
D-Ar-S03	Skill in designing & analyzing data systems, including their resilience, dependability, and response to changes in conditions, operations, and the environment.
D-Ar-S04	Skill in communicating effectively with technical and non-technical stakeholders.
D-Ar-S05	Skill in supporting & hosting discussions within a multidisciplinary team, with potentially difficult dynamics.
D-Ar-S06	Skill in being an advocate for the team externally, and can manage differing perspectives.
D-Ar-S07	Skill in developing data standards for a specific component.
D-Ar-S08	Skill in maintaining a repository to ensure information remains accurate and up to date.
D-Ar-S09	Skill to identify data and privacy issues that stem from connections with internal and external customers & partner organizations.

Skills	D-Ar-S10	Skill in applying and incorporating information technologies into proposed solutions.	D-Ar-S11	Skill in determining the appropriate remedy and assist with its implementation.
			D-Ar-S12	Skill in determining preventive measures.
KNOWLEDGE	D-Ar-K01	Knowledge of various types of data architectures.	D-Ar-K10	Knowledge of key concepts in security and data management.
	D-Ar-K02	Knowledge of data modeling and integration techniques.	D-Ar-K11	Knowledge of data architecture tools, methods, and techniques.
	D-Ar-K03	Knowledge of the enterprise information technology (IT) architectural concepts and patterns (e.g., baseline, validated design, and target architectures.)	D-Ar-K12	Knowledge of software engineering.
			D-Ar-K13	Knowledge of data storage & management principles, models, methods, and systems.
			D-Ar-K14	Knowledge of organizational process improvement concepts and process maturity models.
	D-Ar-K04	Knowledge of risk management processes related to data security, privacy, & governance. (e.g., methods for assessing and mitigating risk).	D-Ar-K15	Knowledge of service management concepts for data and related standards.
	D-Ar-K05	Knowledge of laws, regulations, policies, and ethics as they relate to data and privacy.	D-Ar-K16	Knowledge of confidentiality, integrity, and availability requirements.
	D-Ar-K06	Knowledge of data and privacy principles.	D-Ar-K17	Knowledge of data-enabled solutions.
	D-Ar-K07	Knowledge of database design & database programming.	D-Ar-K18	Knowledge of data analysis and visualization tools.
	D-Ar-K08	Knowledge of organization's enterprise information security architecture.	D-Ar-K19	Knowledge of cloud computing and big data technologies.
	D-Ar-K09	Knowledge of data and privacy principles and organizational requirements (relevant to confidentiality, integrity, availability, authentication, non-repudiation).	D-Ar-K20	Knowledge of an organization's information classification program and procedures data breach.
ABILITIES	D-Ar-A01	Ability to apply the methods, standards, and approaches for describing, analyzing, and documenting an organization's enterprise data architecture.	D-Ar-A07	Ability to design and implements data governance frameworks to ensure data integrity, security, and compliance.
			D-Ar-A08	Ability to share expertise in writing and verbally with other members of the team.
	D-Ar-A02	Ability to apply an organization's goals and objectives to develop and maintain data architecture.	D-Ar-A09	Ability to develop cutting-edge systems and use them in a creative way.
	D-Ar-A03	Ability to design and optimize systems to meet enterprise performance requirements.	D-Ar-A10	Ability to perform outstanding maths activates, strong analytical and problem-solving techniques.
	D-Ar-A04	Ability to execute technology integration processes.	D-Ar-A11	Ability to write a high-level of programming language, adapt new scripting languages, understand the requirements & constraints of software products & services on different platforms including intelligent one(s).
	D-Ar-A05	Ability to build data architectures & frameworks.		
	D-Ar-A06	Ability to apply data and privacy principles to organizational requirements (relevant to confidentiality, integrity, availability, authentication, non-repudiation).	D-Ar-A12	Ability to create basic visuals & presentations.

EDUCATION	- A bachelor's degree in computer science, statistics, mathematics, software engineering or related field is usually required. - A master's or doctoral degree in statistics, data science, or a related quantitative field is usually preferred.
EXPERIENCE	- Experience in enterprise data architecture is usually required.

Data Modeler Associate

JOB CARD	
WORK ROLE	Data Modeler Associate
OCCUPATION CODE	D-Ma
CATEGORY	Engineering and Architecture
SPECIALTY AREA	Data & Artificial Intelligence (AI) Architect

GENERAL JOB DESCRIPTION

Data Modellers are responsible for designing, creating, and maintaining the data models used by an organization (using relational, dimensional, and NoSQL databases). Data models are used to represent the data structures and relationships within a database or an information system. The Data Modeller works closely with the business stakeholders to understand their requirements and translate them into a data model that meets their needs. The Data Modeller also ensures that the data model is scalable, efficient, and easy to maintain.

