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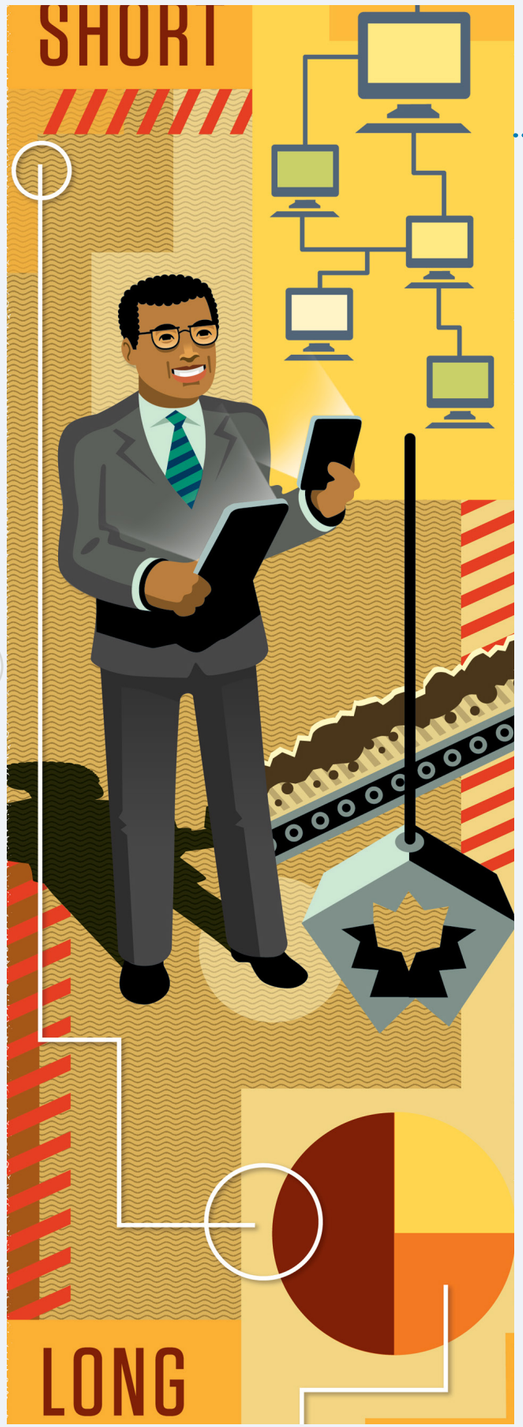
A DELOITTE SERIES ON THE FUTURE OF WORK IN MINING

The future of work in mining

What will jobs look like in intelligent mining operations?

Nerve Center data scientist

Development and management of KPIs; management of data integration, data integrity, and verification; as well as development of advanced analytics through the coding of algorithms and maintenance and direction of AI machine learning



