REACTORE: MODULAR TECHNICAL SALES TRAINING

Company and product training presentation

Prepared by

reactore

One Platform. Multiple Mining Solutions.

AGENDA

- **MODULE 1:** Company Overview
- **MODULE 2:** General Product information and ecosystem

- Optional Break: 15 Minutes-

- **MODULE 3:** Operational Planning and scheduling
- **MODULE 4:** Processing, Production and operations management

- Optional Break: 15 Minutes-

- **MODULE 5:** Underground Solutions
- **MODULE 6:** Asset Tracking and Collision Avoidance

AGENDA continued...

- **MODULE 7:** Asset Maintenance and management
- **MODULE 8:** Sales and distribution

- Optional Break: 15 Minutes-

- **MODULE 9:** Human Resource Management
- **MODULE 10:** HSE and Legal Compliance

- Questions and Answers

MODULE 1: COMPANY OVERVIEW

INTRODUCING REACTORE

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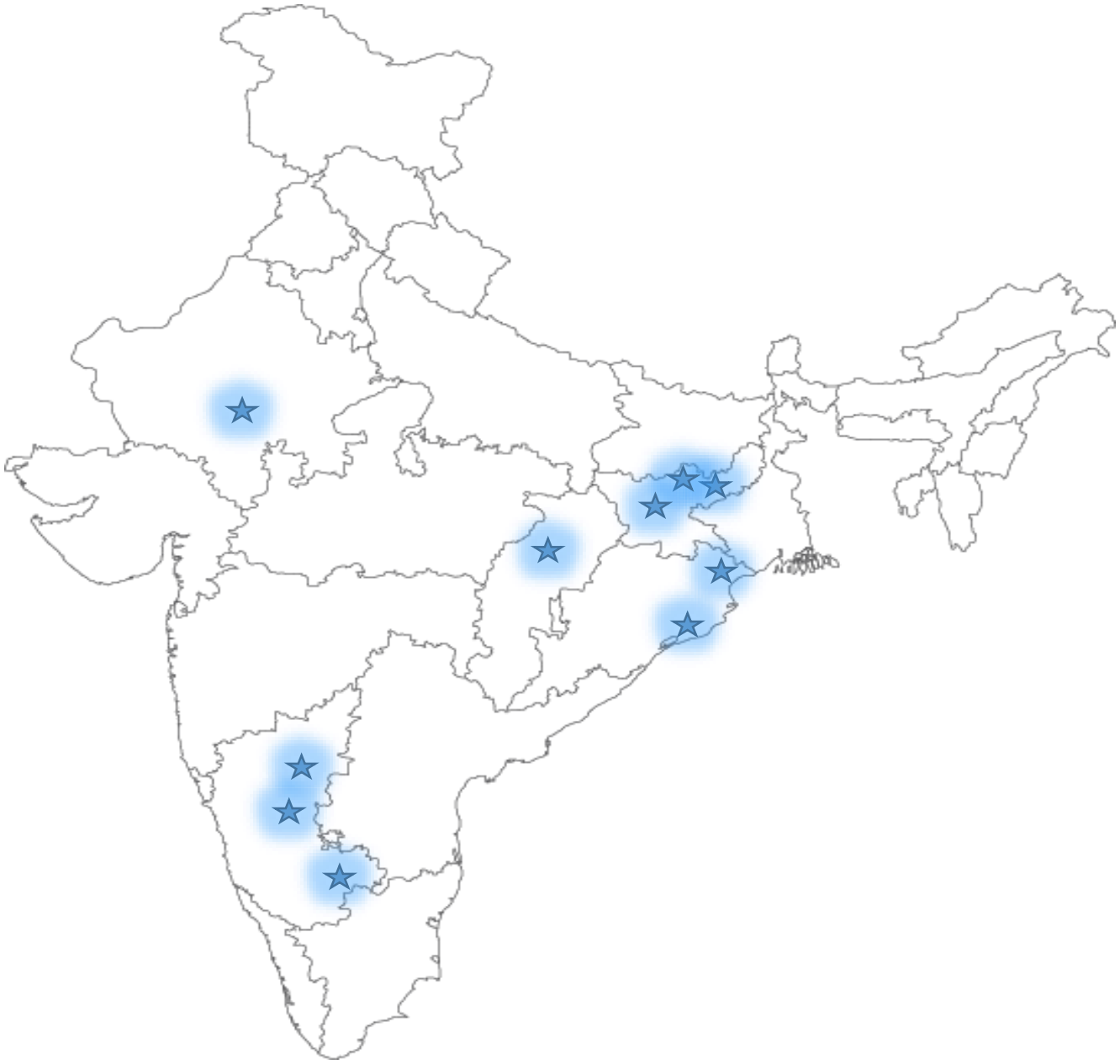
REACTORE ARE A UNIQUE COMBINATION OF
TECHNOLOGY SPECIALISTS AND MINING DOMAIN EXPERTS.

CERTIFIED ISO 9001:2015 COMPANY

MARKET EXPOSURE INDIA



JSW

Foyer Group

TATA

vedanta

ADITYA BIRLA GROUP

imfa

THE HUTTI GOLD MINES CO. LTD.

ACC Limited

MARKET EXPOSURE (SOUTH AFRICA)

becker
MINING SYSTEMS

IMPLEMENTATION METHODOLOGY

Reactore is a service orientated, technology based solution provider.

At Reactore, we recognise that each mining operation has unique constraints and challenges and that the success of a software solution lies in the execution of an effective implementation strategy.

Instead of just providing off the shelf applications we envision ourselves as solution providers and actively collaborate with our clients to ensure fit-for-purpose solutions that really make a difference and bring a tangible return on investment.

Reactore personnel actively consult with our clientele to optimise business processes and achieve maximum gains by leveraging the power of the technology we provide. This results in solution optimisation and efficiencies that translate into effective management of economic, operational and risk management concerns.

Constant Evolution

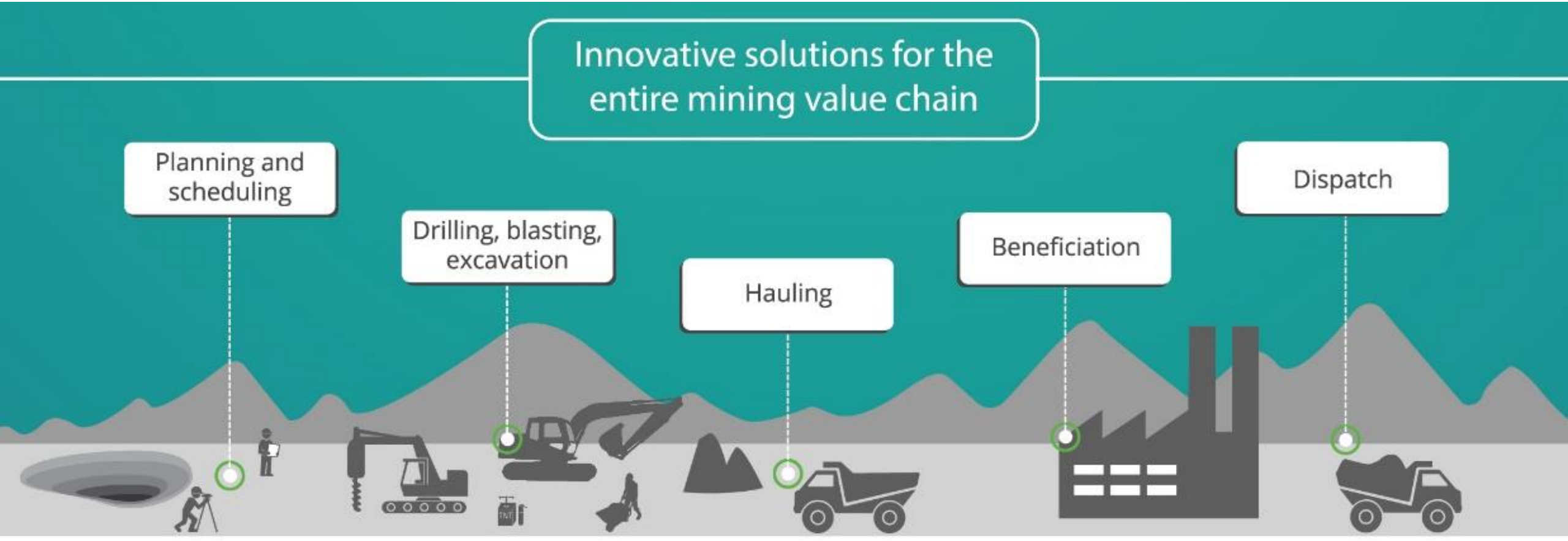
Our product is constantly improving and evolving to incorporate the latest technology to ensure our clients can benefit from a solution that is both future-proof and ready to address the escalating demands of the industry.

Our service level agreements ensure that clients are provided with ongoing after-sales support and training with access to new features and enhancements as they are developed.

MODULE 2: PRODUCT OVERVIEW & ECOSYSTEM

ONE PLATFORM, MULTIPLE MINING SOLUTIONS

- Solutions for planning, real-time operations management through to sales and distribution.
- Support modules include asset management/maintenance and mining specific HR solution.
- Suitable for above and underground mining operations.



SOLUTION ARCHITECTURE AND ECOSYSTEM

PEOPLE

- Personnel Tracking & Safety
- Trainings & Interventions
- Performance Management

Mineral Resources

- Operational Planning
- Production Management
- Beneficiation & Distribution

Assets

- Asset tracking & Management
- Optimal Utilisation
- Preventive / Predictive Maintenance

CONNECT EVERYTHING

Connect to existing hardware and software systems

IMPROVE EFFICIENCY

Manage operations using core, cutting edge productivity tools

COEXISTENCE

Dynamic coexistence with 3rd party systems

INCLUSIVENESS

Various apps, interactive systems for maximum personnel participation

MODULAR ERP SOFTWARE

Mines use the various Reactore modules to budget, plan, schedule, effect and track all operations across the mine, in real time, through to end sales and distribution.

Modules include:

- Operational Planning
- Production
- Beneficiation
- Asset Tracker
- Sales and Distribution
- Underground Mining
- Asset Management
- Human Resources Management
- HSE Legislative Compliance
- Mobile Applications
- Reactore Ecosystem

INTEGRATION SPECIALISTS

Reactore typically integrates with 8 or more systems per implementation.

CASE STUDY: END TO END DIGITALISATION OF MINING OPERATIONS

reactore (Digitalisation partners) JSW

The Vision: Create an integrated, digital, operations management platform.

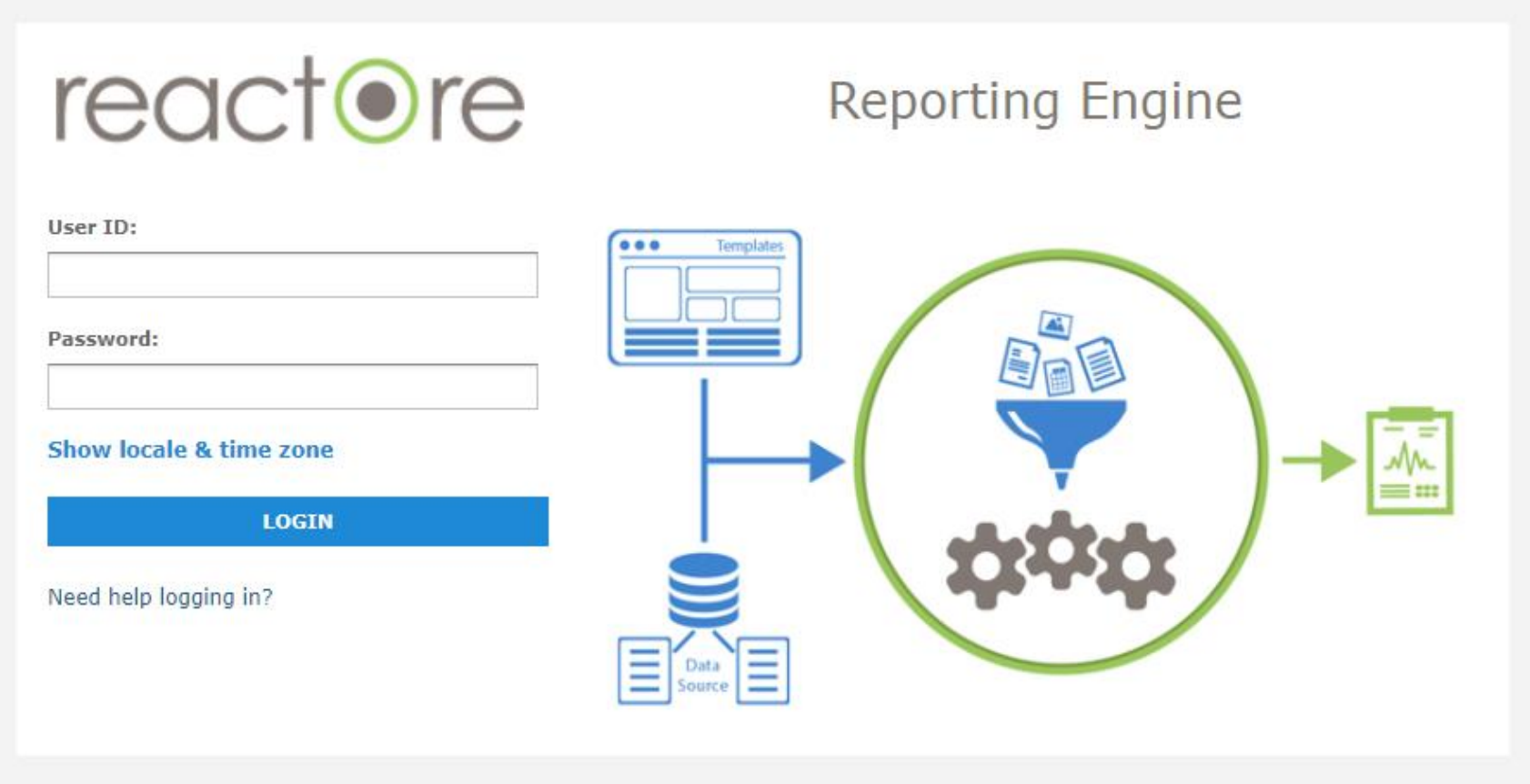
Integrated Solution

Dedicated Mobile Apps

Real-time Dashboards

CUSTOMISED REPORTING

- Report engine allows for user defined reporting.



MOBILE APPLICATIONS

PRODUCTION:
Mining production management, in your pocket.

Dedicated mobile apps for operators, ranging from material handling, drilling, and blasting, to apps for management and supervisors to access real-time operational data and take action on it, all in the palm of their hands.

Key features include resource status summary, logging of incidents, receiving exception alerts, communicating and receiving instructions and viewing the latest production progress.

ASSETS:
Maintenance Management

A feature for technicians, mechanics and artisans to view, manage and close work orders in the field, removing the requirement of paper based record keeping. In the field real time updates will facilitate Reactore Asset Management module to utilise the data captured meaningfully to update maintenance records and align maintenance strategy trajectories accordingly.

HR:Employee Leave Management

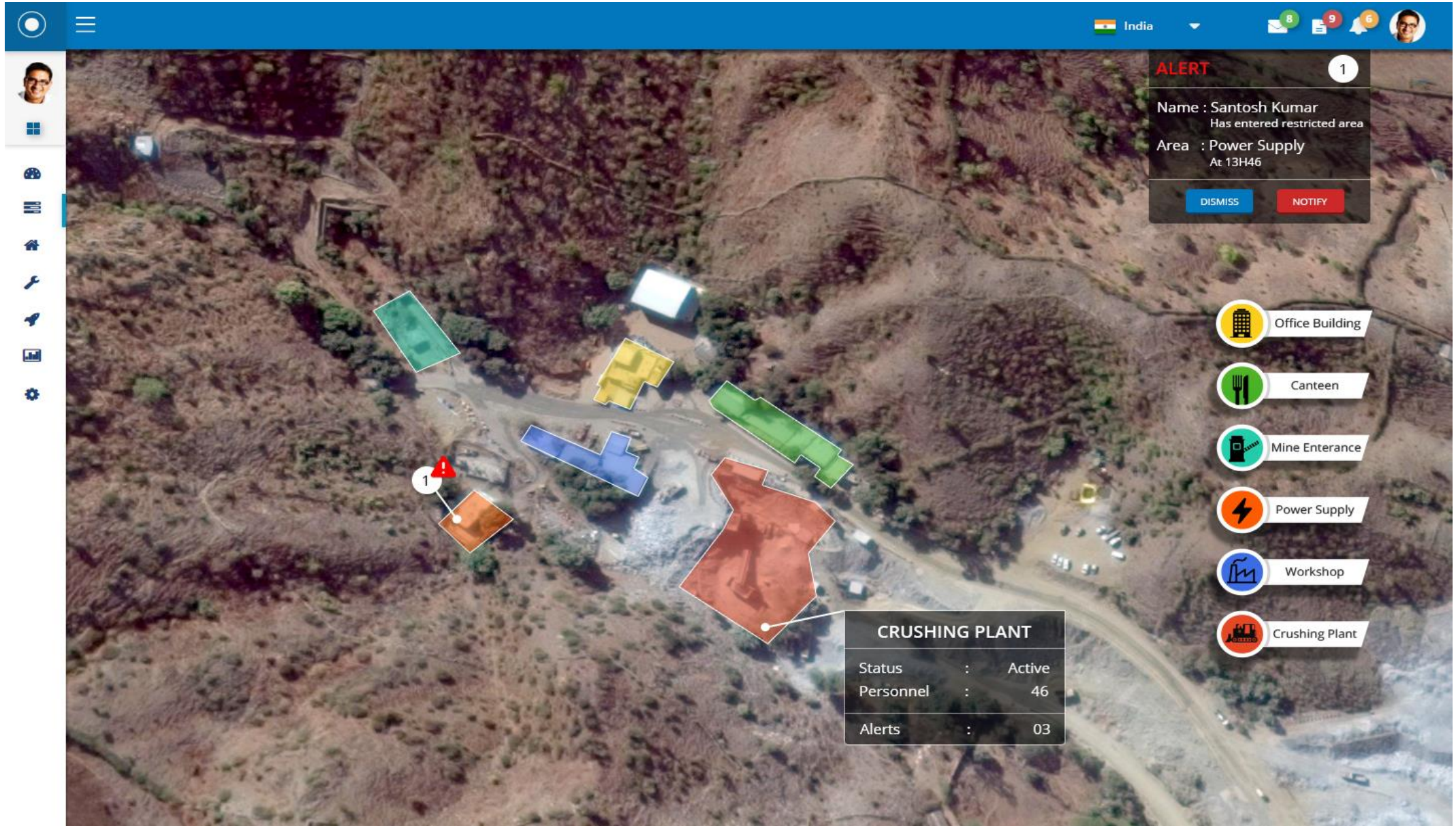
View leave balances for both yourself or subordinates, apply for leave or track the progress of current leave applications. Reactore's mobile app bridges the gap between HR Management and employees by providing key information to personntel thus reducing lengthy adminstrative cycle times.