KEY TASKS

D-Ma-T01	Perform data profiling/analysis activities that helps to establish, modify, and maintain data model.
D-Ma-T02	Apply data analysis, design, modelling, & quality assurance techniques, based upon a detailed understanding of business processes, to establish, modify or maintain data structures and associated components (entity descriptions, relationship descriptions, attribute definitions).
D-Ma-T03	Ensure and enforce a governance process to oversee implementation activities and ensure alignment to the defined architecture.
D-Ma-T04	Help the business in identifying how data supports business processes and how to model those needs.
D-Ma-T05	Liaise with stakeholders in building trust in the data being used for decision making.
D-Ma-T06	Work closely with data architects to develop bespoke databases utilizing a mixture of conceptual, physical, and logical models.
D-Ma-T07	Work with key business representatives, data owners, end users, application designers and data architects to design current and future state data model.
D-Ma-T08	Synchronize data models and implemented databases to identify implementation completeness and identify any gaps.
D-Ma-T09	Recommend data modeling and design standards to Senior Data Modeler and Data Architect.
D-Ma-T10	Collaborate with data architect to design, implement, and document data architecture and data modeling solutions to support enterprise information management, business intelligence, machine learning, data science, and other business interests.
D-Ma-T11	Work with platform engineering teams to drive automation by guiding them through data modeling activities.
D-Ma-T12	Be responsible to produce a data modelling standard and framework, outlining key concepts and principles of data modelling, design standards against best practice suitable for the needs of the business.
D-Ma-T13	Design, build and maintain enterprise data models, meta-data models (graphical data models and textual descriptions) including subject area models, conceptual and logical data models, entity relationship diagrams.
D-Ma-T14	Advocate for data, managing differing perspectives across teams.
D-Ma-T15	Translate technical concepts into non-technical language across a range of internal and external stakeholders.
D-Ma-T16	Provide expert advice to business teams on data standards, engaging with colleagues early in the design phases of products and services.
D-Ma-T17	Undertake data profiling and source system analysis and can present clear insights to colleagues to support the end use of the data.
D-Ma-T18	Collaborate with data architect to provide data architecture assurance on projects or programs as required.
D-Ma-T19	Engage with stakeholders to agree, define, and implement master data management, data architecture, and reference data management.
D-Ma-T20	Represent data on projects, working groups and governance committees.
D-Ma-T21	Applies data analysis, design, modelling, & quality assurance techniques, based upon a detailed understanding of business processes, to establish, modify or maintain data structures and associated components (entity descriptions, relationship descriptions, attribute definitions).
D-Ma-T22	Advises database designers & other application development team members on the details of data structures and associated components.

Skills		
	D-Ma-S01 Skill in designing and creating data models.	D-Ma-S09 Skill in communicating the details of data structures & associated components to others using the data structures and associated components.
	D-Ma-S02 Skill in maintaining & updating data models.	D-Ma-S10 Skill in creating and utilizing mathematical or statistical models.
	D-Ma-S03 Skill in ensuring data models are scalable, efficient, and easy to maintain.	D-Ma-S11 Skill in developing data dictionaries.
	D-Ma-S04 Skill in translating business requirements into data models.	D-Ma-S12 Skill in developing data models, design modeling (e.g., unified modeling language).
	D-Ma-S05 Skill in identifying and resolving data-related issues.	D-Ma-S13 Skill in data mining techniques (e.g., searching file systems) and analysis.
	D-Ma-S06 Skill in working with data modelling tools and industry standard techniques to capture and document data artefacts & be knowledgeable on topics such as data lineage, data usage and data structures.	D-Ma-S14 Skill in identifying hidden patterns or relationships.
	D-Ma-S07 Skill in applying standard data modelling and designing techniques based upon a detailed understanding of requirements.	D-Ma-S15 Skill in data modeling & data mapping tools.
	D-Ma-S08 Skill in establishing, modifying, & maintaining data structures and associated components.	D-Ma-S16 Skill to identify sources, characteristics, and uses of the organization's data assets.
		D-Ma-S17 Skill in generating queries and reports.
		D-Ma-S18 Skill in communicating effectively with technical and non-technical stakeholders.