NERVE CENTER DATA SCIENTIST

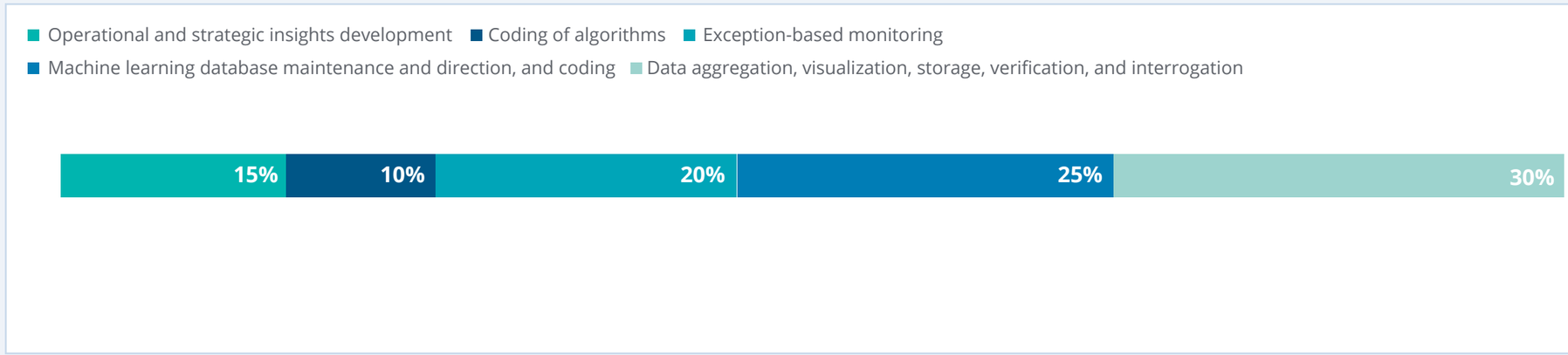
Summary

The Nerve Center data scientist is a hybrid role playing the critical link between digitized operations, processes, and assets; short-term operational efficiency; and long-term strategy. They use their core understanding of data science to marry cutting-edge technology and business operations. Using their operational experience and analytical insight, they align mining operations with strategic intent through KPI dashboard visualization, developing and updating advanced analytics algorithms, providing direction, maintaining machine learning paths, and auditing cognitive automation decision paths. They conduct technical activities such as data management and develop analytics solutions that solve business-related problems by extracting value from the data. The Nerve Center data scientist uses a platform with data analytics tools to develop algorithms and visualizations that will drive business decisions, and builds in business logic and smart workflows to enable exception-based monitoring and preconfigured automatic escalations. They are directly involved in training, tuning, and testing data for machine learning algorithms to increase accuracy and integrity of data outputs. The Nerve Center data scientist acts as the data ethicist for integrated operations by maintaining compliance with government regulations and follows an ethical approach when working with data. They regularly conduct audits on the decision paths followed by the algorithms informing the Nerve Center notifications and make the necessary adjustments in consultation with the Nerve Center orchestrator and relevant site personnel.

Responsibilities

- Generate, aggregate, and prepare data, as well as ensure data governance
- Develop algorithms and data visualizations with built-in business logic and workflows to enable decision-making and exception-based monitoring
- Receive requests and instructions from the Nerve Center orchestrator regarding new analytics and data visualization use cases
- Engage with stakeholders to formulate algorithms and test its accuracy
- Ensure the integrity of data and algorithms through regular audits and apply ethical approaches when working with data

Time spent on activities



ALLAN MISTRY

NERVE CENTER DATA SCIENTIST
Mining Inc.

Allan is a decisive, hard-working individual. He is a fast learner and has developed a strong interest and passion for data science. He believes that one never stops learning in analytics. His background in engineering and mining, as well as his affinity for big data, created the opportunity for him to become a Nerve Center data scientist. He loves to work remotely although he connects with his colleagues regularly through video conferencing and social platforms.

Experience

Nerve Center data scientist
Mining Inc. | *Aug 2020 - present*
Works within the Nerve Center to develop advanced analytics algorithms and monitor digital operations as well as report real-time data to inform day-to-day operations

Data scientist
ABC Mining Technologies | *June 2018 - Jul 2020*
Applied data preparation and data mining techniques, performed statistical analyses, and built predictive algorithms

Mine planning engineer
Mining Inc. | *Jun 2015-May 2018*
Directed and managed all mine production activities, including planning, budgeting, staffing, cost control, and profitability

Education

- **edEx | The future of mining**
- **Udemy | Python for data science and machine learning bootcamp**
- **World University | BSc, Data analytics**
- **World University | BEng. Mining**

Toolbox

Nerve Center
A visual display that presents data, live information, and analysis from multiple sources to facilitate informed decision-making

Nuance
A software package that performs semantics and text-topic clustering

DNAi
Automated supervised learning to create predictive models through hyper acceleration and automation of key modelling process steps, i.e., feature engineering, feature selection, and algorithmic selection

Skills and endorsements

HUMAN

Business acumen · 200
Endorsed by **Lee** and **Jamie**, who are highly skilled at this

Strategic thinking · 138
Endorsed by **Samara**, who is highly skilled at this

Critical thinking and problem-solving · 360
Endorsed by **Amy**, who is highly skilled at this

Insight development · 397
Endorsed by **Sarah** and **Matt**, who are highly skilled at this

Communication (empathetic) · 405
Endorsed by **Dave** and **Alex**, who are highly skilled at this

Inquisitive trend spotter · 348
Endorsed by **Ira** and **Anjali**, who are highly skilled at this

TECH

Multilingual program coding · 245
Endorsed by **Kevin**, who is highly skilled at this

Data analysis · 358
Endorsed by **Sana** and **Craig**, who are highly skilled at this

Machine learning and AI · 468
Endorsed by **Jacob**, who is highly skilled at this

Data visualization · 560
Endorsed by **Luke**, who is highly skilled at this

A DAY IN THE LIFE

07:00 AM

Decides to work remotely via his tablet. He joins the virtual meeting with the Nerve Center orchestrator and outgoing night shift supervisor via video conferencing to understand any issues that occurred overnight. He begins his day by reviewing the report that the Nerve Center has produced while on autopilot during the night shift