ADMINISTRATION:
Manage tasks while on the move

Reactore's mobile Task Management App facilitates viewing and managing tasks assigned to you. Provide inputs for the required tasks and sync with the enterprise App in real time. View data and audit trails for historical tasks when required.

GEOLOCATION

Leveraging the power of geo-location using geo-fencing, tracking and user defined business rules.



CONTROL ROOM MONITORING

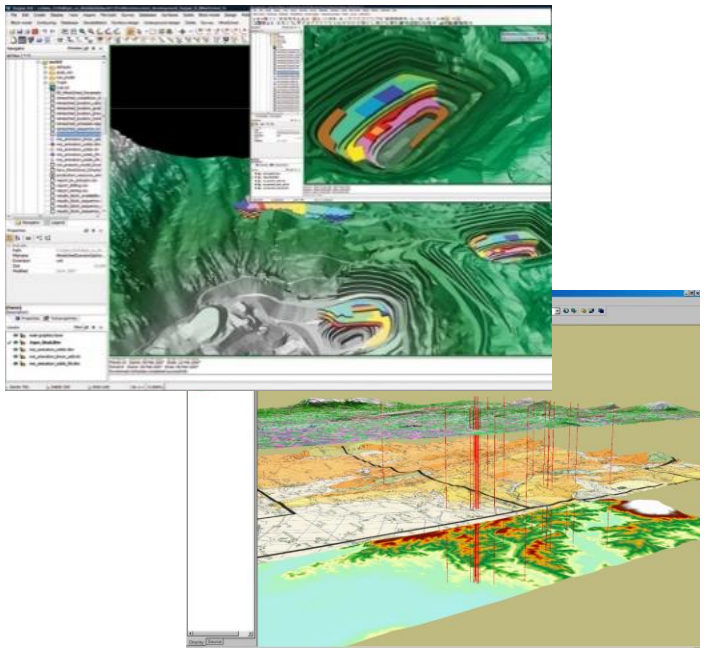
- Real-time dashboard tracking of operational data.

MODULE 3: OPERATIONAL PLANNING

OPERATIONAL PLANNING

Optimised planning, maximum value with an advanced collaborative planning solution for the entire mining value chain.

- **Integrate with geo-science systems** and combine with Reactore data to facilitate a broad based planning / project management solution.



GEOVIA GEMCOM Surpac etc.

3RD party commercial Geo-science systems.

Complements GIS data with additional mine planning parameters

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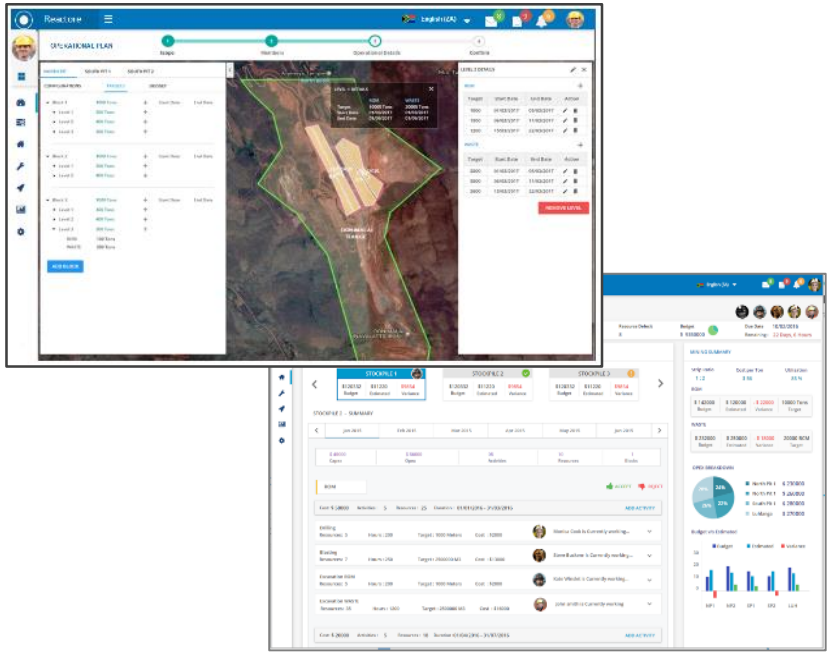
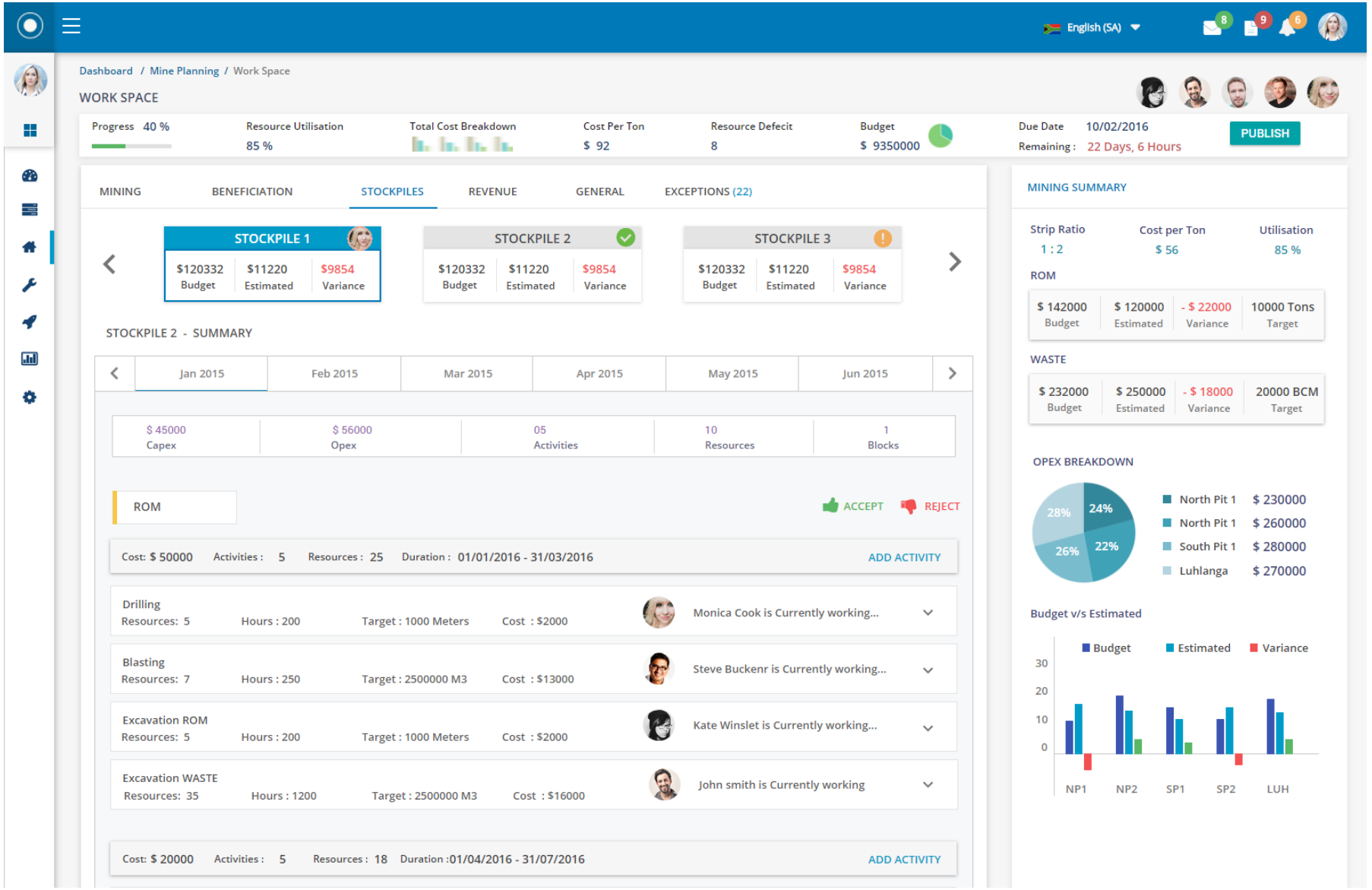
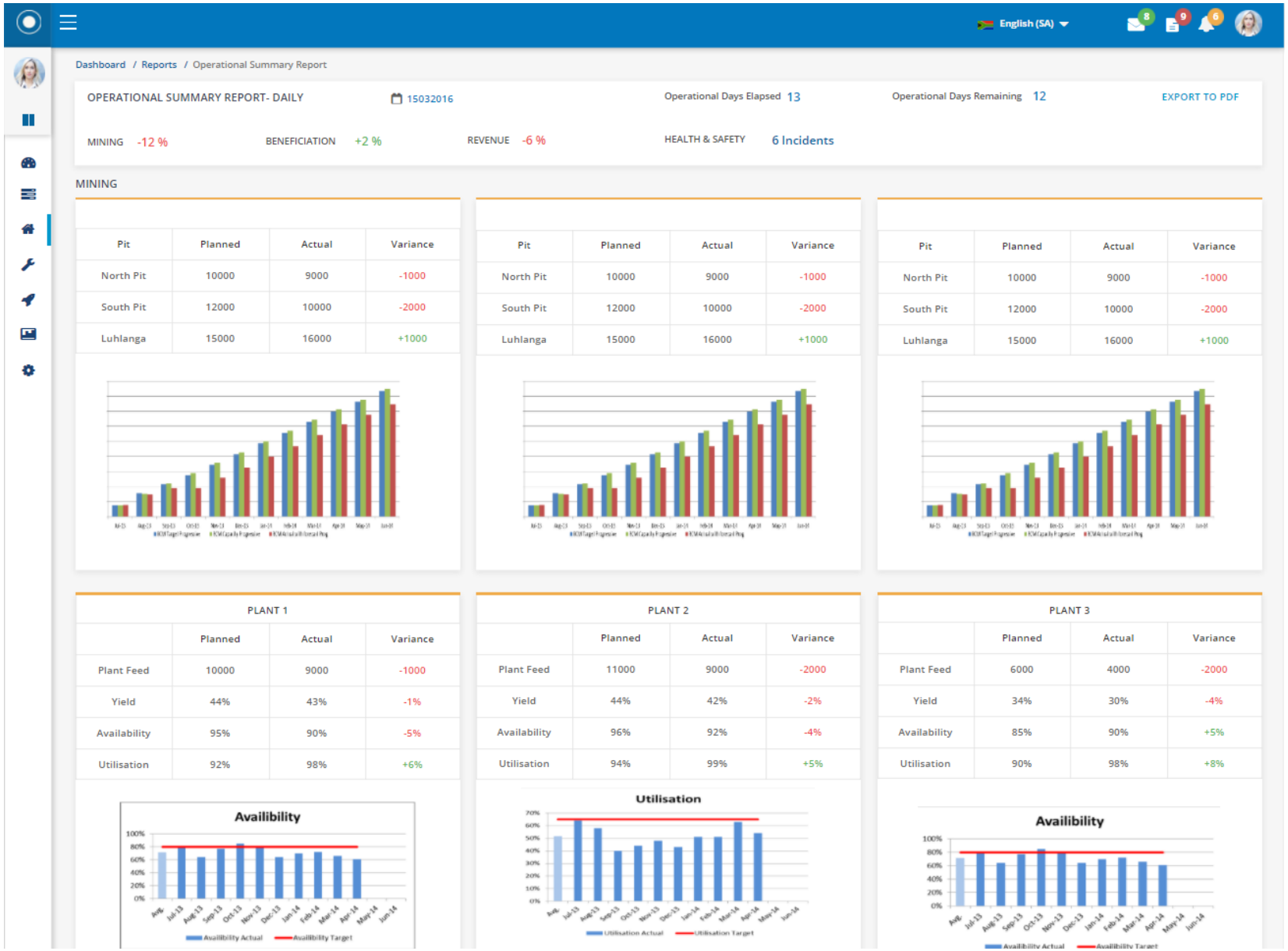


Collaboration - a single workspace environment where multiple users can apply their expertise



Beyond Mine Planning – Take planning beyond the mine itself and incorporate the entire value chain



Pit	Planned	Actual	Variance
North Pit	10000	9000	-1000
South Pit	12000	10000	-2000
Luhlanga	15000	16000	+1000

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Luhlanga	15000	16000	+1000

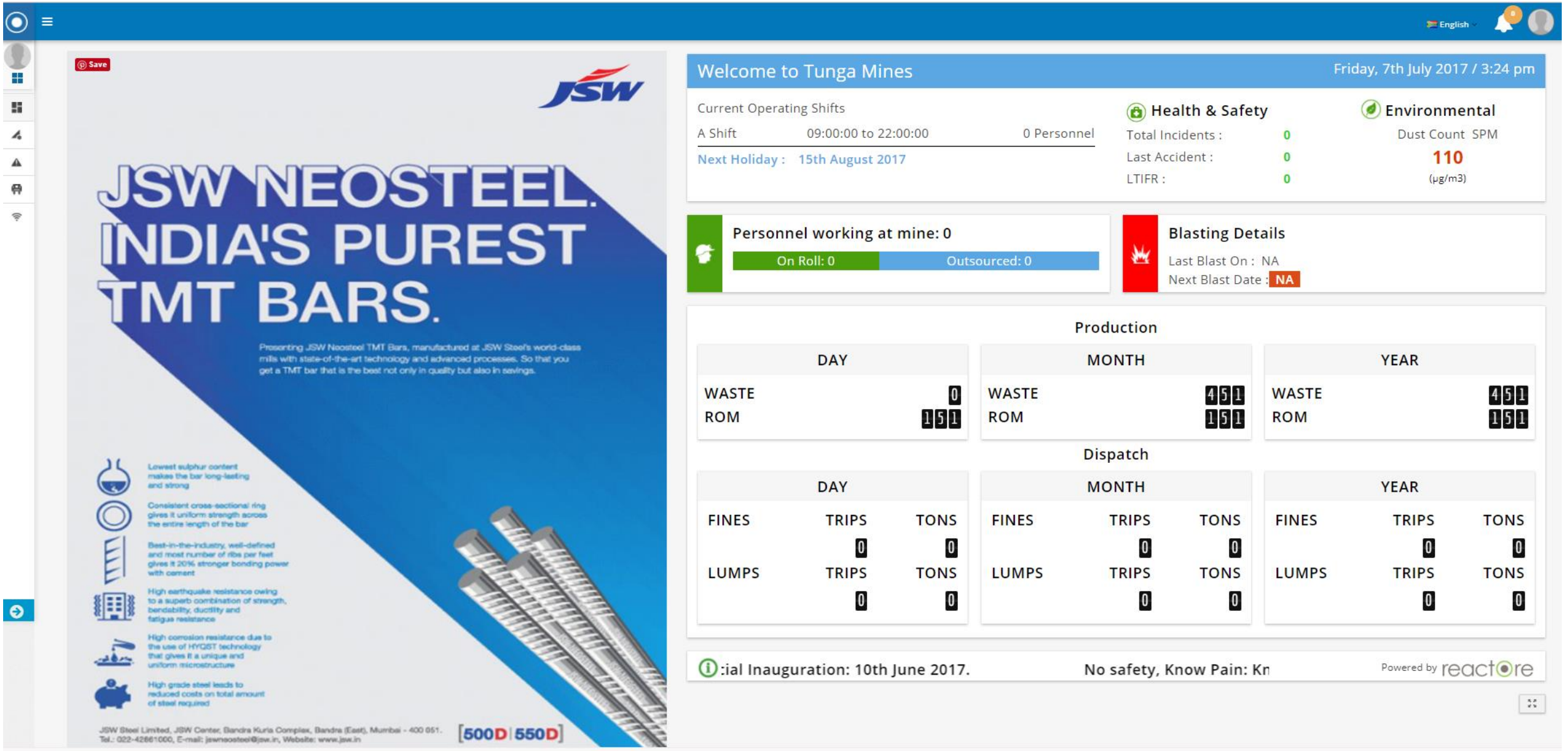
PLANT 1	Planned	Actual	Variance
Plant Feed	10000	9000	-1000
Yield	44%	43%	-1%
Availability	95%	90%	-5%
Utilisation	92%	98%	+6%

PLANT 2	Planned	Actual	Variance
Plant Feed	11000	9000	-2000
Yield	44%	42%	-2%
Availability	96%	92%	-4%
Utilisation	94%	99%	+5%

PLANT 3	Planned	Actual	Variance
Plant Feed	6000	4000	-2000
Yield	34%	30%	-4%
Availability	85%	90%	+5%
Utilisation	90%	98%	+8%

PUBLIC DISPLAY BOARDS

Status of mine – Operational data for the entire value chain including safety and environmental parameters.

