Odisha Mining Corporation Ltd.

Leveraging Digital Technologies for
Business Excellence
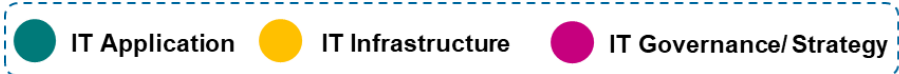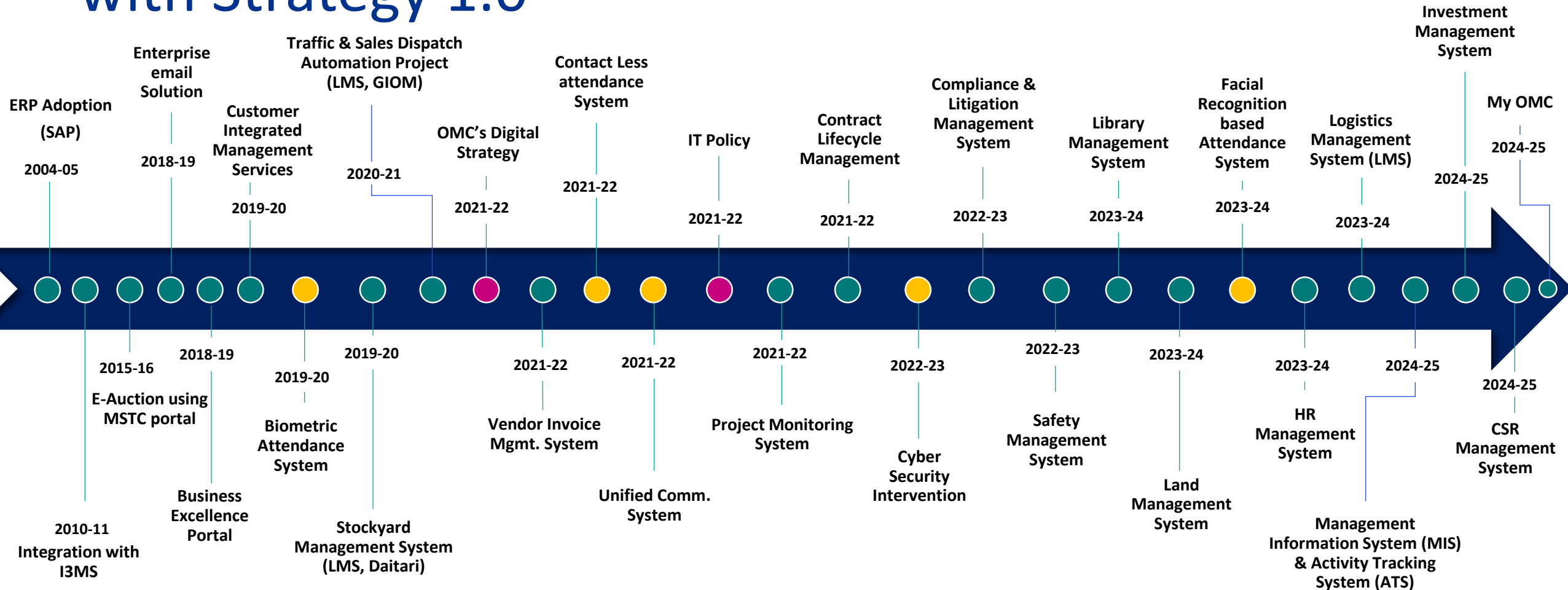
14th May 2024

OMC

ODISHA
NEW OPPORTUNITIES
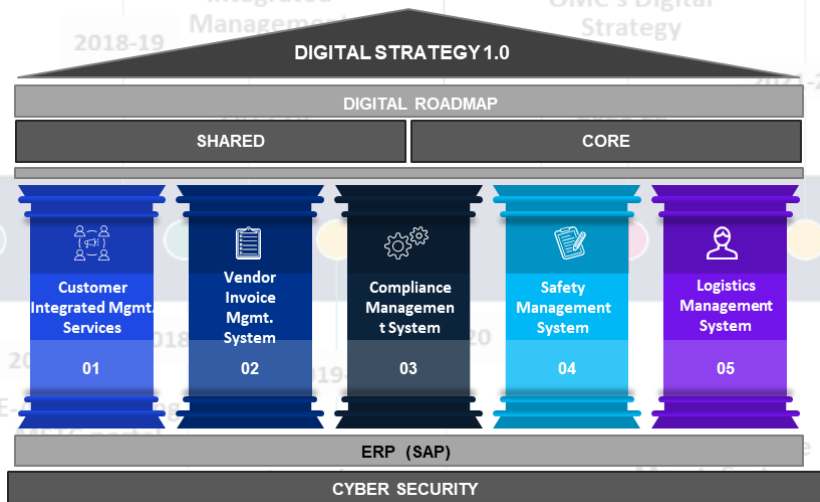Mining Happiness