07:30 AM

Dials in to another meeting with the engineering staff to provide them an update on the latest algorithms and analytical models, as well as an overview of the additional tool on the analytics platform he recently added, which they will be required to use when actively modelling likely outcomes during night shifts and over weekends, when the Nerve Center data scientist is not on active duty

09:05 AM

Notices a predictive safety flag for site #01 relating to a potential pipeline failure and identifies Tumelo as the responsible maintenance officer. This risk is triggered by means of predictive analytics, based on the correlation between Tumelo's work performance, wearable device (indicating lack of sleep), and the high-risk work area. He checks to ensure that the system sends out a notification to the safety health environment and quality (SHEQ) manager and the team performance scientist

09:15 AM

Researches an online analytics platform that uses AI to explore the possibility of generating a predictive safety score for operators. He sets up a virtual meeting with the team performance scientist who may have a better understanding of human behavior with regard to safety

11:00 AM

Notices that the autonomous driving truck #05 indicator is changing color to red with the warning that excessive vibrations are being picked up on the suspension, and sees that the AI he developed last week is notifying the supervisor to investigate and rectify loading practices as this may be the cause

02:00 PM

Notifies his colleague that he is taking his scheduled break from his work day to pick up his daughter from school, as he does three days a week

03:30 PM

Receives a pop-up from LinkedIn Learning about a new course on hardware-in-the-loop (HIL) and software-in-the-loop (SIL) technologies. He enrolls for the course, which he plans to attend virtually the following week

04:15 PM

Dials into a Nerve Center meeting room to hold a handover meeting with the incoming engineering supervisor who reviews his shift log and provides an update on his data checks. They agree that if the engineering team on night shift has time, they will start to compile and analyze the data, for him to continue the next day

07:15 PM

Logs off for the day, in time to tuck in his daughter into bed and read her a bedtime story

About the authors

ANDREW SWART is both the global and Canadian leader of the Mining & Metals practice as well as the global leader for the sector. In his global roles, Swart leads a team from around the world and sets the strategic direction and go-to-market strategy for the global practice. With 20 years of industry and consulting experience, he is passionate about client service, having worked across many major mining and metals geographies, including Canada, Chile, Russia, Ukraine, Kazakhstan, Brazil, Germany, India, South Africa, the United Kingdom, and the United States. Swart's areas of expertise include corporate and competitive strategy engagements, digital and innovation systems, and large organizational transformation programs.

JANINE NEL is Deloitte's global Future of Work leader for Energy, Resources & Industrials, and Deloitte's global co-lead for the People & Diversity pillar of the mining and metals group. Leading delivery and thought leadership in the area of digital and its impact on work, Nel focuses on the workforce and the workplace in the future of work. She helps clients unpack the elements of work that are truly human, what can be done by machines, and what this means for people. She is also part of an effort that pioneers the people impacts of the mine of the future.

JULIE HARRISON is Deloitte's global co-lead for the People & Diversity pillar of the mining and metals group, and Deloitte Australia's Human Capital lead for Energy, Resources & Industrials. Harrison has worked extensively in consulting for the past 25 years and within the ER&I sector for nearly 15 years where she has led many transformation programs with a strong focus on people-centered transformation. Her areas of expertise include global transformations, organization redesign, workforce optimization, HR transformation, leadership and culture, and global talent programs. Passionate about the future of work, Harrison is a regular speaker at local and international conferences.

TALITHA MULLER is the Future of Work program manager for Deloitte Africa and a member of the Global Future of Work Regional Leadership forum. Muller plays an integral part in leading the Future of Work movement within South Africa by providing strategic guidance to business leaders on navigating the complexity of digital disruptions pertaining to changes in work, workforce, and workplace, and how to create exponential professionals.

JENNA WING is an industrial psychologist with two years of experience within the Energy and Resources industry. Wing has worked with the Future of Work team on developing the digital Nerve Center solutions for the intelligent mine. She focuses on the future of the workforce, the change in skills and capabilities, how roles will be deconstructed, and the business case for reskilling/repurposing people. Through creative ways of working and learning, Wing wants to continue to be a part of, and build, high-performing teams by challenging everything we do from a personal, work, and mindset perspective.

Deloitte Consulting's Mining & Metals practice has helped clients transform to integrated operations through the adoption of digital technologies, artificial intelligence, and analytics solutions. Our future of work assets examine what future mining jobs will look like and enable the fundamental redesign of work, workforce, and workplace. Our work in intelligent mining includes the realization of operational efficiency improvements, enhanced decision-making and productivity, improved safety performance, remote management of resources and optimization of workforce allocation. Contact the authors for more information or read more about the future of work and intelligent mining in our mining and metals services on Deloitte.com.

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