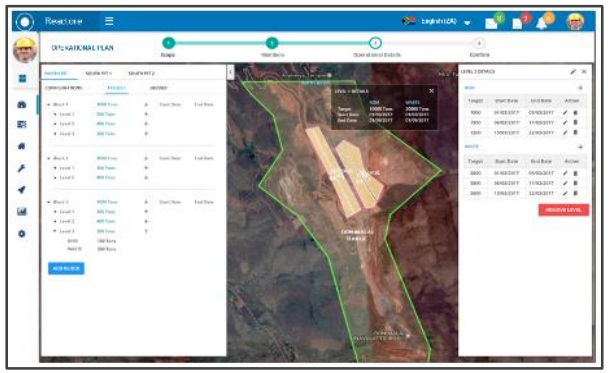


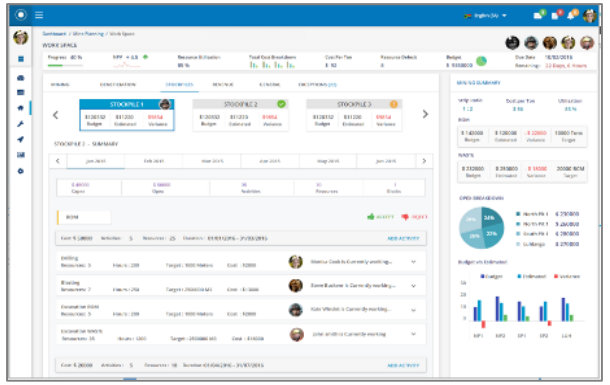
MODULE 4: PRODUCTION AND BENEFICIATION

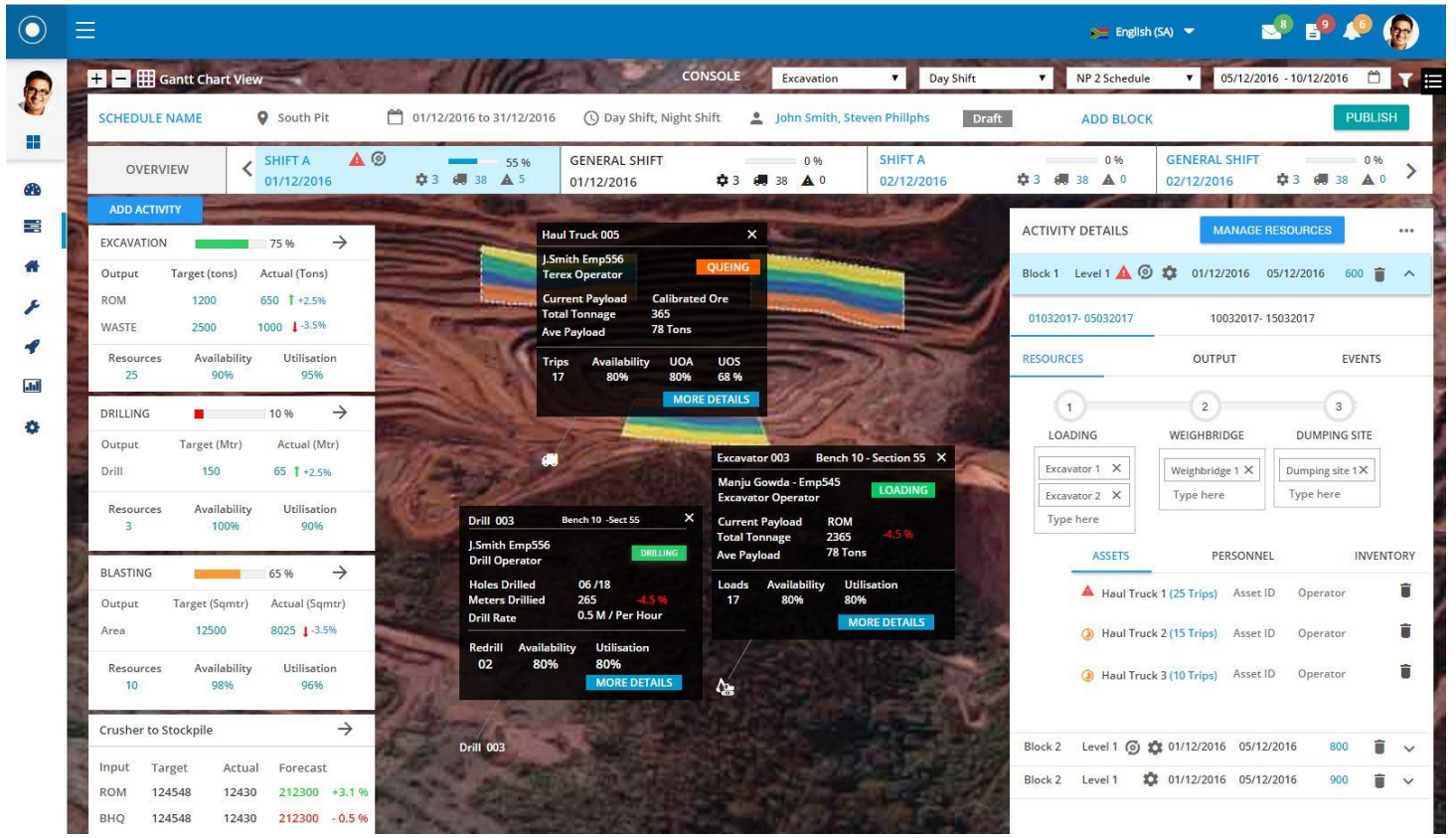
PRODUCTION – SHORT TERM PRODUCTION SCHEDULING

Schedule | Execute | Monitor | Optimise

- Seamlessly create day to day work schedules, down to the resource level via direct operational planning integration.

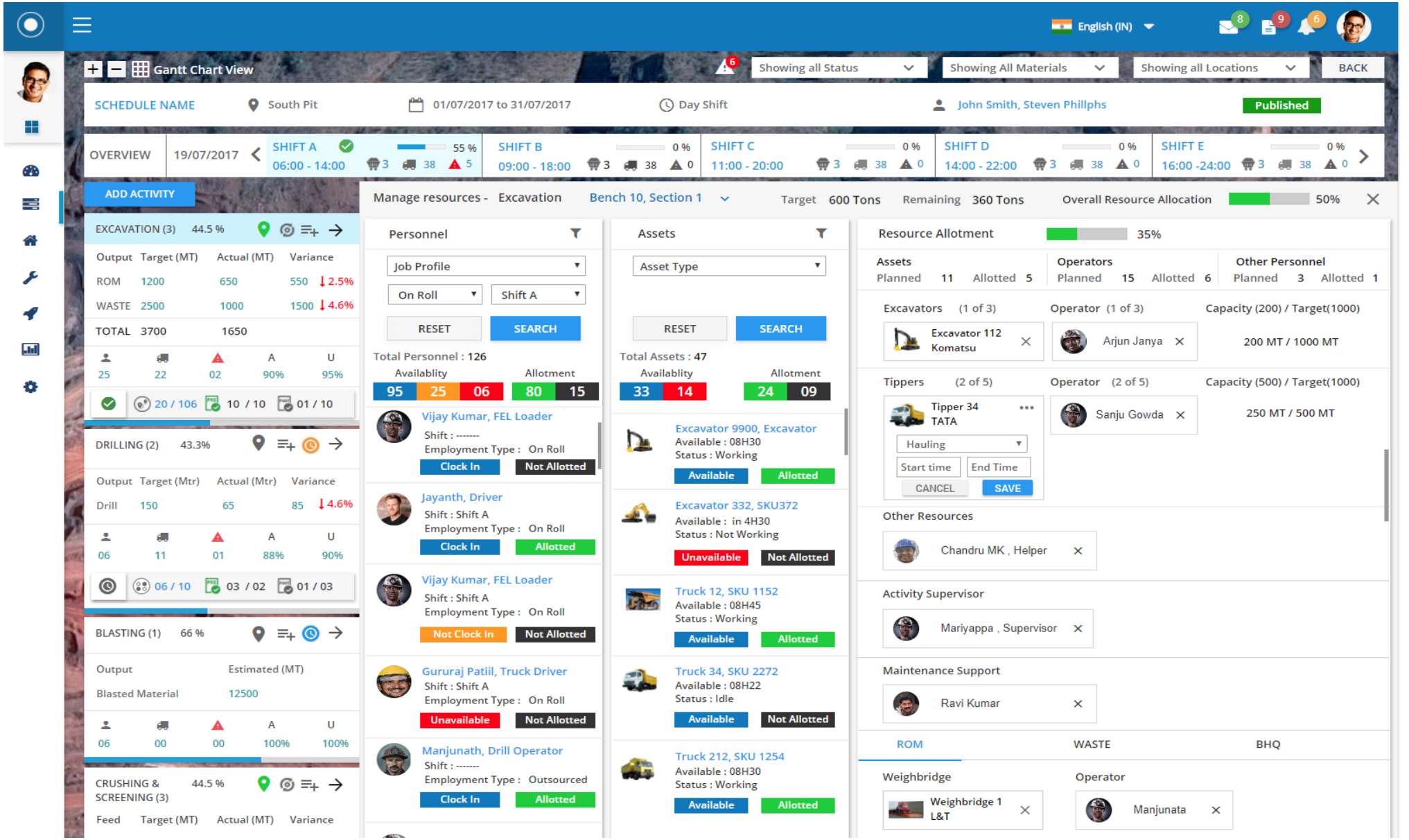






PRODUCTION –RESOURCE MANAGEMENT

- Streamline resource management and allocation and optimise resource utilisation



PRODUCTION –RESOURCE MANAGEMENT

- Complete oversight over resource utilisation and performance.

Resource Management

Personnel Availability — Clock in | Not Clocked in | Unavailable

On Roll — Total : 48: 30 | 12 | 06

Outsourced — Total : 16: 10 | 04 | 02

Personnel Allotment — Alloted | Unalloted

On Roll: 44 | 04

Outsourced: 10 | 06

Filters

Designation	Employment Type	Availability	Activity	Location	Asset Type
Select Designation	Both	Select	All Activity	Select Location	Select Type

Work Status	Search by Asset/Personnel	Clock in Status	Work Start	Allotment Status	
Select Status	Asset ID / Personnel ID	Clocked in	Select	Select	APPLY RESET

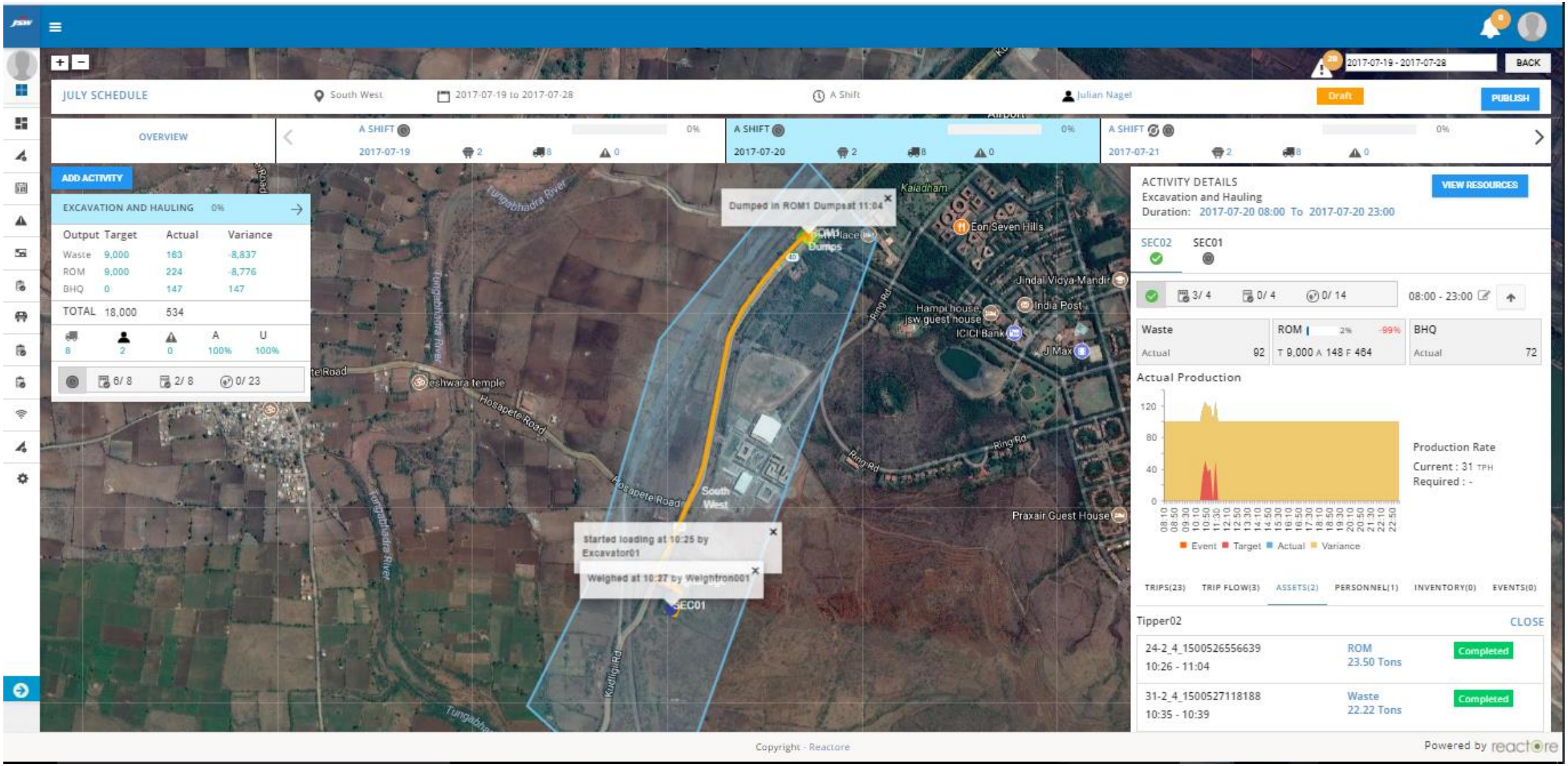
3 Filters Applied, Displaying 3 Results

EXPORT TO PDF

Details & Machine Allocation	Availability	Location and Activity Status	Time Analysis				
Raj Kumar, Tipper Operator On Roll, Tipper 01	Available	Excavation, Bench 10, Section 5 In-Progress	Clock In - 08H45 Work End - ------	Allotment - 08H55 Post Stop - ----	Pre Start- 08H55 Over time - -----	Work Starts - 08H55 Clock Out - ------	Onsite Time 2 H 30
Manjunatha , Drill Operator Outsourced, No Machine Allocation	Available	Not Alloted ---------	Clock In - 08H55 Work End - -----	Allotment - ------ Post Stop - -----	Pre Start- ----- Over time - ------	Work Starts - ------ Clock Out - ------	Onsite Time 2 H 20
Suresh Gowda , Foreman On Roll, No Machine Allocation	Available	Excavation, Bench 11, Section 6 Stopped	Clock In - 08H50 Work End - -----	Allotment - 08H42 Post Stop - -----	Pre Start- NA Over time - ------	Work Starts - 08H55 Clock Out - ------	Onsite Time 2 H 25