OMC's Technology Roadmap

OMC's Current Technology Roadmap which is in line with Strategy 1.0

Investment Management System

ERP Adoption (SAP)
2004-05

Enterprise email Solution
2018-19

Customer Integrated Management Services
2019-20

Traffic & Sales Dispatch Automation Project (LMS, GIOM)
2020-21

OMC's Digital Strategy
2021-22

Contact Less attendance System
2021-22

IT Policy
2021-22

Contract Lifecycle Management
2021-22

Compliance & Litigation Management System
2022-23

Library Management System
2023-24

Facial Recognition based Attendance System
2023-24

Logistics Management System (LMS)
2023-24

My OMC
2024-25

2010-11 Integration with I3MS

2015-16 E-Auction using MSTC portal

2018-19 Business Excellence Portal

2019-20 Biometric Attendance System

2019-20 Stockyard Management System (LMS, Daitari)

2021-22 Vendor Invoice Mgmt. System

2021-22 Unified Comm. System

2021-22 Project Monitoring System

2022-23 Cyber Security Intervention

2022-23 Safety Management System

2023-24 Land Management System

2023-24 HR Management System

2024-25 Management Information System (MIS) & Activity Tracking System (ATS)

2024-25 CSR Management System

- IT Application
- IT Infrastructure
- IT Governance/ Strategy

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Now we are in the process of revisiting our Digital Strategy

Digital Strategy 1.0

Digital Strategy 2.0

Digital penetration to core functions across mining value chain with the help of advanced technologies

Key areas of Digital Strategy 2.0 are:

- **A** — Connecting Stakeholders Seamlessly
- **B** — Embracing Industry 4.0 Solutions
- **C** — Automation of processes
- **D** — Solutions driven by emerging technology like AI/ML, Analytics, Blockchain etc.

- Digital Strategy 1.0 was focused on bringing required digital infrastructure like ERP adoption and critical enterprise applications for transforming processes.

- Some of the key verticals/ areas transformed as part of digital strategy 1.0 are Customer(CIMS), Vendor(VIMS) and Compliances & Litigation, Logistics Management System, Safety etc.

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Logistics Management System

Logistics Management System

Overview

LMS is an IOT based application to transform the existing process by automating the ore evacuation process, aid better management of stockyard, sales activities and better management of traffic, thereby increasing the productivity, efficiency and safety standards in operation.

LMS has been implemented in Daitari and Gandhamardhan Mines. OMC has started working to roll out LMS for 14 other operational mines owing to its growing demand, ease of integration and configuration.

Challenges:

- Lack of real time visibility in material dispatch movement
- Longer queues of vehicles at various points resulting to higher dispatch cycle time
- Difficulty in restricting the movement of unauthorized vehicles within the mine area.
- Offline and in-silo management of data resulting in poor reporting and analysis
- Significant manual process was time-consuming and hampered OMC's overall productivity.

Benefit and Impact

- **Faster throughput** for optimal weighbridge utilization
- **Improved safety standards** within mines, stockyard and adjoining premises
- Efficient operations owing to **no/ lesser human intervention** at the various points
- **Better regulatory compliance**
- **Automatic identification** of vehicles using RFID Technology
- Centralized viewing of all material inbound and outbound from Mines area
- Helps to take **data driven strategic decisions** using Dashboard and Reports

Daily Throughput

40% increase in daily trips

The average number of trips by vehicles from entry to exit, including the weighment (Tare and Gross) during the ore evacuation in the sales cycle.

Weighbridge Utilization

30% increase in vehicles per hour at the WB

The average weighbridge utilization in terms of number of vehicles for weighment per hour

Manpower Reduction

30% reduction in manpower

The average number of human resources deployed to carry out the operations

Vehicle Turn Around Time

35% reduction in TAT

The average Vehicle Turnaround Time from entry to exit, including the weighment (Tare and Gross) during the ore evacuation in the sales cycle.