KNOWLEDGE		
	D-Ma-K01 Knowledge of data modeling concepts and integration techniques.	D-Ma-K11 Knowledge of programming language structures and logic.
	D-Ma-K02 Knowledge of data management areas including data architecture, data modelling and design, data quality, reference and master data, and metadata.	D-Ma-K12 Knowledge of sources, characteristics, and uses of the organization's data assets.
	D-Ma-K03 Knowledge of using basic descriptive statistics and techniques (e.g., normality, model distribution, scatter plots).	D-Ma-K13 Knowledge of the capabilities & functionality associated with various technologies for organizing and managing information (e.g., databases, bookmarking engines).
	D-Ma-K04 Knowledge of data modeling tools such as ERwin, ER/Studio, or PowerDesigner.	D-Ma-K14 Knowledge of laws, regulations, policies, and ethics as they relate to data, privacy, and cybersecurity.
	D-Ma-K05 Knowledge of data management best practices.	D-Ma-K15 Knowledge of risk management processes (e.g., methods for assessing and mitigating risk).
	D-Ma-K06 Knowledge of database management systems, query languages, table relationships, and views.	D-Ma-K16 Knowledge of machine learning theory and principles.
	D-Ma-K07 Knowledge of query languages such as SQL (structured query language).	D-Ma-K17 Knowledge of database theory.
	D-Ma-K08 Knowledge of data migration planning and implementation.	D-Ma-K18 Knowledge of Information Theory (e.g., source coding, channel coding, algorithm complexity theory, and data compression).
	D-Ma-K09 Knowledge of data mining and data warehousing principles.	D-Ma-K19 Knowledge of machine learning theory and principles.
	D-Ma-K10 Knowledge of digital rights management.	

ABILITIES

D-Ma-A01	Ability to interface with, and gain the respect of, stakeholders at all levels and roles within the company.
D-Ma-A02	Ability to prioritize and use initiative.
D-Ma-A03	Problem solving and analytical skills.
D-Ma-A04	Attention to detail and accuracy.
D-Ma-A05	Ability to work independently and in a team environment with good communication and collaboration skills.
D-Ma-A06	Ability to work with considerable latitude and independence of action.
D-Ma-A07	Ability to clearly communicate technical concepts verbally and in writing to management, technical staff, and customers in terms appropriate for each audience.
D-Ma-A08	Ability to analyze large amounts of detailed information, quickly understand complex issues, and break information down into smaller, more manageable pieces.
D-Ma-A09	Ability to communicate complex information, or ideas in a confident & well-organized manner through verbal, written, and/or visual means.
D-Ma-A10	Ability to evaluate information for reliability, validity, and relevance.
D-Ma-A11	Ability to build complex data structures and high-level programming languages.
D-Ma-K12	Ability to function in a collaborative environment, seeking continuous consultation with other data science members and experts—both internal and external to the organization—to leverage analytical and technical expertise.

EDUCATION

- A bachelor's degree in computer science, statistics, mathematics, software engineering or related field is usually required.
- A master's or doctoral degree in statistics, machine learning, data science, or a related field is usually preferred.

EXPERIENCE

- Experience with data modeling solutions, including tools, industry data models, data warehouse approaches, data modeling approaches relational, and dimensional or equivalent knowledge is required.

5.5 Research Category

Artificial Intelligence (AI) Ethicist

JOB CARD		
	WORK ROLE	Artificial Intelligence (AI) Research Scientist
	OCCUPATION CODE	AI-R
	CATEGORY	Research
	SPECIALTY AREA	Artificial Intelligence (AI) Research

GENERAL JOB DESCRIPTION

This job applies scientific discovery research/process, including hypothesis and hypothesis testing, to obtain actionable knowledge related to scientific problem, business process, or reveal hidden relations between multiple processes. The goal of AI Research is to explore and advance cutting-edge research in AI, including ML as well as related fields like Cryptography, to develop and discover principles of impact to an organization's clients and businesses.