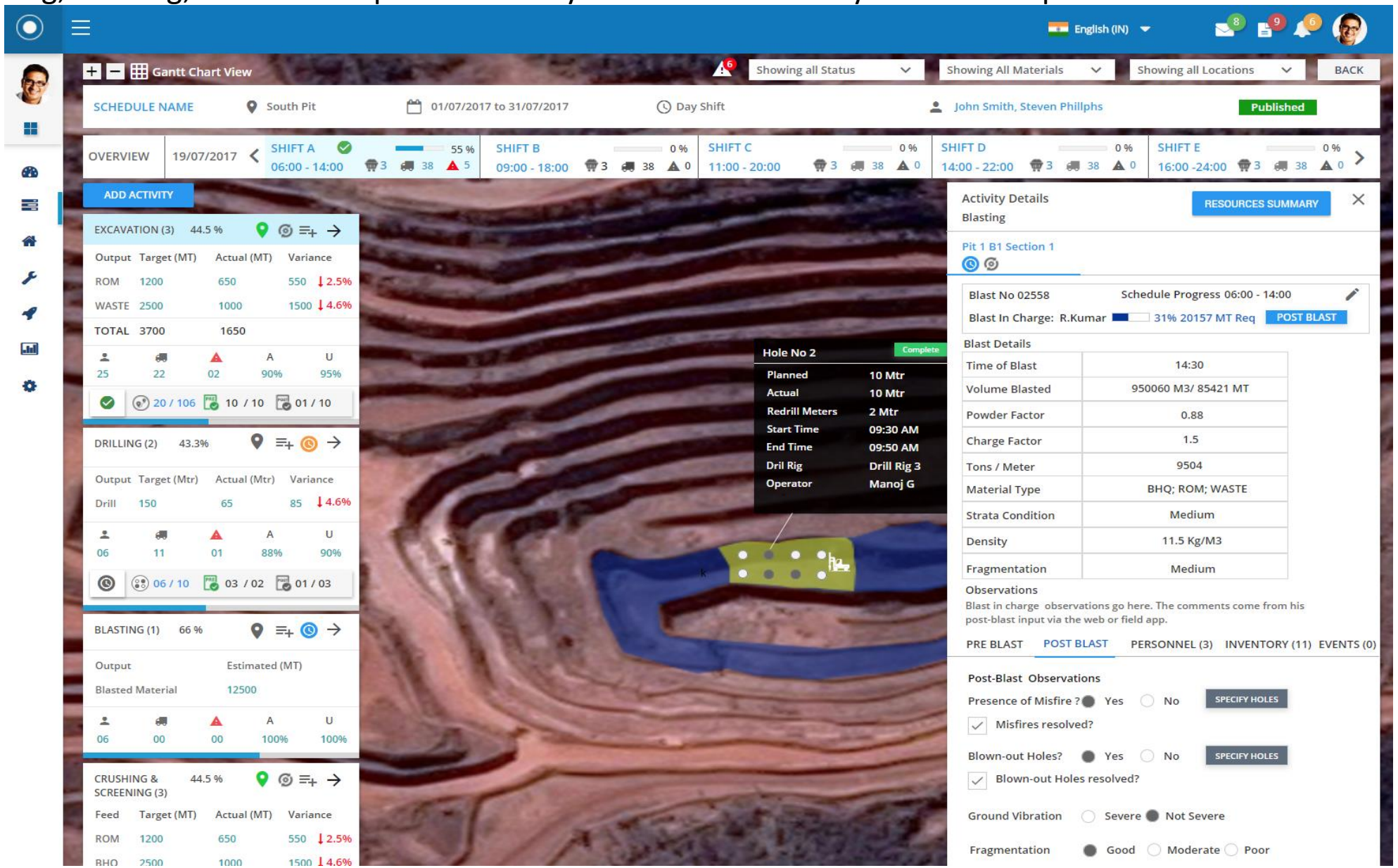
PRODUCTION – REAL-TIME ACTIVITY MONITORING AND MANAGEMENT

- Real-time tracking of all activities –planned versus actual.



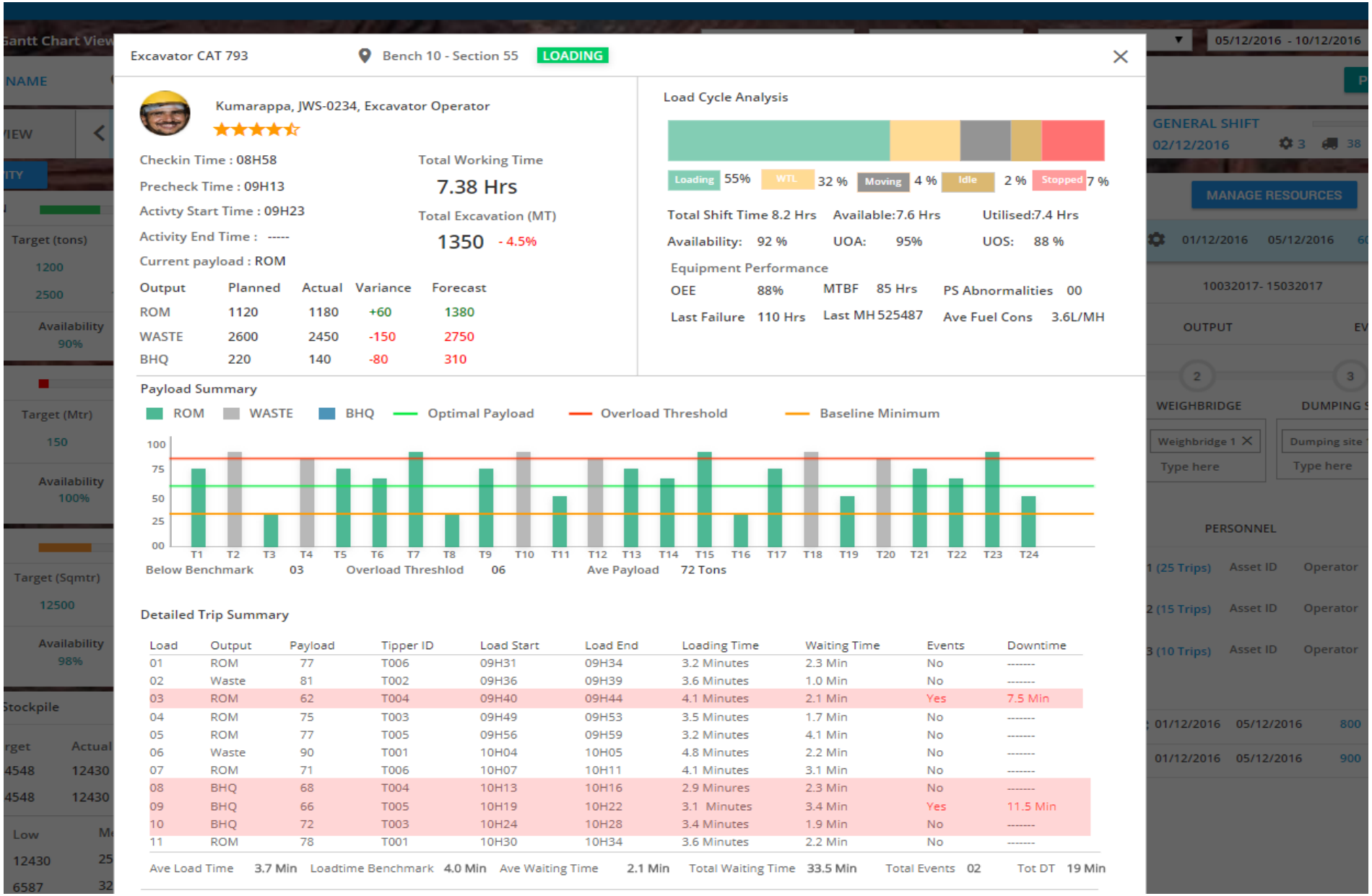
PRODUCTION – SCOPE TO INCORPORATE ALL MINING ACTIVITIES

- Drilling; Blasting; Mine Development and any user defined activity can be incorporated and monitored.



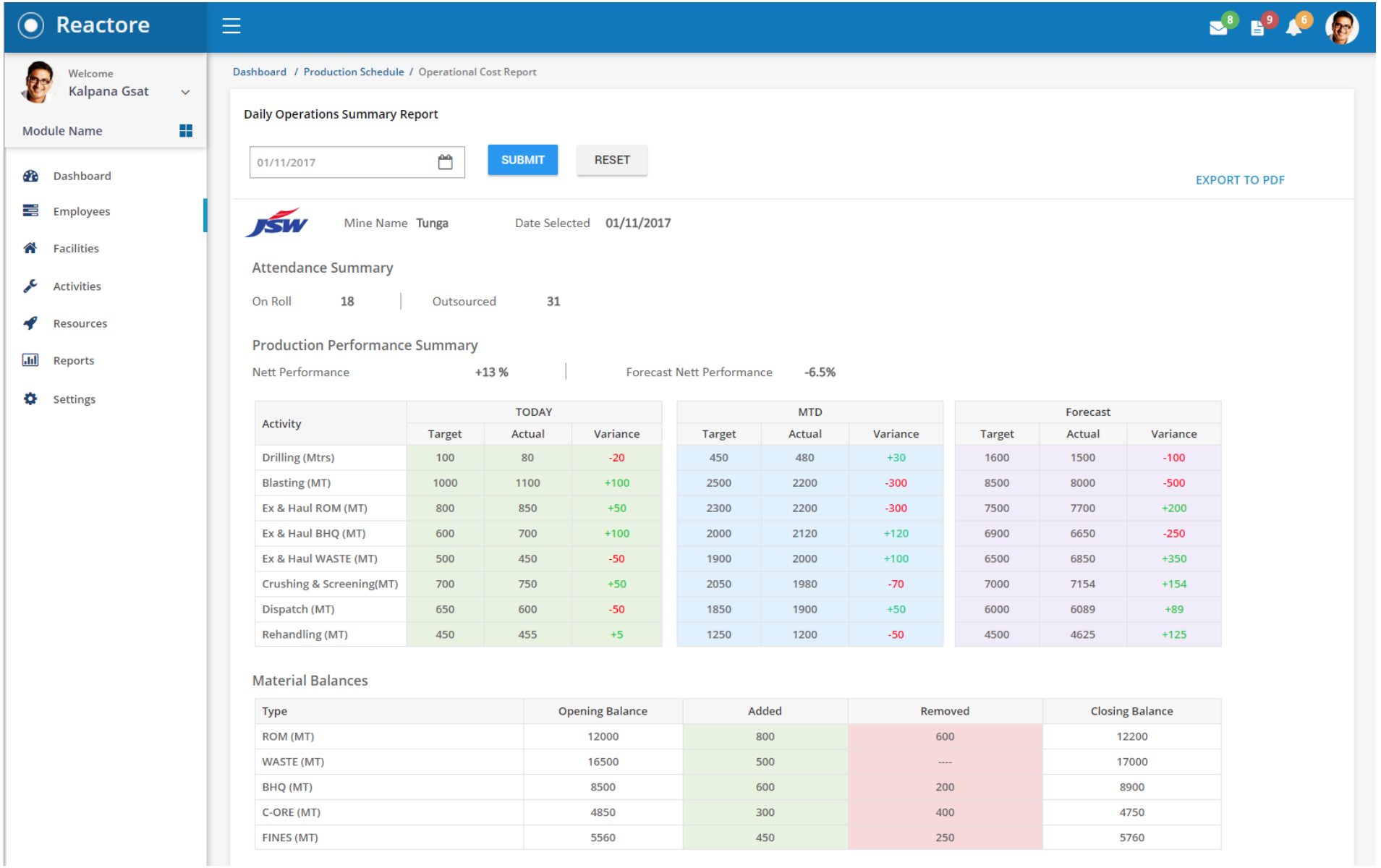
PRODUCTION – RESOURCE AND ACTIVITY PERFORMANCE MANAGEMENT

- Analytics and data on demand for mining activities and resources.



PRODUCTION – CUSTOMISED REPORTING

- Customised reporting for operations and costs.

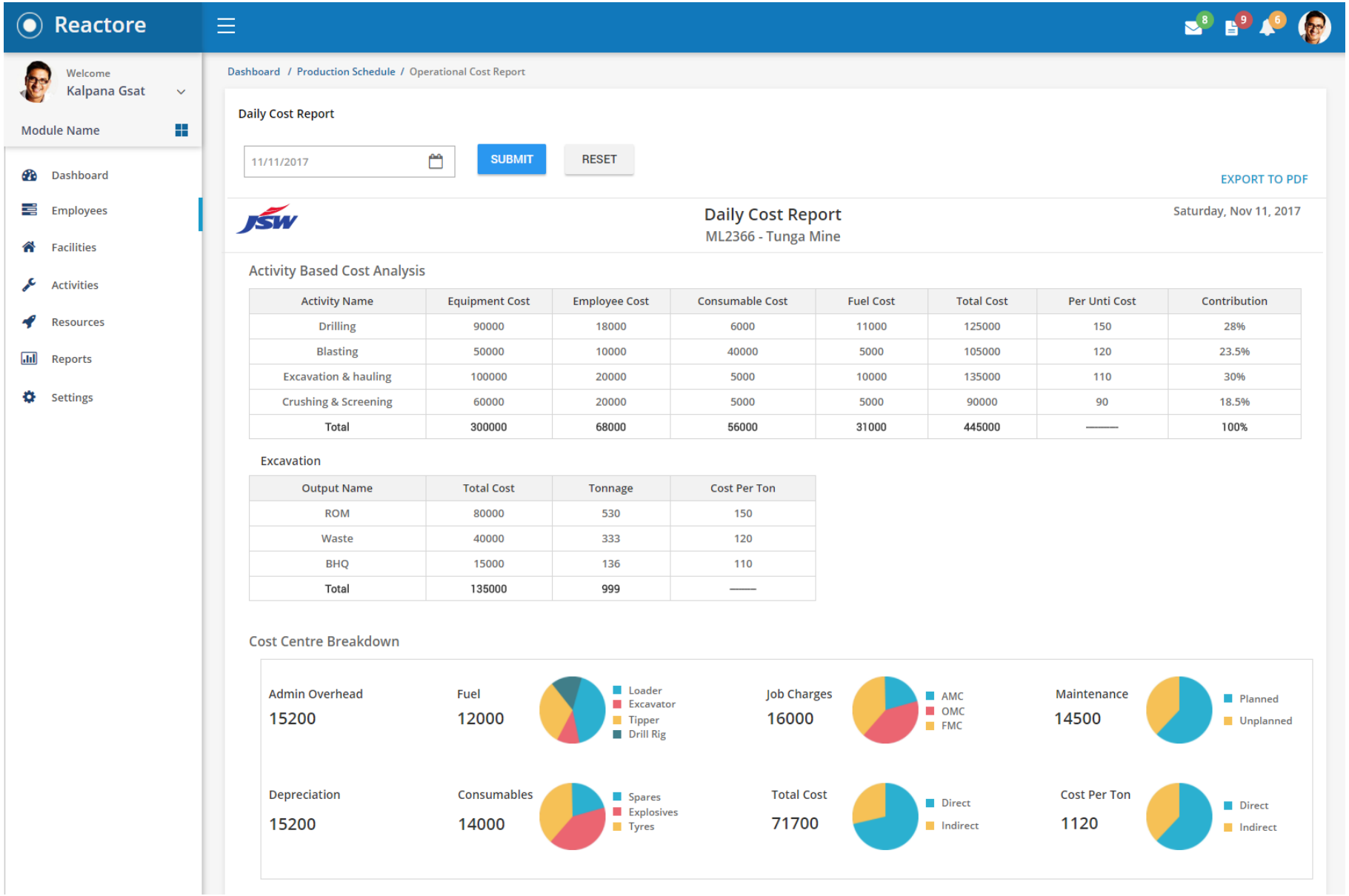


Activity	TODAY			MTD			Forecast		
	Target	Actual	Variance	Target	Actual	Variance	Target	Actual	Variance
Drilling (Mtrs)	100	80	-20	450	480	+30	1600	1500	-100
Blasting (MT)	1000	1100	+100	2500	2200	-300	8500	8000	-500
Ex & Haul ROM (MT)	800	850	+50	2300	2200	-300	7500	7700	+200
Ex & Haul BHQ (MT)	600	700	+100	2000	2120	+120	6900	6650	-250
Ex & Haul WASTE (MT)	500	450	-50	1900	2000	+100	6500	6850	+350
Crushing & Screening(MT)	700	750	+50	2050	1980	-70	7000	7154	+154
Dispatch (MT)	650	600	-50	1850	1900	+50	6000	6089	+89
Rehandling (MT)	450	455	+5	1250	1200	-50	4500	4625	+125

Type	Opening Balance	Added	Removed	Closing Balance
ROM (MT)	12000	800	600	12200
WASTE (MT)	16500	500	----	17000
BHQ (MT)	8500	600	200	8900
C-ORE (MT)	4850	300	400	4750
FINES (MT)	5560	450	250	5760

PRODUCTION – CUSTOMISED REPORTING

- Customised reporting for operations and costs.



PRODUCTION – DEDICATED MOBILE APPLICATIONS

- Dedicated apps for various roles including management, Shift in charge, blast technicians and machinery operators.