AI/ML Use Cases

Real time identification of Ore Types (CLO or Fines) by analyzing feed from AI enabled CCTV Cameras at the time of gross weighment using Machine Vision Algorithms

Alert to Control Center after identification of people not wearing PPE using Machine Vision Models

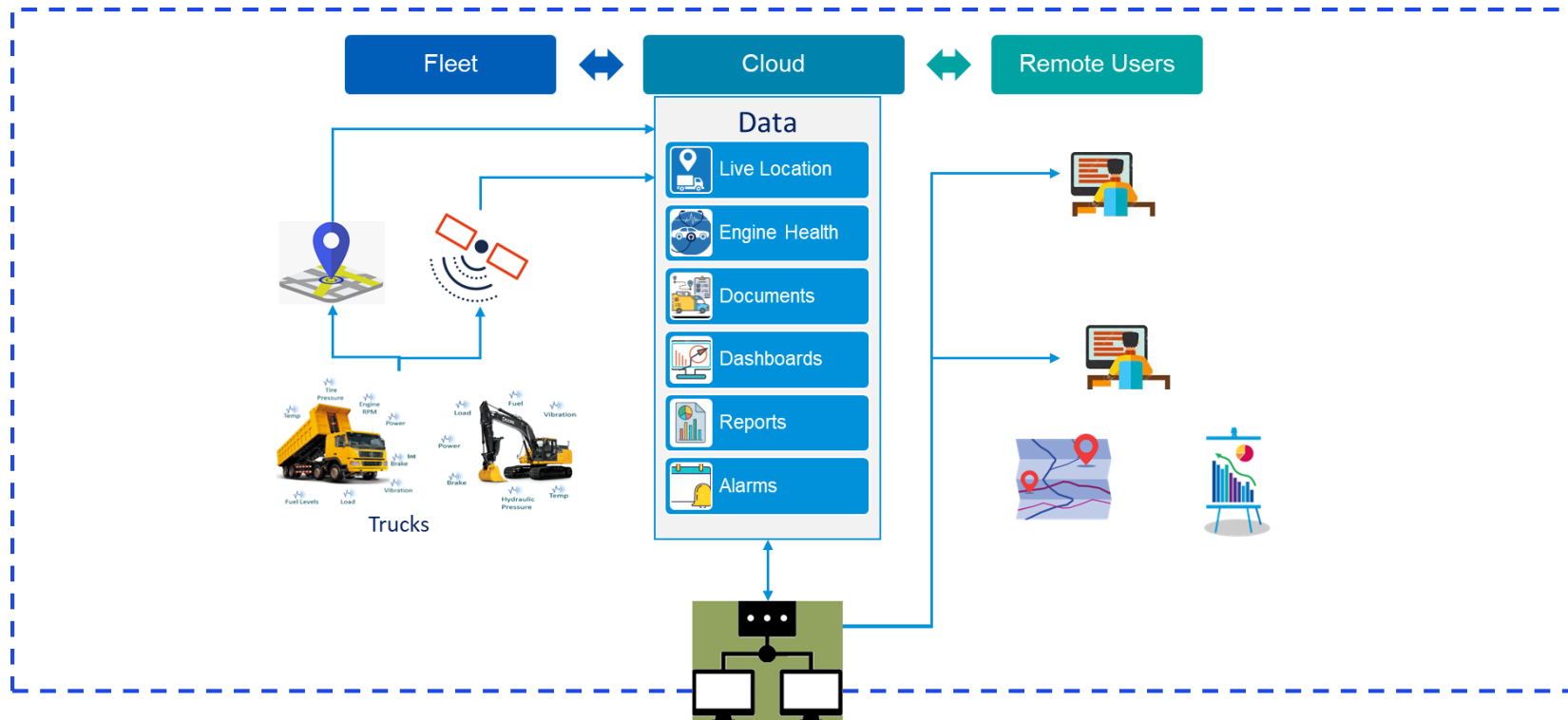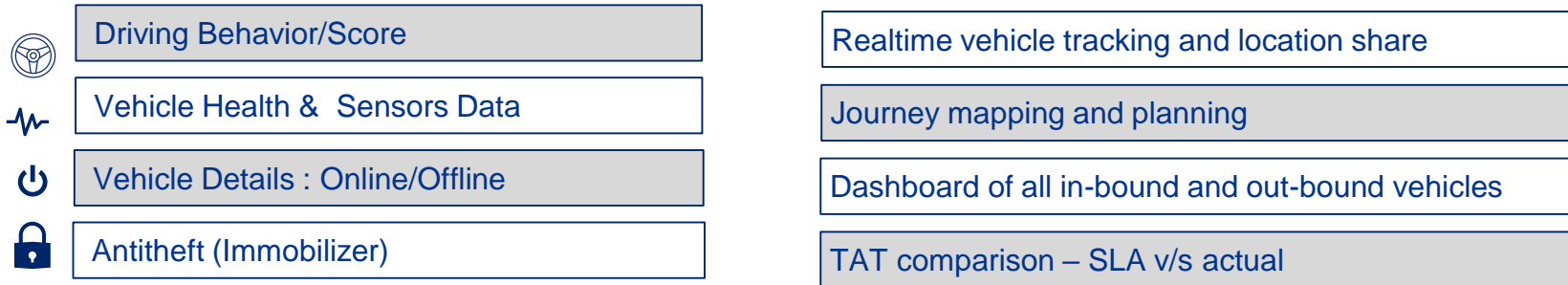# More AI ML Use Cases