KEY TASKS

AI-R-T01	Conduct artificial intelligence research, typically within a specialized focus area.
AI-R-T02	Conduct logical analyses of business, scientific, engineering, and other technical problems, formulating mathematical models of problems for solution by computers.
AI-R-T03	Work on multiple research projects in collaboration with internal and external researchers and with applied engineering teams.
AI-R-T04	Provide advice on information systems strategy, policy, management and service delivery.
AI-R-T05	Participate in relevant top-tier academic conferences.
AI-R-T06	Conduct reviews to assess quality assurance practices, software products and information systems.
AI-R-T07	Build models and simulations to describe data, predict events, and inform a course of action.
AI-R-T08	Work with senior leaders to help define, build, and transform businesses.
AI-R-T09	Carry out analysis techniques for data inspection, exploration and visualisation.
AI-R-T10	Support test and evaluation as well as validation and verification efforts, by developing a test harness to support systematic evaluation of machine learning frameworks using evaluation data sets.
AI-R-T11	Execute, with team lead oversight, experiments to develop novel assets (algorithms or solutions) to be reused across organizational teams.
AI-R-T12	Contribute to the R&D team by analyzing previous research reports and deriving insights that can be leveraged in current research use cases.
AI-R-T13	Apply appropriate statistical techniques to available data to discover new relations and offer insight into research problems, helping to improve organizational processes, support decision making, solve problems, fix critical errors, and raise important issues to appropriate level.
AI-R-T14	Help to identify the data engineering requirements for any data science product, while working with data engineers and data scientists to design and deliver those products into the organization effectively.

Skills				
	AI-R-S01	Skill in working with ML frameworks, libraries, and packages.	AI-R-S07	Skill in examining data or facts to determine appropriate actions or recommendations.
	AI-R-S02	Skill in working in an interdisciplinary research environment, especially running experiments.	AI-R-S08	Skill in determining phases and steps, defining activities and tasks and establishing schedules to complete objectives on time and within budget.
	AI-R-S03	Skill in providing guidance & advice to enable decision-making about tasks, situations, and processes.	AI-R-S09	Skill in estimating the results of an action or a series of actions.
	AI-R-S04	Skill in preparing and delivering written, oral or visual material for the workplace that presents information.	AI-R-S10	Skill in developing machine learning, statistical models and experimental designs.
	AI-R-S05	Skill in developing alliances, contacts or partnerships, and exchanging information with others.	AI-R-S11	Skill in directing & monitoring the performance of others.
	AI-R-S06	Skill in building models and simulations to describe data, predict events, and inform a course of action.	AI-R-S12	Skill in identifying & defining concrete machine learning tasks and solutions when presented with broader customer needs.

KNOWLEDGE				
	AI-R-K01	Knowledge of public safety and security operations and systems, of policy, regulations and procedures for the protection of people, data and property.	AI-R-K06	Knowledge of critique statistical analyses, and application of machine learning techniques and methodologies.
	AI-R-K02	Knowledge of all aspects of the research lifecycle such as formulating problems, gathering data, generating hypotheses, developing models and algorithms, conducting experiments, synthesizing results, building prototype applications and communicating the significance of research.	AI-R-K07	Knowledge of a broad range of statistical tools, particularly those deployed within the organization, & can use these appropriately and help others to use them.
	AI-R-K03	Knowledge of arithmetic, algebra, geometry, calculus and their applications, principles, methods and function.	AI-R-K08	Knowledge of ML/DL techniques both from mathematical formulation to applied issues such as loss functions, optimization methods, sampling, under- and over-fitting.
	AI-R-K04	Knowledge of core AI disciplines create new methods and architectures of new algorithms.	AI-R-K09	Knowledge of the role of ethical AI and its application in research projects.
	AI-R-K05	Knowledge of one or more specialized areas; e.g., deep learning (DL), reinforcement learning (RL), planning, information representation & retrieval, graphs, multiagent systems (MAS), natural language processing (NLP), or other AI fields.	AI-R-K10	Knowledge of exploratory and confirmatory data analysis.
			AI-R-K11	Knowledge of computer systems organization for big data applications, CAP, BASE and ACID theorems.
			AI-R-K12	Knowledge of quantitative and qualitative analytics.
			AI-R-K13	Knowledge of data visualization tools and agile delivery methodologies and concepts.

ABILITIES	AI-R-A01	Ability to work in collaborative project settings.
	AI-R-A02	Ability to obtain and maintain a KSA Top Secret level security clearance. If selected, he/she will be subject to a government security clearance investigation and must meet the requirements for access to classified information.
	AI-R-A03	Ability to translate mathematical concepts into well-documented and efficient code.
	AI-R-A04	Ability to interpreting statistical output effectively and accurately.
	AI-R-A05	Ability to understand applied mathematics and statistics methods, and can use this knowledge to carry out AI related-tasks.
	AI-R-A06	Ability to collect, prepare and analyse datasets.
	AI-R-A07	Ability to work under tight timelines, in cases for multiple project deliveries.
	AI-R-A08	Ability to adapt in a fast paced multinational environment.
	AI-R-A09	Ability to coordinate with several institutes to build data and code repositories.