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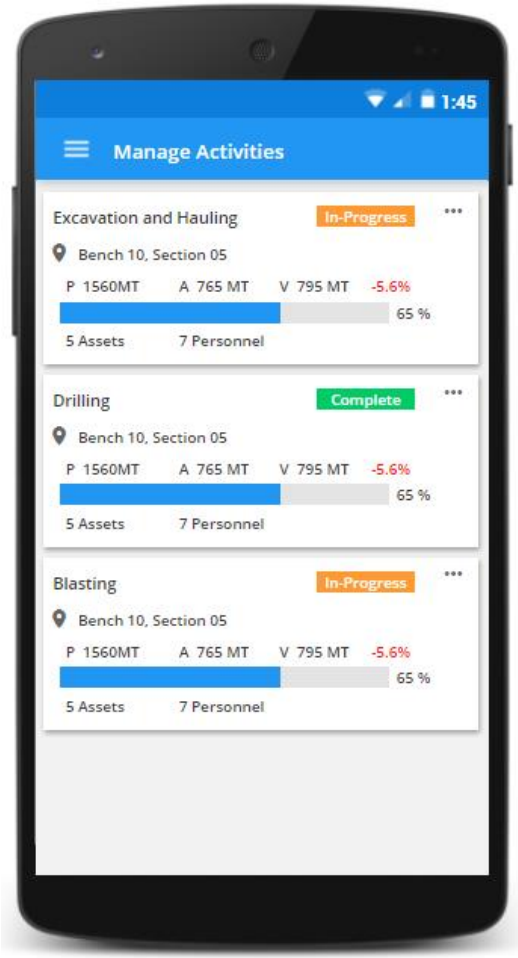
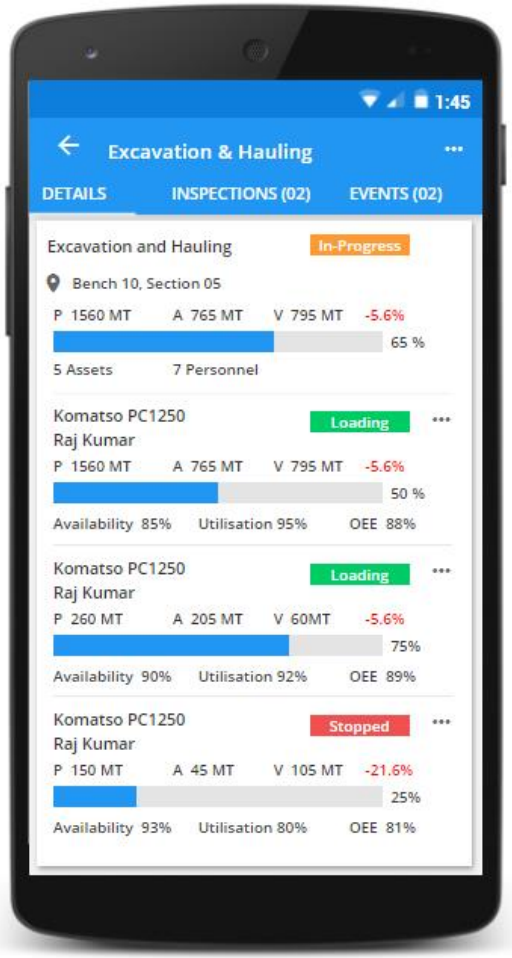
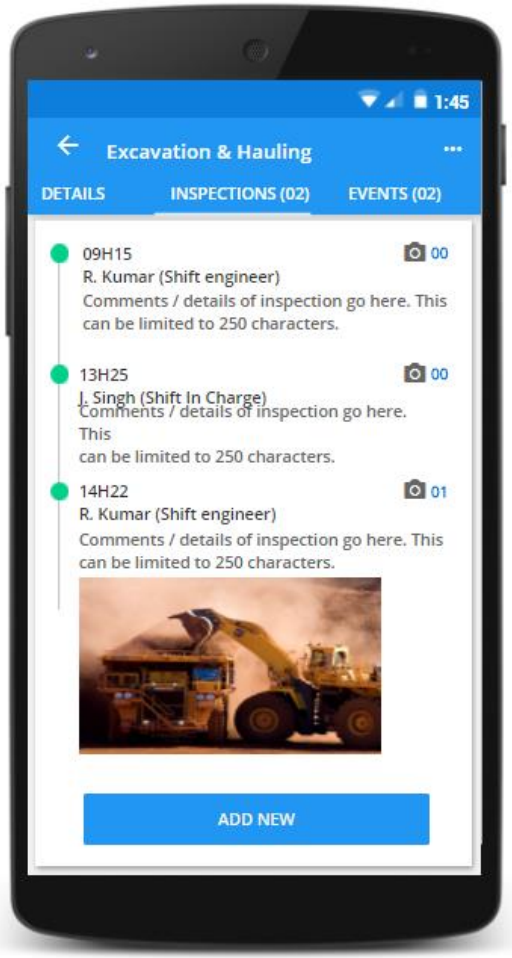






BENEFICIATION

- Integration with PLC/SCADA/Sensors and equipment. 3D Dashboards with real-time data.

MODULE 5: UNDERGROUND SOLUTIONS

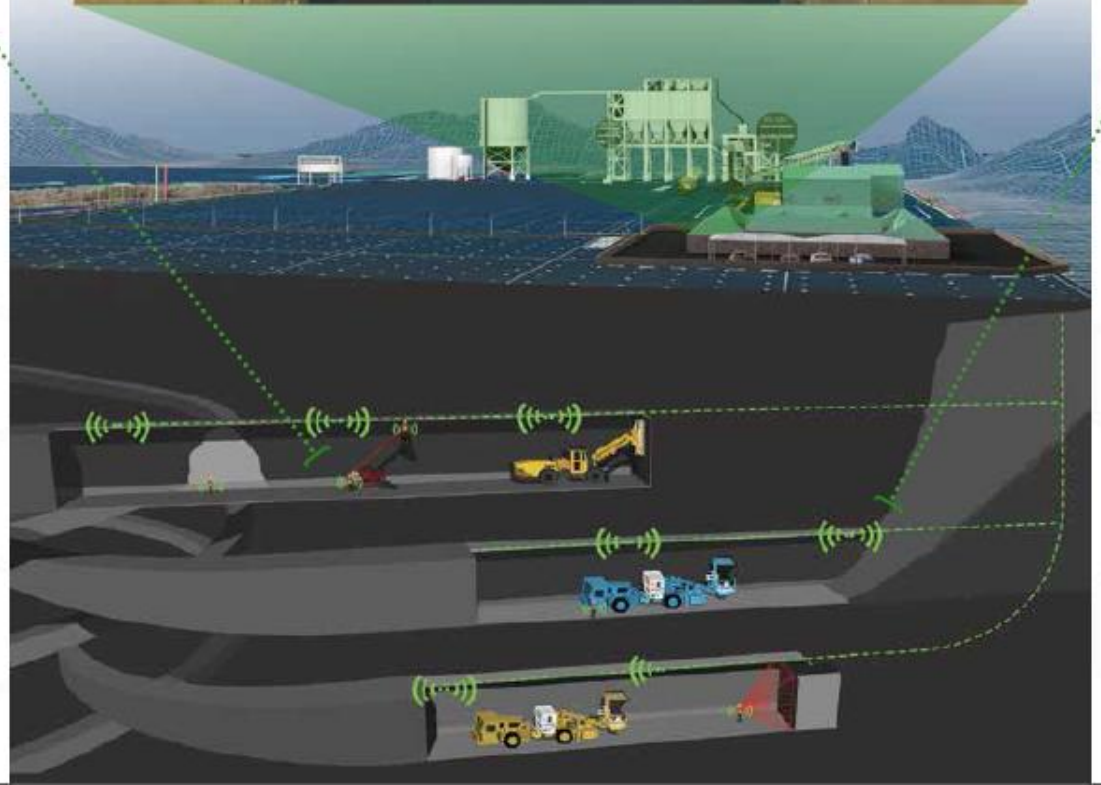
UNDERGROUND MINING SOLUTIONS

Two-way communication.

Asset Tracking and Production Management.

Personnel Tracking and virtual tag board.

Surface control room monitoring, in real-time.



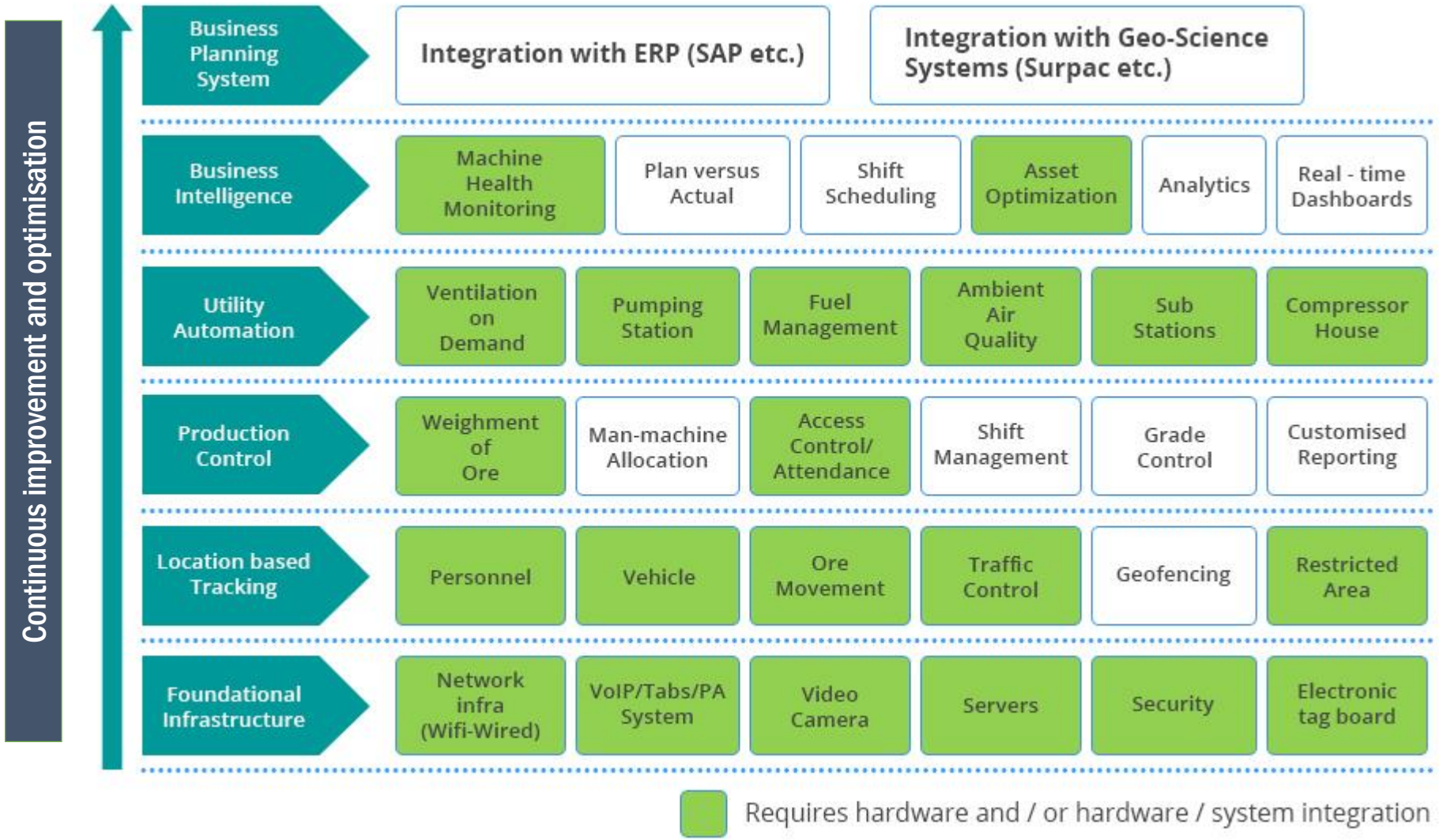
Underground Wireless Network.

Remote utility monitoring and control.

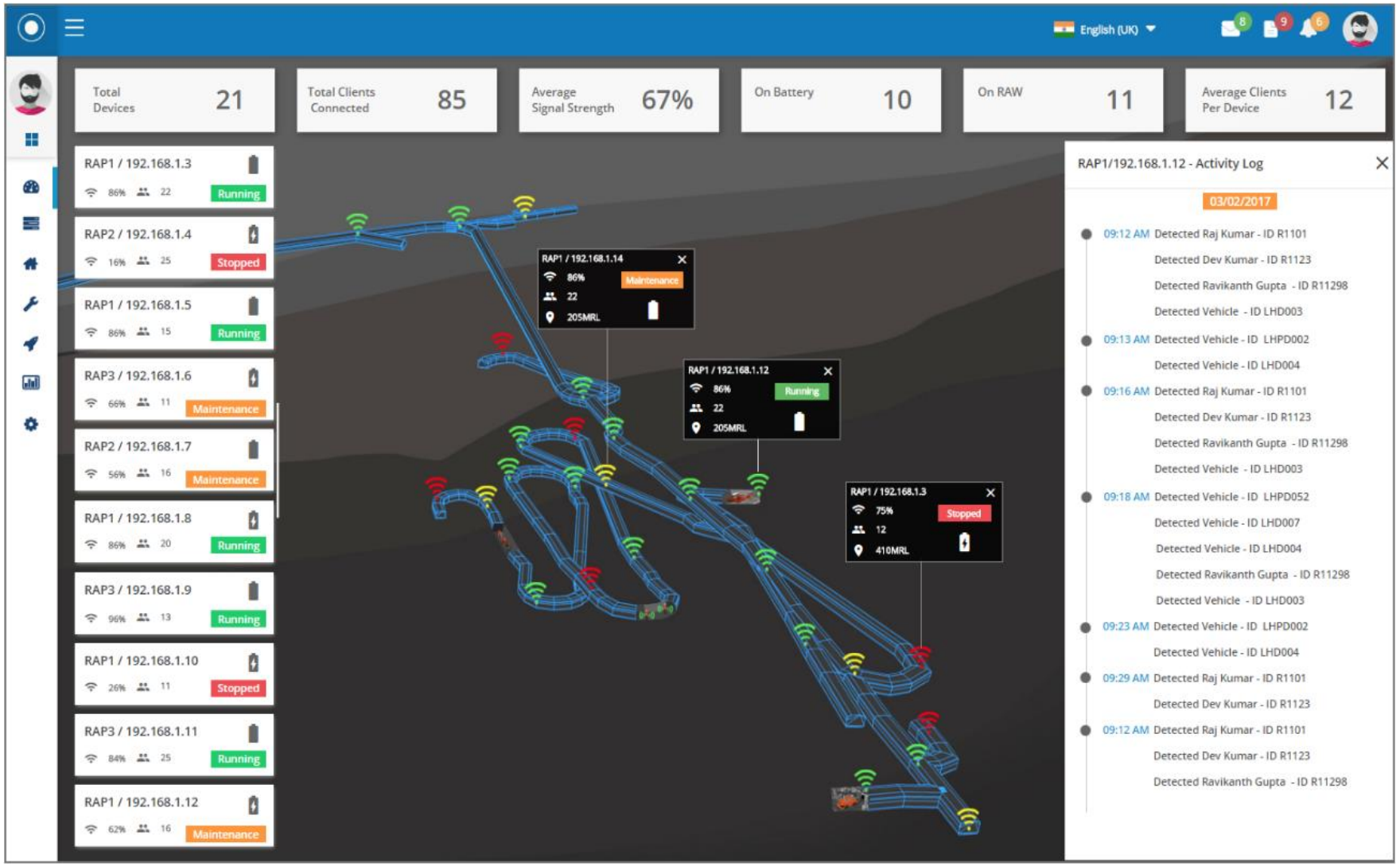
Real-time environmental monitoring.