AI/ML Use Cases

Fleet Management & Dynamic Asset Allocation:

- Fleet Status Monitoring (Trips/ Payloads/ Average speed)
- Notification for asset allocation
- Asset Location tracking
- Fleet Health Failure Predictions
- Geo –Fencing boundary violation Alert.
- Overall Safety Score predictions for drivers
- Dynamic Asset Allocation for a job
- Recommendations to increase Fleet Utilization

IT-OT integration at beneficiation plant, crusher and conveyor belt

- Monitoring Critical Parameters of conveyors, crusher house, Beneficiation Plant
- Predictive Maintenance Analysis for conveyors and Crusher(HT Motors)
- Load Anomaly detections
- Set Point recommendation based on Historical data analysis

Fleet Management System

Driving Behavior/Score

Vehicle Health & Sensors Data

Vehicle Details : Online/Offline

Antitheft (Immobilizer)

Realtime vehicle tracking and location share

Journey mapping and planning

Dashboard of all in-bound and out-bound vehicles

TAT comparison – SLA v/s actual

Fleet ⬌ Cloud ⬌ Remote Users

Data
- Live Location
- Engine Health
- Documents
- Dashboards
- Reports
- Alarms

Trucks

App Engine

User & Account Management

Device Management

SMS Based Operations

Document Wallet

Data integration with 3rdParty Apps

Trips & Historical Analysis

Advanced Analytics

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IT-OT integration at beneficiation plant, crusher and conveyor belt

Use Cases

Real-time information of Beneficiation Plant

Remotely monitor the Beneficiation Plant, Crusher and Conveyors SCADA

Automated alerts in case of threshold limits exceeds

Mines are monitored using various tools that provide insights on different KPIs enabling end- end visibility, remote monitoring, autonomous decision making

Data Driven Analytics	It enables the Data driven decision making for prescriptive algorithm using the Supervised and machine learning modules
SCADA Systems	Fetched data from the existing SCADA system via Industrial gateway server to integrate with business system for complete autonomous decision making
IoT sensors & Devices	IoT Sensors & devices will be installed to monitor and control the critical parameters if there is no Control system present

Command and Control Center

Analytical Engine

Supervised learning Algorithm with Decision tree Classifier module to predict the components failures / Preventive maintenance

Machine Learning-Data driven based prescriptive Analytics

IoT Sensors & Devices

Benefits

Predictive Maintenance

Analyze components data and predict the component failure based on process value deviations and schedule for predictive maintenance

Real Time Results and On-site Alerts
Results provided in real-time with on-site processing. Alarms can be set based on specific thresholds and alerts activated via pop-up, email, text

Data Driven based Prescriptive Analytics
Analyze historical data to improve decision making on Set Point & Recommendation to improve productivity

Throughput
Reduced breakdown, increased throughput and Auto alerts for abnormal Load, Motor/GB performance
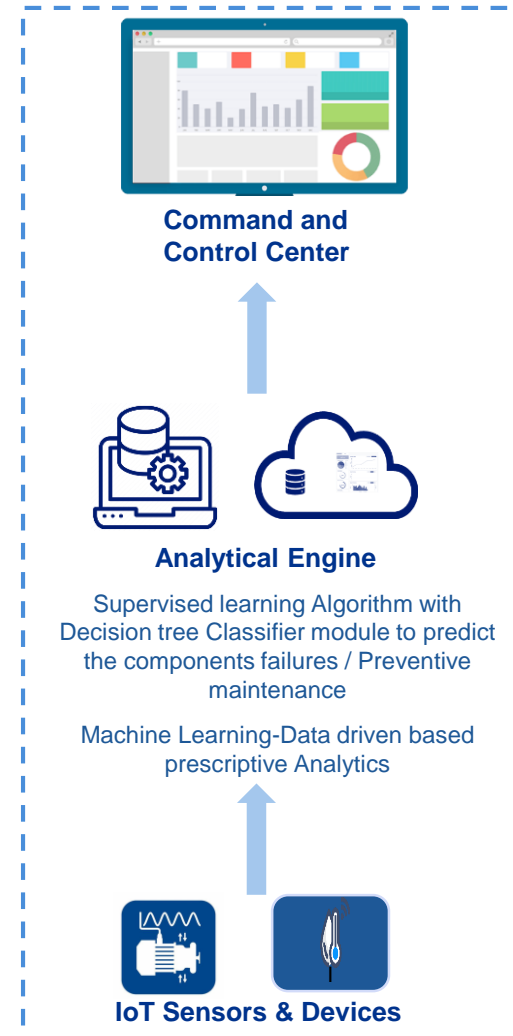
AI/ML Use Cases Involving Drones