EDUCATION	- A master's degree in statistics, mathematics, computer science, computer systems engineering or related discipline is usually required. - A master's or doctoral degree in artificial intelligence, machine learning, data science, or a related quantitative field is usually preferred.
EXPERIENCE	- Experience in research is usually required. - Experience in statistical modelling or machine learning is usually required.

SDAIA recommends that the organizations and practitioners should invest in human capital by applying the National Occupational Standard Framework for Data and Artificial Intelligence, which will contribute to improve and refine practices and formulating career paths for national capabilities and benefitting from it in the applications related to the human capacity development. For instance: talent acquisition, job description development, workforce planning, guiding and developing individuals professionally, performance management and evaluation, developing licenses and accredited professional certificates, and developing national occupational policies. Besides, one of SDAIA uses of the National Occupational Standard Framework for Data and Artificial Intelligence in formulating career paths can be viewed in (Annex A).

Annex

Annex (A)

SDAIA has applied the national occupational standards in Data & AI. This is achieved by applying internally defined occupations with standardized job titles & career paths for each profession.

SADAD implemented the National Occupational Standards Framework for Data & AI by aligning the framework with occupations internally & creating unified job titles & paths for each profession. These paths and titles allow employees to clearly understand their career progression at all levels and the job requirements within it.

This step is part of SDAIA's efforts to develop human capital, as the framework outlines the required tasks to perform and the knowledge and skills that enable employees to perform tasks. this is linked with employee training requirements through learning paths, professional certifications, and on-the-job training programs.

Career paths for core data and artificial intelligence jobs

Chief	Expert	Principle	Senior	Engineer	
Chief Data Engineer	Expert Data Engineer	Principle Data Engineer	Senior Data Engineer	Data Engineer	Data Engineering
Chief Data Scientist	Expert Data Scientist	Principle Data Scientist	Senior Data Scientist	Data Scientist	Data Science
Chief Data Analyst	Expert Data Analyst	Principle Data Analyst	Senior Data Analyst	Data Analyst	Data Analysis
Chief AI Engineer	Expert AI Engineer	Principle AI Engineer	Senior AI Engineer	AI Engineer	AI Engineering
Chief AI Researcher	Expert AI Researcher	Principle AI Researcher	Senior AI Researcher	AI Researcher	AI Research

AI Engineer

	Requirements			Progression		Technical Evaluation	Promotion Requirement
	Education	Years of Experience	Accreditation	On Job Practice / Training	Training programs/ Professional Certificates		
AI Engineer	**Bachelor's Degree** in Computer Science, Electric Engineering or relevant field	**Fresh Graduate**	**A certificate of readiness** from the Education and Training Evaluation Commission	**Job rotation & training with close supervision from a team lead on some or all the required competencies:** Computer Vision, NLP, Deep Learning, Data Science, DevOps, Agile Development, Privacy & Security Compliance, Data Engineering, Data Governance.	**Intensive Training programs & bootcamps in the required competencies, such as but not limited to:** - Deep Learning Specialization by deeplearning AI. - Machine Learning by Andrew Ng, Stanford University. - Applied AI with DeepLearning by IBM. **Professional Certificates in the required competencies such as but not limited to (or equivalent):** - Google TensorFlow Developer Certificate. - AWS Certified Machine Learning. – Specialtyz. - Microsoft Certified Azure AI Engineer Associate.	**Practical tests** (to be devloped)	**Human Resources Department requirements for promotion**
Senior AI Engineer		**2-4 years** of experience in AI/ML engineering experience or software development or equivalent experience in ML	**SDAIA Professional** Accreditation (Senior)	**On job training with minor supervision from a team lead for intermediate level on some or all the required competencies:** Computer Vision, NLP, Deep Learning, Data Science, DevOps, Agile Development, Privacy & Security Compliance, Data Engineering, Data Governance.	**Professional Certificates in the required competencies such as but not limited to (or equivalent):** - Google Machine Learning Professional. - IBM AI Engineering Professional Certificate.		