UNDERGROUND MINING SOLUTIONS

Objective: Streamlining operations, improving safety and maximising productivity



UNDERGROUND MINING SOLUTIONS: NETWORK INFRASTRUCTURE

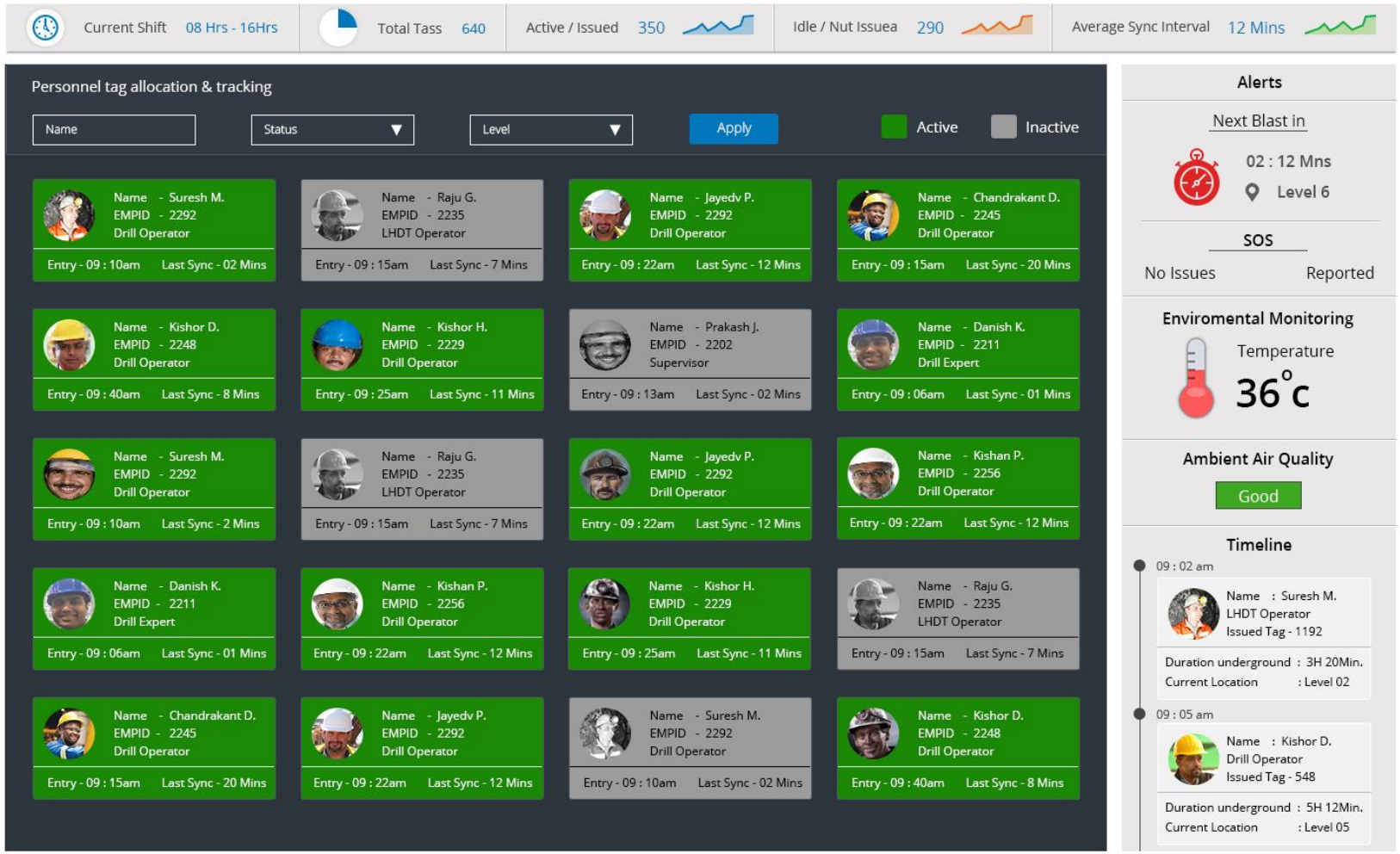


- Establish wireless hop-based underground RF / Wi-Fi Network.
- Wireless access points do not require direct line of site.
- Seamless plug and play for access point replacement or network extension
- Central DHCP Server & management console deployed in a surface based control room

UNDERGROUND MINING SOLUTIONS: 2-WAY COMMUNICATIONS

- 2-Way voice communication using rugged and compact Wi-Fi Radio device
- Conference Call function for multiple simultaneous communication
- PA/ Voice Broadcasting options available.
- Dock-able hands free mouthpiece and microphone for equipment operators
- Feasibility to use existing android smartphones or tablets as a hardware alternative.

UNDERGROUND MINING SOLUTIONS: ELECTRONIC TAG BOARD / PERSONNEL TRACKING

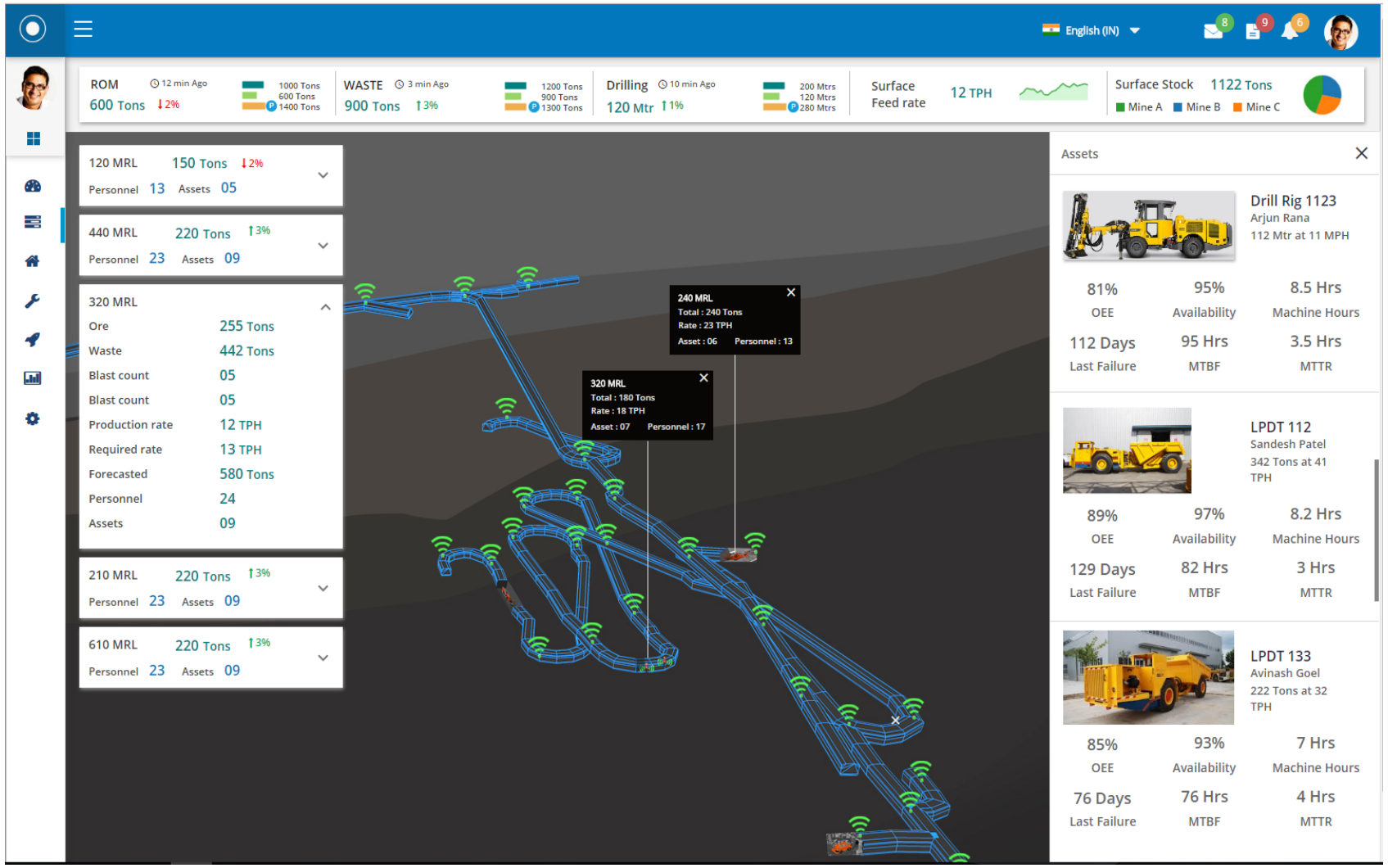


- System based process for allocation of tracking device, access tags, cap lamps etc.
- Supplement existing physical tag board processes with a public display/ management console to dynamically track tag allocation.
- Once tracking device is issued personnel can be tracked by utilising the wireless network infrastructure.

UNDERGROUND MINING SOLUTIONS: SECURITY

- **Video Surveillance:** IP Cameras deployed at required locations with direct feed to surface.
- **Dashboard cameras** for underground equipment and machinery.
- **IT Security:** Custom IP range for DHCP servers, MAC address based access list. Wireless network secured using WPA2 / WEP and AES / TKIP encryption.
- **Physical Security:** Biometric personnel access control. Hard and soft barriers. Zone wise tracking.

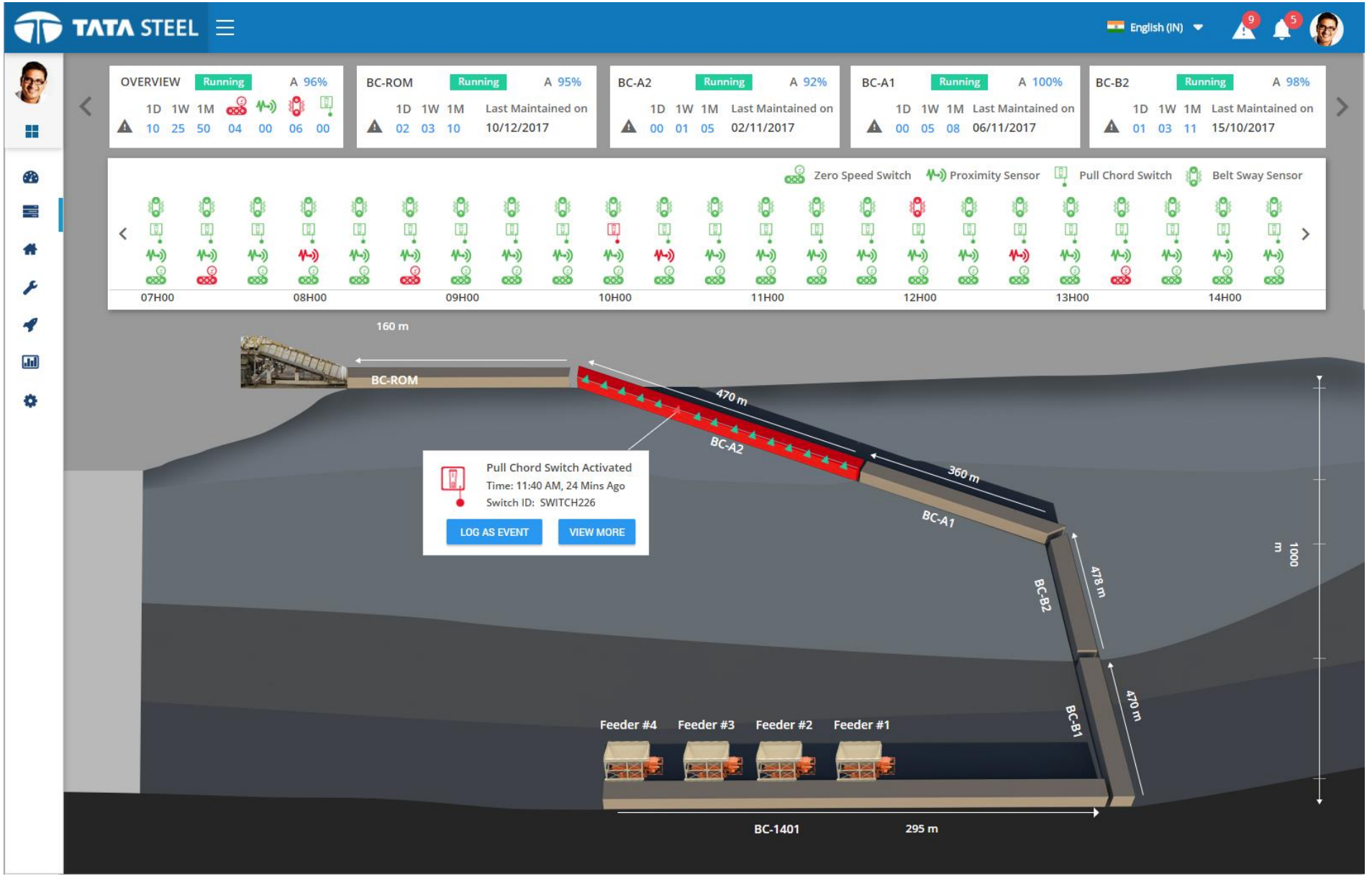
UNDERGROUND MINING SOLUTIONS: EQUIPMENT TRACKING



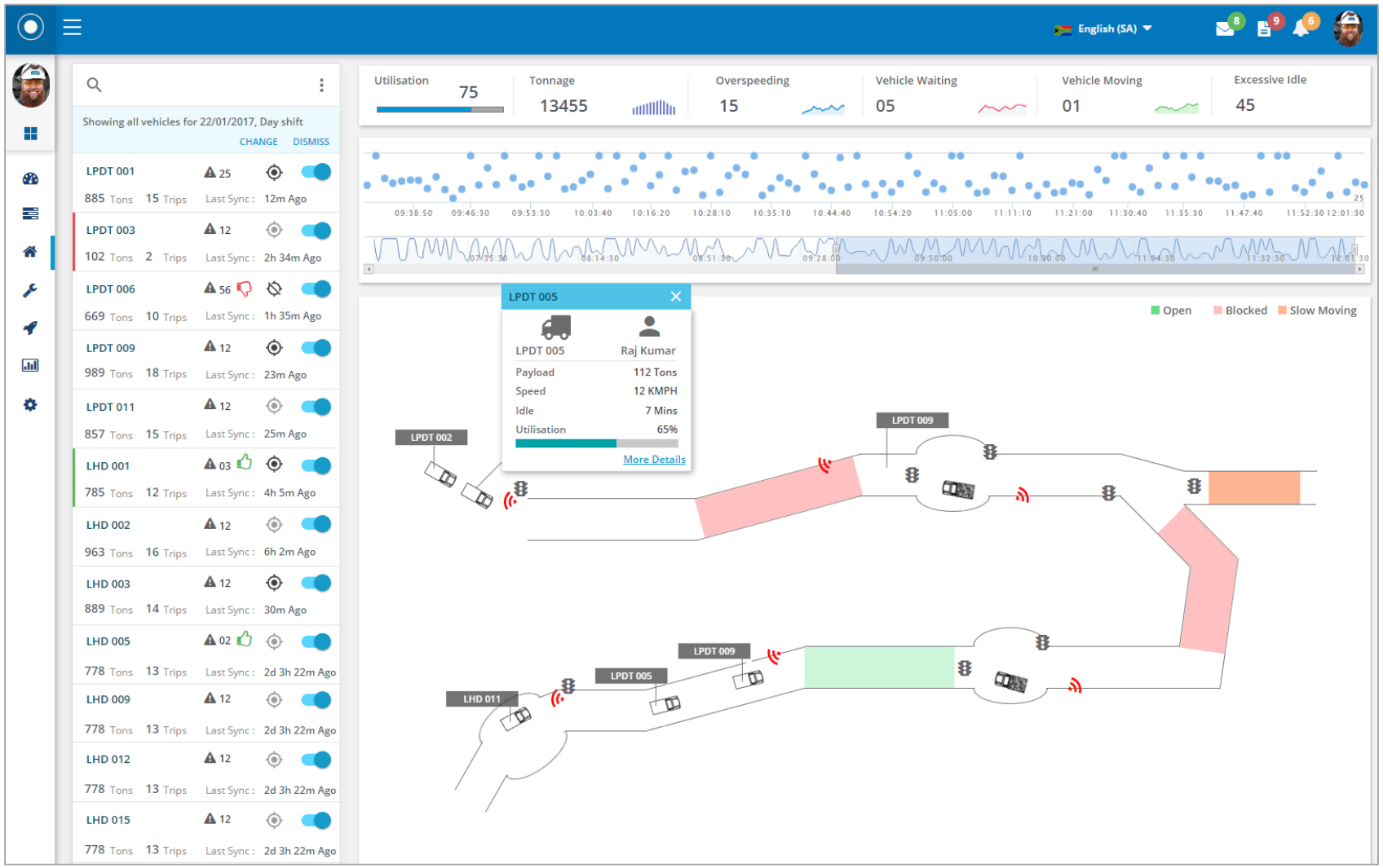
- **Surface:** Real-time tracking of vehicles, stockpile levels and plant feed.
- **Underground:** Real-time tracking of vehicles, monitor total ore extracted for each level.
- **Ore Movement** managed and tracked on a trip by trip basis.
- **Ore movement and volumes displayed** on a real-time dashboard for complete oversight.

UNDERGROUND MINING SOLUTIONS: PRODUCTION MONITORING

- Real-time tracking of conveyor and tram systems for production and equipment monitoring.