Use of Drones and AI ML Models for Real-Time Monitoring of Dump Slope, Haul Road Width & Slope

- Image Analysis to detect changes in slope morphology
- Sensor Data Analytics: Slope displacement, Ground Movement and moisture content are analyzed

Real time change identification from Drone Survey on Mining Lease Area

- Analysis of Drone Feeds on development over land like construction activities etc. using machine vision
- Realtime alert to the authorities on possible enchroachment

Use of Drones and AI ML Models for Real-Time Monitoring of Dump Slope

Use Cases

Real-time information of slope: Mine face, OB, Tailings dam

Remotely monitor the mine fields and ensure worker & equipment safety

Automated alerts in case of potential hazardous situations

Mines are monitored using various tools that provide insights on different KPIs enabling slope monitoring & potential failures

LIDAR	In-depth geotechnical analysis like slope stability monitoring, deformation measurement
GPS, GIS, Radar	Used to measure the movement and continuous monitoring of slopes in surface mines with high accuracy
Inclinometers, Time Domain Reflectometry	Enables Sub surface monitoring, rapid remote monitoring and immediate determination of deformation
Seismic sensors	Records and sends micro-seismic events that will determine potential failure/hazardous situation
Digital photogrammetry	Creates 3D images of objects and provides insights on location of faults

Command and Control Center

Analytical Engine

The Deep Neural Network (DNN) model to analyze the image and predict the slope displacement and Erosion

Drones, IoT Sensors, Radar Tech.

Benefits

Measurement Accuracy and Resolution
Hyper spatial resolution (0.2m x 0.8m @100m scan distance) able to detect even the smallest moving rock element with sub-millimetric accuracy.
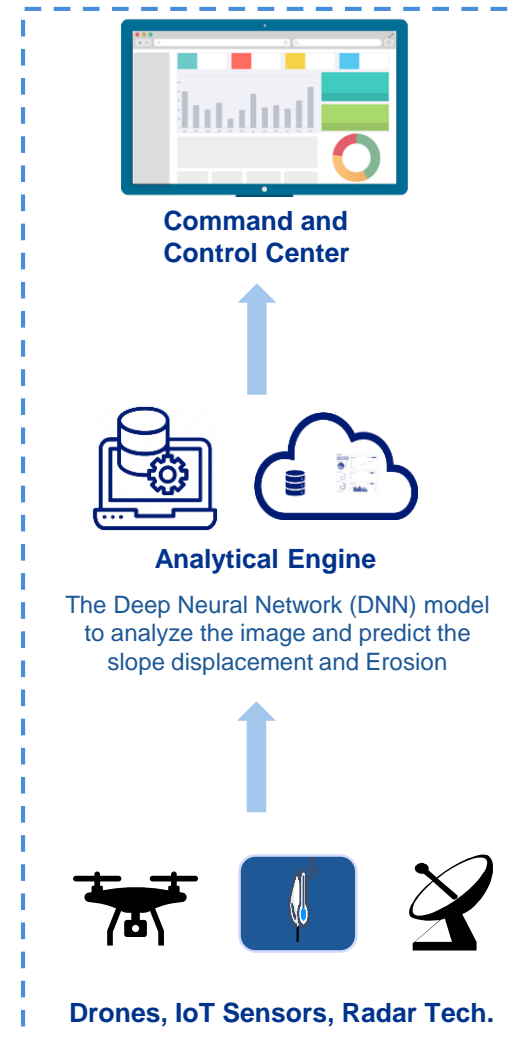
Real Time Results and On-site Alerts
Results provided in real-time with on-site processing. Alarms can be set based on specific velocity thresholds and alerts activated via pop-up, email, text

Compact and Portable Solution
Easily transportable from a location to another and installed by one single person.

High Availability with Low Maintenance Costs
Minimal moving parts and low-profile design to guarantee robustness and maximum availability in all mining conditions.

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Thank You