AI Engineer

	Requirements			Progression		Technical Evaluation	Promotion Requirement
	Education	Years of Experience	Accreditation	On Job Practice / Training	Training programs/ Professional Certificates		
AI Engineer	**Bachelor's Degree** in Computer Science, Electric Engineering or relevant field	**4-6 years** of experience in AI/ML engineering experience or software development or equivalent experience in ML	**SDAIA Professional** Accreditation (Principle)	- **Mentoring & training** number of engineers & senior engineers. - **Technically leading** a team of engineers in number of projects with reporting to a project manager.	**Recommended Professional development training and Certificates, Such as but not limited to:** **MIT technical leaders training:** - Gordon-MIT Engineering Leadership Program. - Technology Leadership Program. **Public Speaking for Technical Leaders:** - Speaking as a leader by the Humphrey group. **Leaders' programs by Harvard Business School:** - Program for Leadership Development. - Negotiation Mastery.	**No test** required	**Human Resources Department requirements for promotion**
Expert AI Engineer		**6-8 years** of experience in AI/ML engineering experience or software development or equivalent experience in ML	**Expert evaluation**	**- Fully managing and leading a team of principles** in a number of projects.	**Recomended Advanced Professional Development Certificates for Technical Leaders, such as but not limited to:** **Executive leaders programs by Harvard Business School:** - Advanced Management Program (AMP). - General Management Program (GMP). - Driving Digital Strategy. - Leading Change and Organizational Renewal.		
Chief AI Engineer		**8+ years** of experience in AI/ML engineering experience or software development or equivalent experience in ML					

AI Research

	Requirements			Progression		Technical Evaluation	Promotion Requirement
	Education	Years of Experience	Accreditation	On Job Practice / Training	Training programs/ Professional Certificates		
AI Researcher	**Bachelor's Degree** in Computer Science, Electric Engineering or relevant field	**Fresh Graduate**	**A certificate of readiness** from the Education and Training Evaluation Commission	**On job rotation and training with close supervision for entry level on some or all the required competencies:** Develop and implement artificial intelligence solutions for processing big data and conduct research in the fields of artificial intelligence and data science.	**Recommendation for:** - Attending national and international conferences. - Nomination for postgraduate scholarships for master's degree holders.	**Practical tests** (to be devloped)	**Human Resources Department requirements for promotion**
Senior AI Researcher		**2-4 years** of experience in research in artificial intelligence sciences.	**SDAIA Professional** Accreditation (Senior)	**On job training with minor supervision from a team lead for intermediate level on some or all the required competencies:** Develop and implement artificial intelligence solutions for processing big data and conduct research in the fields of artificial intelligence and data science.	**Training, professional development & professional certifications are recommended, including but not limited to:** **Training for technical leaders at MIT:** - Gordon-MIT Engineering Leadership Program. - Technology Leadership Program. **Public Speaking for Technical Leaders:** - Speak like a leader. **Leadership Programs from Harvard Business School:** - Leadership Development Program. - Negotiation Mastery.		

AI Research

	Requirements			Progression		Technical Evaluation	Promotion Requirement
	Education	Years of Experience	Accreditation	On Job Practice / Training	Training programs/ Professional Certificates		
Principle AI Researcher	**Bachelor's Degree** in Computer Science, Electric Engineering or relevant field	**4-6 years** of experience in research in artificial intelligence sciences.	**SDAIA Professional** Accreditation (Principle)	- **Mentoring & training** number of AI researchers & senior AI researchers. - **Technically leading** a team of researchers on a number of projects reporting to the Project Manager.	**Advanced professional training & certifications for technical leaders are recommended, but not limited to:** **Harvard Business School Executive Leadership Programs:** - AMP Advanced Management Software. - Public Administration Program. - Leading digital strategy. - Leading change and organizational renewal.	**No test** required	**Human Resources Department requirements for promotion**
Expert AI Researcher		**6-8 years** of experience in research in artificial intelligence sciences.	**Expert evaluation**	**- Fully managing and leading a team of principles** in a number of projects.			
Chief AI Researcher		**8+ years** of experience in research in artificial intelligence sciences.					