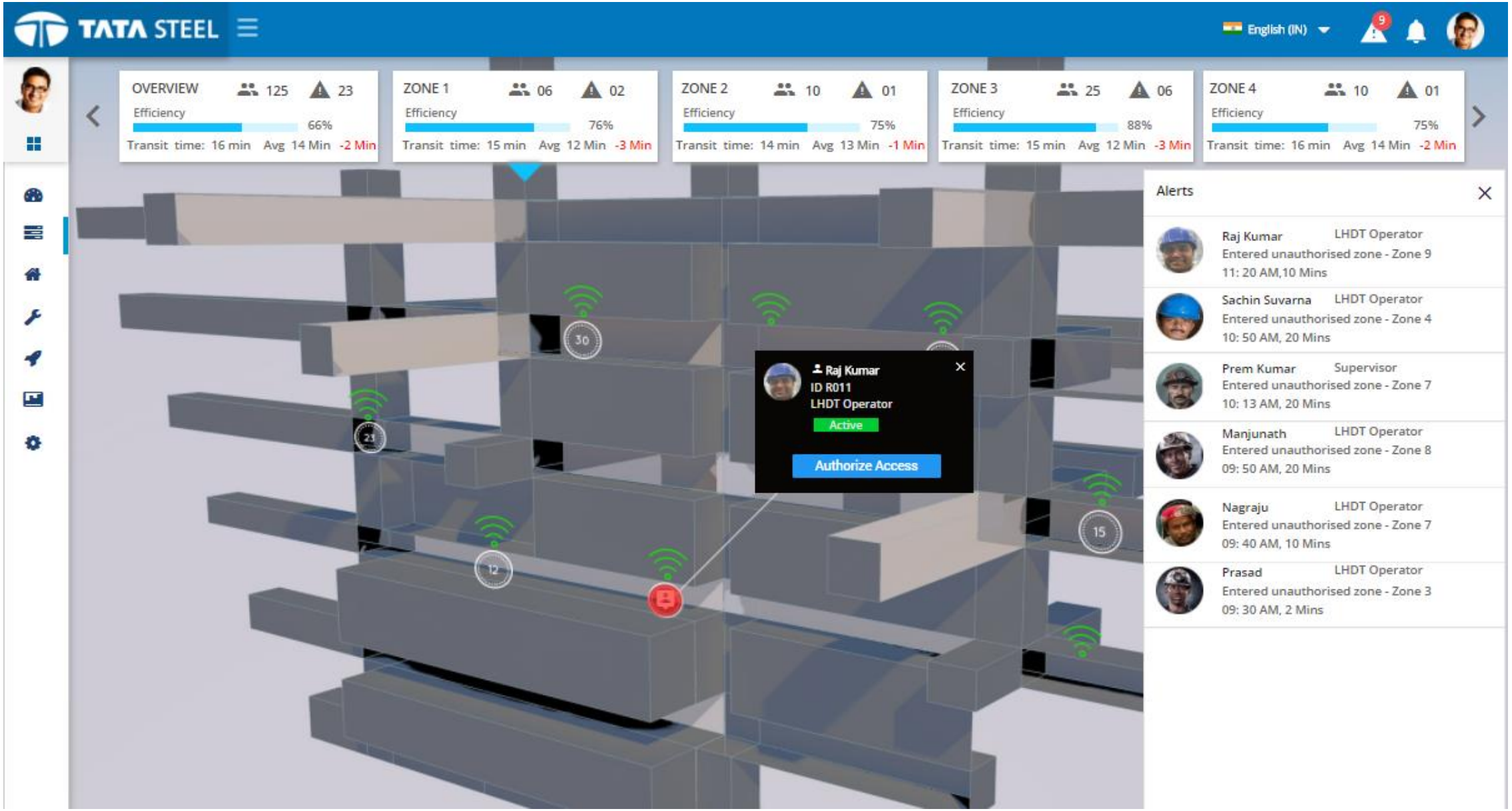
UNDERGROUND MINING SOLUTIONS: TRAFFIC MANAGEMENT



- Dynamic traffic control using signal lights to ensure optimal vehicle movement and safety.
- Intelligent decision making algorithms ensure priority is given to loaded vehicles on the ramp.
- Traffic movement and operator behavior can be remotely monitored from a management console.

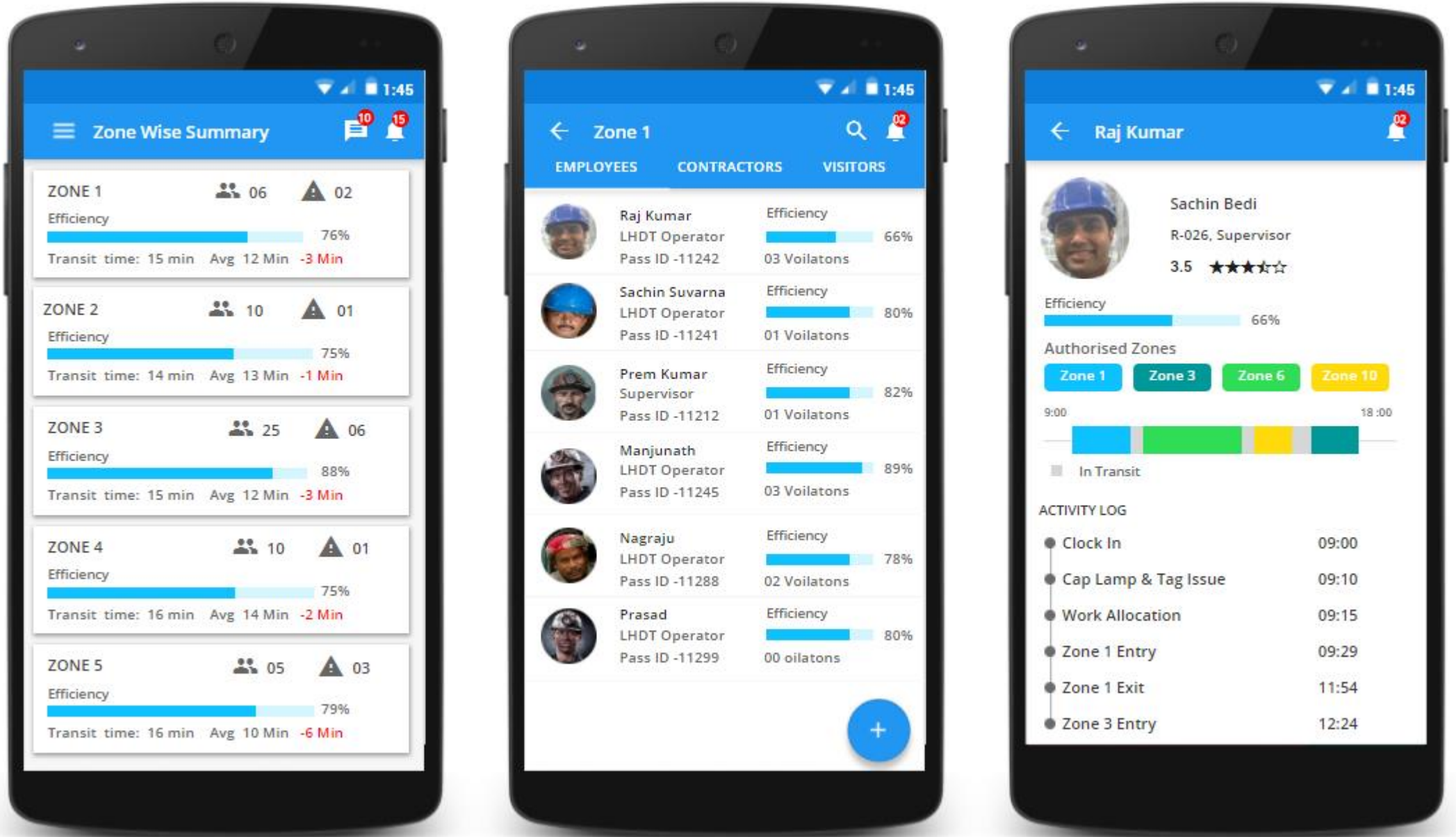
UNDERGROUND MINING SOLUTIONS: 3D DASHBOARDS

- Customisable 3D dashboards depicting tunnels, networks and galleries combined with required real-time data.



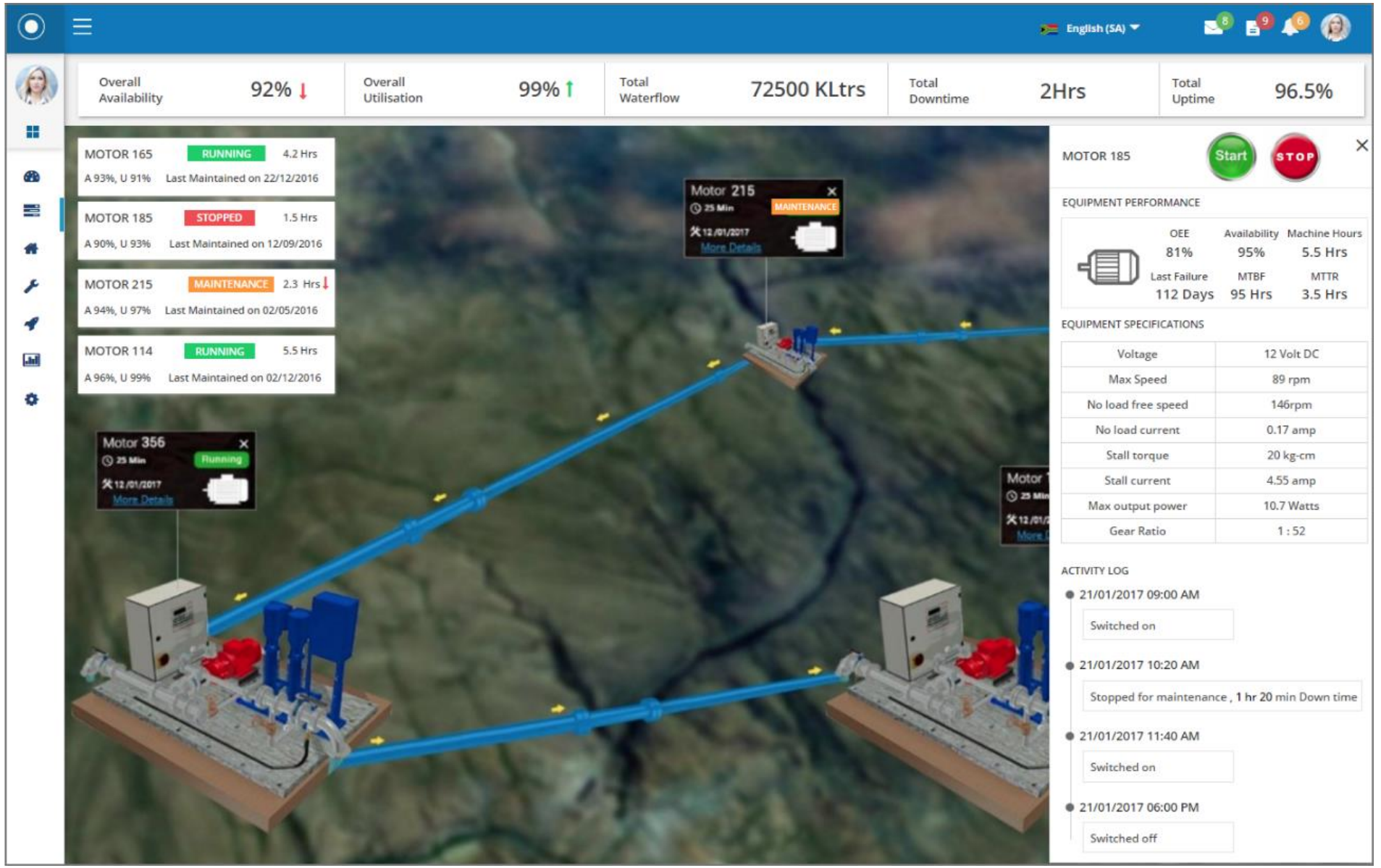
UNDERGROUND MINING SOLUTIONS: MOBILE APPLICATIONS

- Customisable 3D mobile applications dealing with tracking, production, safety and/or utility management.



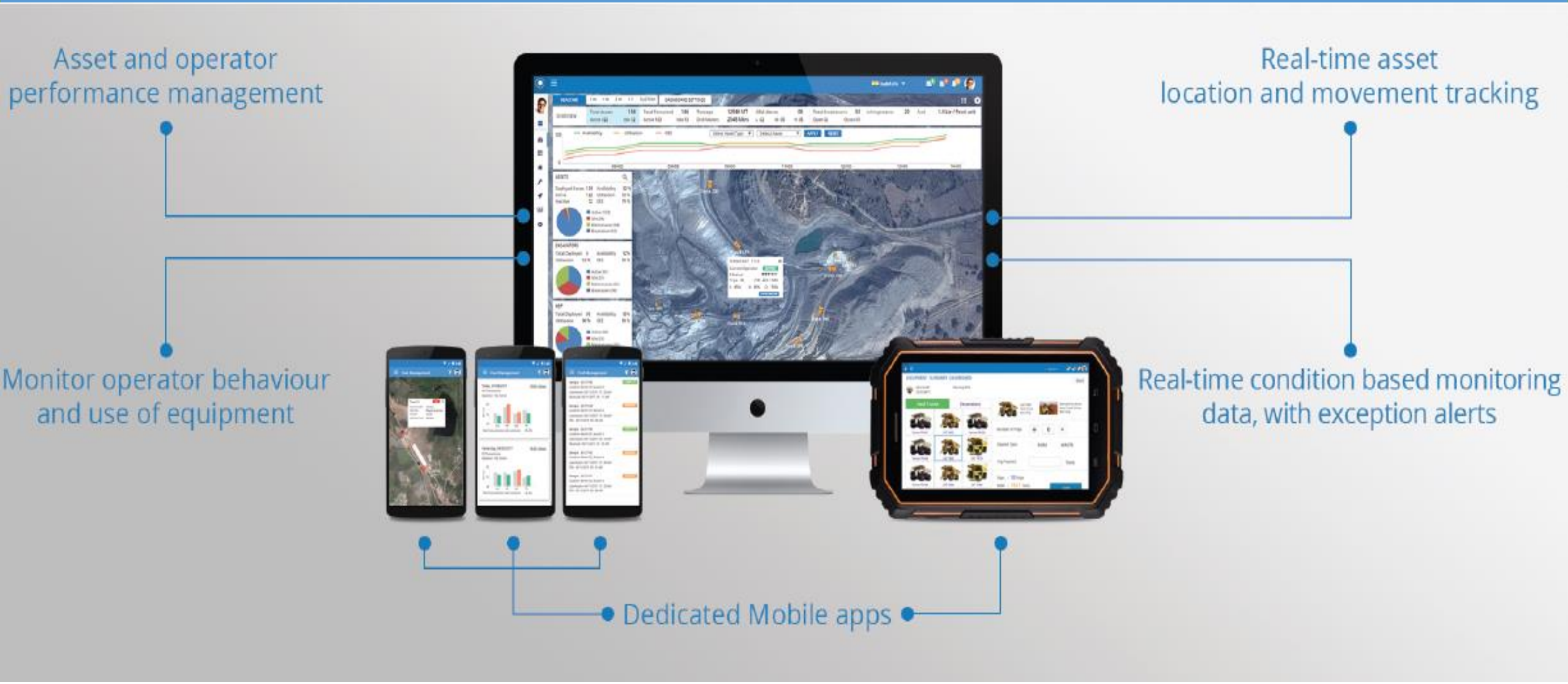
UNDERGROUND MINING SOLUTIONS: REMOTE UTILITY MANAGEMENT

- Remote utility management for pumps, conveyors, ventilation as well as environmental and gas monitoring.



MODULE 6: ASSET TRACKING & COLLISION AVOIDANCE

ASSET TRACKING AND FLEET MANAGEMENT



- Track and monitor all assets in real-time from a customisable web based dashboard.
- Monitor operator utilisation of equipment and behaviour.