Data Engineer

	Requirements			Progression		Technical Evaluation	Promotion Requirement
	Education	Years of Experience	Accreditation	On Job Practice / Training	Training programs/ Professional Certificates		
Data Engineer	**Bachelor's Degree** in Computer Science, Electric Engineering or relevant field	**Fresh Graduate**	**A certificate of readiness** from the Education and Training Evaluation Commission	**On job rotation and training with close supervision for entry level on some or all the required competencies:** AI Solutions Development, DevOps, Agile Development, Privacy and Security Compliance, Data Engineering, Data Governance.	**Intensive Training programs and bootcamps in the required competencies, such as but not limited to:** - Data Engineering Foundations Specialization by the University of California - Modern Big Data Analysis with SQL Specialization by the University of California - Data Engineering Bootcamp - Data Camp **Professional Certificates in the required competencies such as but not limited to (or equivalent):** - IBM Certified Data Engineer -DAMA-CDAM: The Certified Data Management Associate (CDAM) - AWS Certified Machine Learning – Specialty.	**Practical tests** (to be devloped)	**Human Resources Department requirements for promotion**
Senior Data Engineer		**2-4 years** of experience in Data Engineering or similar roles	**SDAIA Professional** Accreditation (Senior)	**On job training with minor supervision from a team lead for intermediate level on some or all the required competencies:** AI Solutions Development, DevOps, Agile Development, Privacy and Security Compliance, Data Engineering, Data Governance, Machine Learning.	**Professional Certificates in the required competencies such as but not limited to (or equivalent):** - Data Engineer Professional (Google). - AWS Certified Big Data. - DAMA-DAA: The Data Management Architect (DAA). - Google Machine Learning Professional.		

	Data Engineer						
	Requirements			Progression		Technical Evaluation	Promotion Requirement
	Education	Years of Experience	Accreditation	On Job Practice / Training	Training programs/ Professional Certificates		
Principle Data Engineer	**Bachelor's Degree** in Computer Science, Electric Engineering or relevant field	**4-6 years** of experience in Data Engineering or similar roles	**SDAIA Professional** Accreditation (Principle)	- **Mentoring & training** number of AI researchers & senior AI researchers. - **Technically leading** a team of researchers on a number of projects reporting to the Project Manager.	**Recommended Professional development training and Certificates, Such as but not limited to:** **MIT technical leaders training:** - Gordon-MIT Engineering Leadership Program. - Technology Leadership Program. **Public Speaking for Technical Leaders:** - Speaking as a leader by the Humphrey group. **Leaders' programs by Harvard Business School:** - Program for Leadership Development. - Negotiation Mastery.	**No test** required	**Human Resources Department requirements for promotion**
Expert Data Engineer		**6-8 years** of experience in Data Engineering or similar roles	**Expert evaluation**	**- Fully managing and leading a team of principles** in a number of projects.	**Recomended Advanced Professional Development Certificates for Technical Leaders, such as but not limited to:** **Executive leaders programs by Harvard Business School:** - Advanced Management Program (AMP). - General Management Program (GMP). - Driving Digital Strategy. - Leading Change and Organizational Renewal.		
Chief Data Engineer		**8+ years** of experience in Data Engineering or similar roles					

Data Science

	Requirements			Progression		Technical Evaluation	Promotion Requirement
	Education	Years of Experience	Accreditation	On Job Practice / Training	Training programs/ Professional Certificates		
Data Scientist	**Master's** in Data Science or equivalent	**Fresh Graduate**	**A certificate of readiness** from the Education and Training Evaluation Commission	**On job rotation and training with close supervision for entry level on some or all the required competencies:** Machine Learning, Data Science, AI Solution Development, Agile Development, Model Testing.	**Intensive Training programs and bootcamps in the required competencies, such as but not limited to:** - Data Science Specialization: Statistics and Machine Learning. - Data Science Applications using Python from the University of Michigan. - Machine Learning from Stanford University. - Data Visualization and Communication using Tableau. **Professional Certificates in the required competencies such as but not limited to (or equivalent):** - Microsoft Azure Data Science Specialist. - Data Analyst using Microsoft Power BI. - AWS Certified Machine Learning Practitioner.	**Practical tests** (to be devloped)	**Human Resources Department requirements for promotion**
Senior Data Scientist		**2-4 years** of experience in data science and analysis or a related field.	**SDAIA Professional** Accreditation (Senior)	**On job training with minor supervision from a team lead for intermediate level on some or all the required competencies:** Machine Learning, Data Science, AI Solution Development, Agile Development, Model Testing.	**Professional Certificates in the required competencies such as but not limited to (or equivalent):** - Data Science Professional Certification from IBM. - Google Data Analytics Professional Certification. - Machine Learning Professional Engineer.		

Data Science

	Requirements			Progression		Technical Evaluation	Promotion Requirement
	Education	Years of Experience	Accreditation	On Job Practice / Training	Training programs/ Professional Certificates		
Principle Data Scientist	**Master's** in Data Science or equivalent	**4-6 years** of experience in data science and analysis or a related field.	**SDAIA Professional** Accreditation (Principle)	- **Mentoring & training** number of AI researchers & senior AI researchers. - **Technically leading** a team of researchers on a number of projects reporting to the Project Manager.	**Recommended Professional development training and Certificates, Such as but not limited to:** **MIT technical leaders training:** - Gordon-MIT Engineering Leadership Program. - Technology Leadership Program. **Public Speaking for Technical Leaders:** - Speaking as a leader by the Humphrey group. **Leaders' programs by Harvard Business School:** - Program for Leadership Development. - Negotiation Mastery.	**No test** required	**Human Resources Department requirements for promotion**
Expert Data Scientist		**6-8 years** of experience in data science and analysis or a related field.	**Expert evaluation**	**- Fully managing and leading a team of principles** in a number of projects.	**Recomended Advanced Professional Development Certificates for Technical Leaders, such as but not limited to:** **Executive leaders programs by Harvard Business School:** - Advanced Management Program (AMP). - General Management Program (GMP). - Driving Digital Strategy. - Leading Change and Organizational Renewal.		
Chief Data Scientist		**8+ years** of experience in data science and analysis or a related field.			**Recommendation for:** - Attending national and international conferences. - Nomination for postgraduate scholarships.		

	Data Analysis						
	Requirements			Progression		Technical Evaluation	Promotion Requirement
	Education	Years of Experience	Accreditation	On Job Practice / Training	Training programs/ Professional Certificates		
Data Analyst	**Bachelor's degree** in Computer Science, Information Technology, or equivalent	**Fresh Graduate**	**A certificate of readiness** from the Education and Training Evaluation Commission	**On job rotation and training with close supervision for entry level on some or all the required competencies:** Statistical Understanding, Programming with Python, R or SQL, ability to query and analyze data using SQL, Predictive analysis skills, creating graphs and illustrations to simplify data and make it easier to understand.	**Professional certificates in the required competencies include, but are not limited to (or their equivalent):** - DAMA Framework. - CDMP ASSOCIATE.	**Practical tests** (to be devloped)	**Human Resources Department requirements for promotion**
Senior Data Analyst		**2-4 years** of experience in data analysis using statistical, mathematical, and computational methods to explore patterns and trends in data.	**SDAIA Professional** Accreditation (Senior)	**On job training with minor supervision from a team lead for intermediate level on some or all the required competencies:** Statistical Understanding, Programming with Python, R or SQL, ability to query and analyze data using SQL, Predictive analysis skills, creating graphs and illustrations to simplify data and make it easier to understand.	**Professional Certificates in the required competencies such as but not limited to (or equivalent):** - Data Science Professional Certification from IBM. - Google Data Analytics Professional Certification. - Machine Learning Professional Engineer.		

Data Science

	Requirements			Progression		Technical Evaluation	Promotion Requirement
	Education	Years of Experience	Accreditation	On Job Practice / Training	Training programs/ Professional Certificates		
Principle Data Analyst	**Bachelor's degree** in Computer Science, Information Technology, or equivalent	**4-6 years** of experience in data analysis using statistical, mathematical, and computational methods to explore patterns and trends in data.	**SDAIA Professional** Accreditation (Principle)	- **Mentoring & training** number of AI researchers & senior AI researchers. - **Technically leading** a team of researchers on a number of projects reporting to the Project Manager.	**Professional certificates in the required competencies include, but are not limited to (or their equivalent):** -CDMP PRACTITIONER.	**No test** required	**Human Resources Department requirements for promotion**
Expert Data Analyst		**6-8 years** of experience in data analysis using statistical, mathematical, and computational methods to explore patterns and trends in data.	**Expert evaluation**	**- Fully managing and leading a team of principles** in a number of projects.	**Training, professional development & professional certifications are recommended, including but not limited to:** -CDMP PRACTITIONER. -PMP. -TOGAF. -ISO 8000. -Lean Six Sigma Green/Black Belt.		
Chief Data Analyst		**8+ years** of experience in data analysis using statistical, mathematical, and computational methods to explore patterns and trends in data.		**-Experience** in leadership and management. **-Experience** in project management.	**Recommendation for:** - Attending national and international conferences. - Nomination for postgraduate scholarships.		


SDAIA
الهيئة السعودية للبيانات
والذكاء الاصطناعي
Saudi Data & AI Authority