VEHICLE MOUNTED COMPUTER

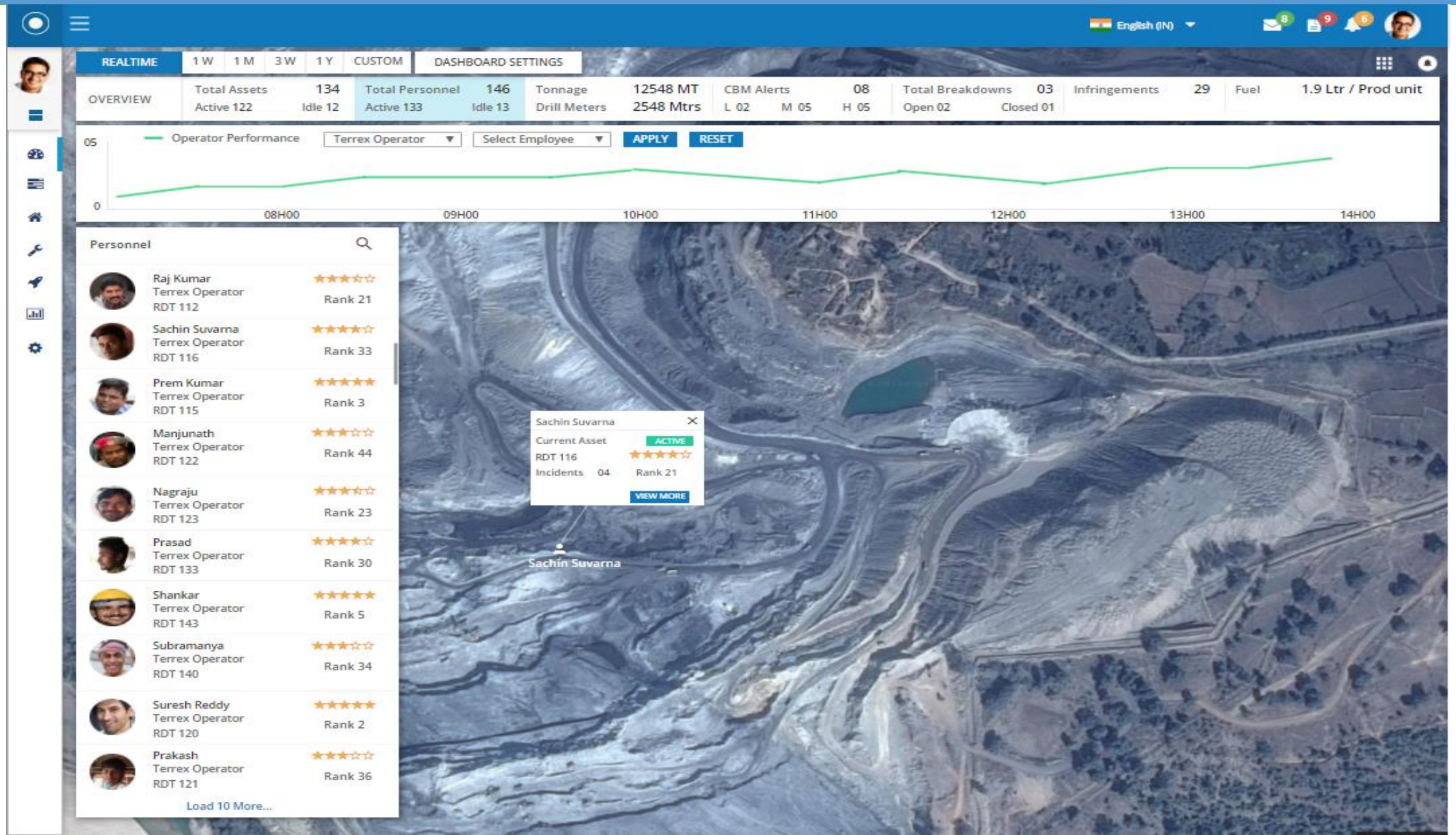
- **Input** – GPS & BDS; Finger print; HF RFID; OBD Data Collection; Hi-Resolution Camera; Android OS; High Power Quad Core Processor
- **Output** – 720P TFT-LCD screen to relay key information to the operator with full audio capability.
- **Performance** – Biometric scanner, 4G LTE; HF RFID; OBD Data Collection; Hi-Resolution Camera; Android OS; High Power Quad Core Processor, 4GB RAM

CONDITION BASED MONITORING

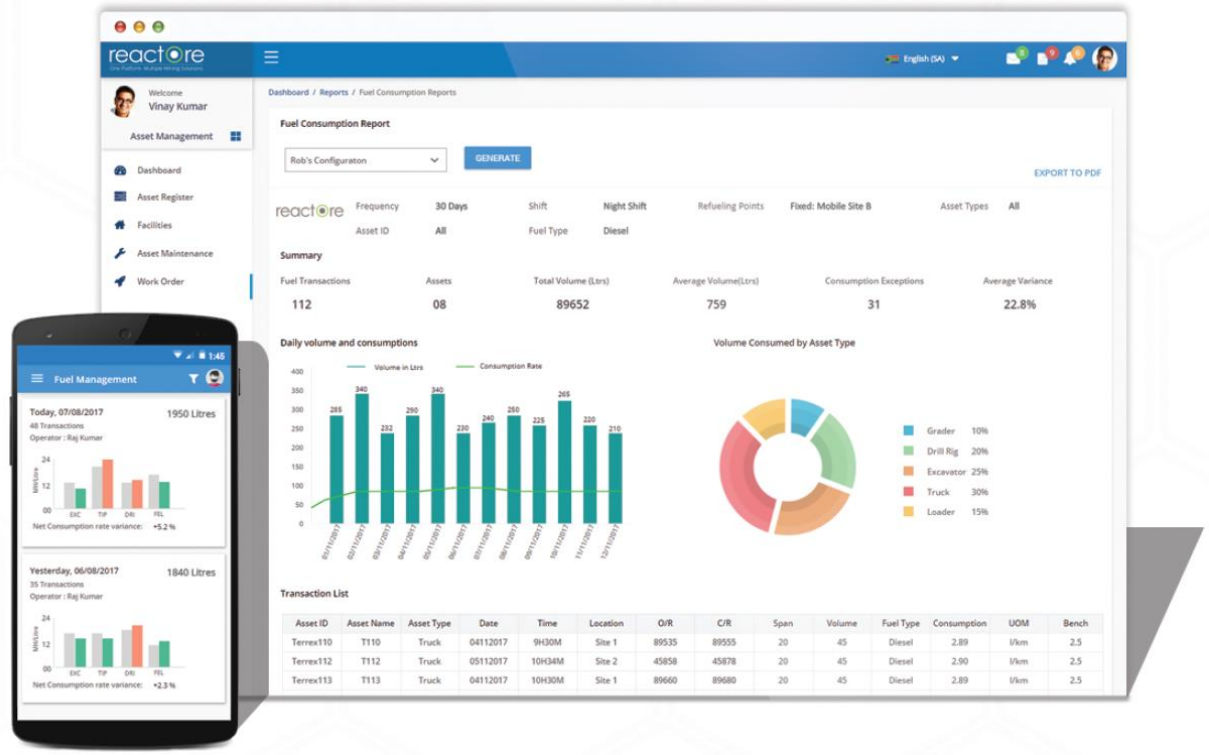
- **OBD II** – Gather equipment diagnostic data directly from the vehicle and transmit to a central monitoring dashboard and the operator display device.
- **Intelligence** – Analytics and historical trend analysis on OBD diagnostic data to provide insight and early warning signs of potential equipment failure.
- **Alerts** – Alerts sent to both operator and central server in the event of negative diagnostic parameters.

ASSET TRACKING

PERFORMANCE MANAGEMENT



FUEL MANAGEMENT



- **Consumption**– Tracking equipment fuel consumption by using existing OEM sensors or specialised 3rd party sensors.

- **Reporting and alerts**– Consumption reports and exception based alerts according to customisable user parameters available on web or mobile application.

- **Expanded Solution** – Option to integrate with a specialized fuel transaction management (FMS) solution for a comprehensive solution.

LEGAL COMPLIANCE AND ADMINISTRATION

- **Legal Compliance**– Administration of all operator and vehicle statutory and regulatory requirements.
- **Warranties**– Manage and track vehicle and component warranties with ease.
- **Insurance and Licensing** – Streamline the administration of insurance and licensing requirements.

PROXIMITY DETECTION / COLLISION AVOIDANCE SOLUTION

Collaborative or Stand-alone solution options

+

Reactore: Intelligent Application of sensor technology for Collision avoidance risk management

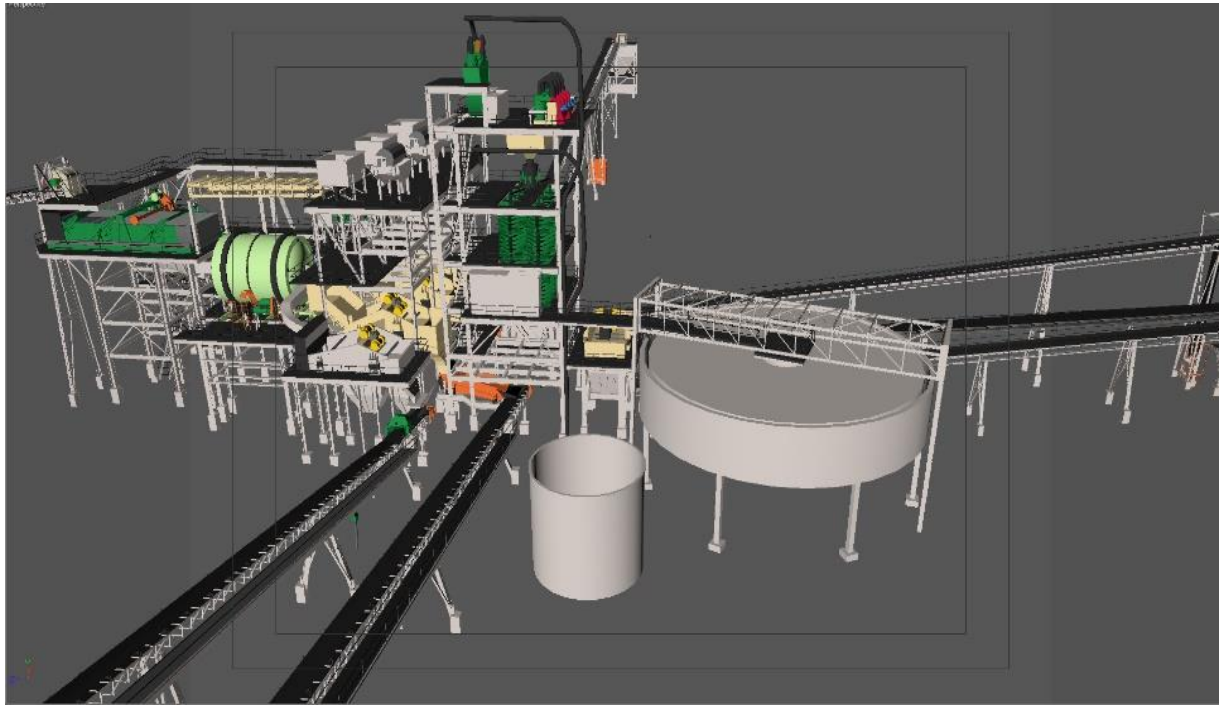
- **Intelligent threat evaluation**– Track multiple simultaneous proximate vehicles and personnel and using algorithms that take parameters such as location, speed, trajectory into account assess the greatest threat.

- **Early anticipation of collisions**– Advanced collision prediction with early audio and visual alerts to operators to prevent last minute panic situations from arising.

MODULE 7: ASSET MANAGEMENT

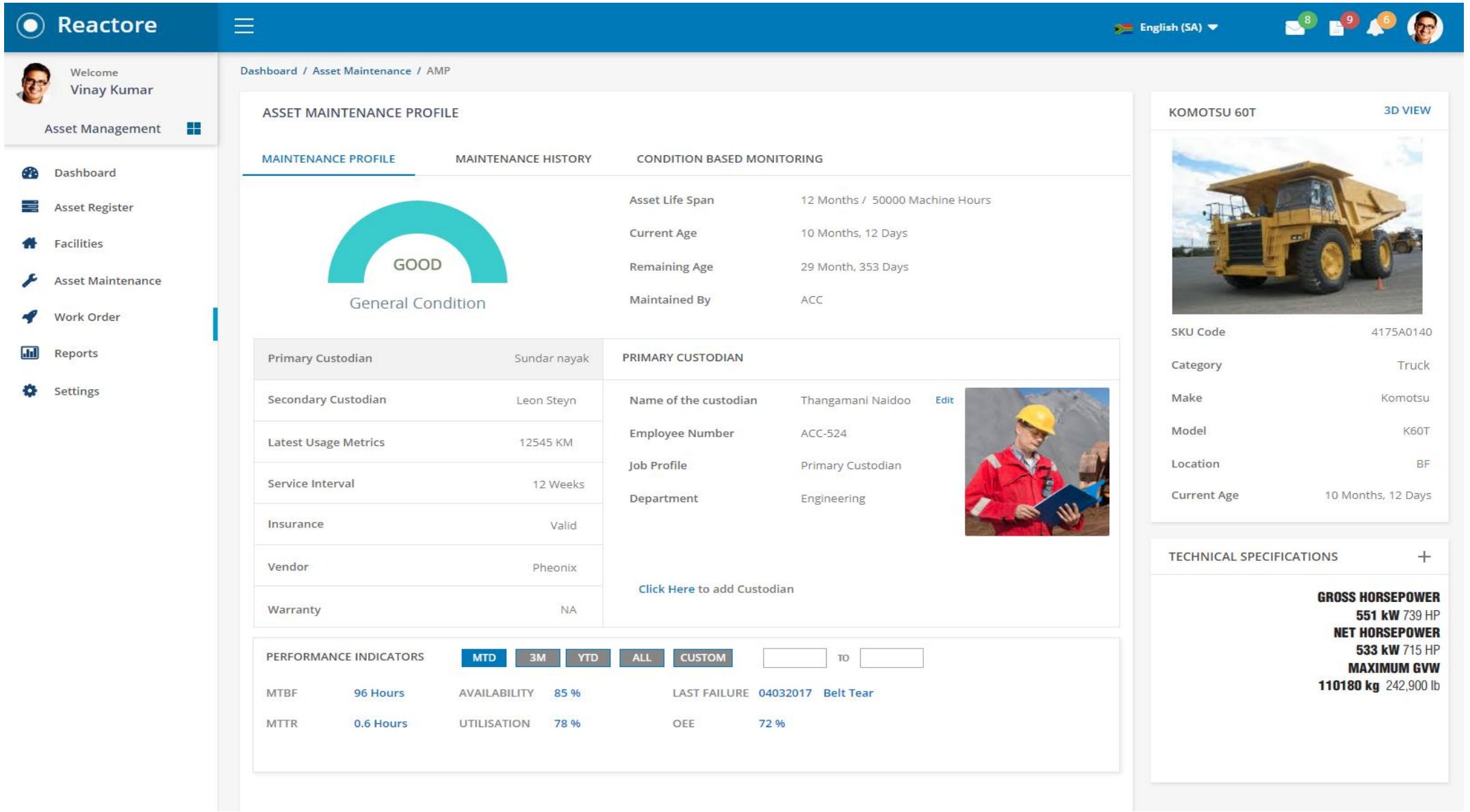
ENTERPRISE ASSET MANAGEMENT SOLUTION

- Asset maintenance and management solutions for equipment, GET, vehicles and entire facilities.
- Detailed, customisable asset register with administrative tools.
- 3D modelling of facilities and equipment with component level maintenance.



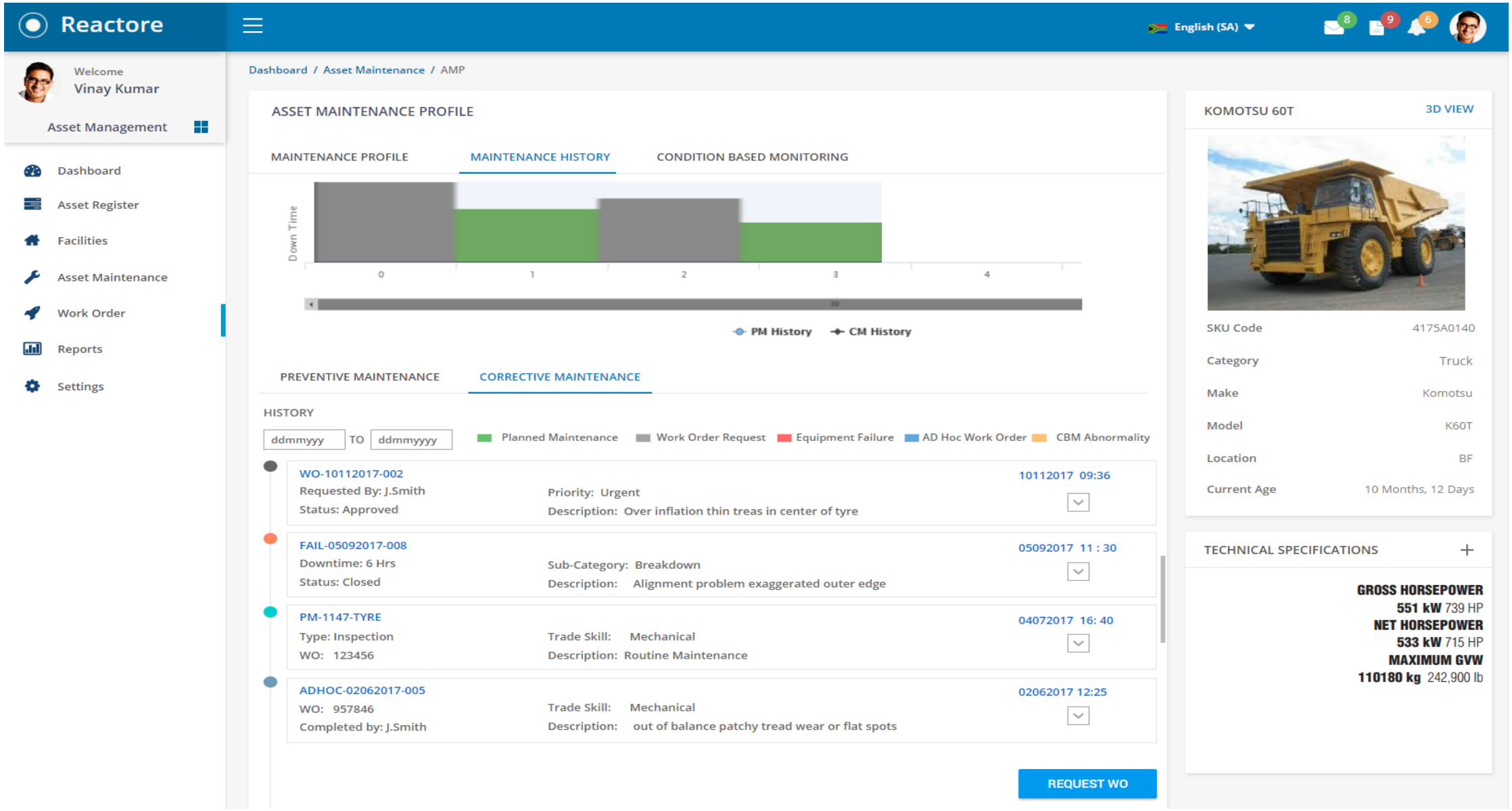
ASSET MAINTENANCE PROFILE

- Detailed health record of each asset and its performance.



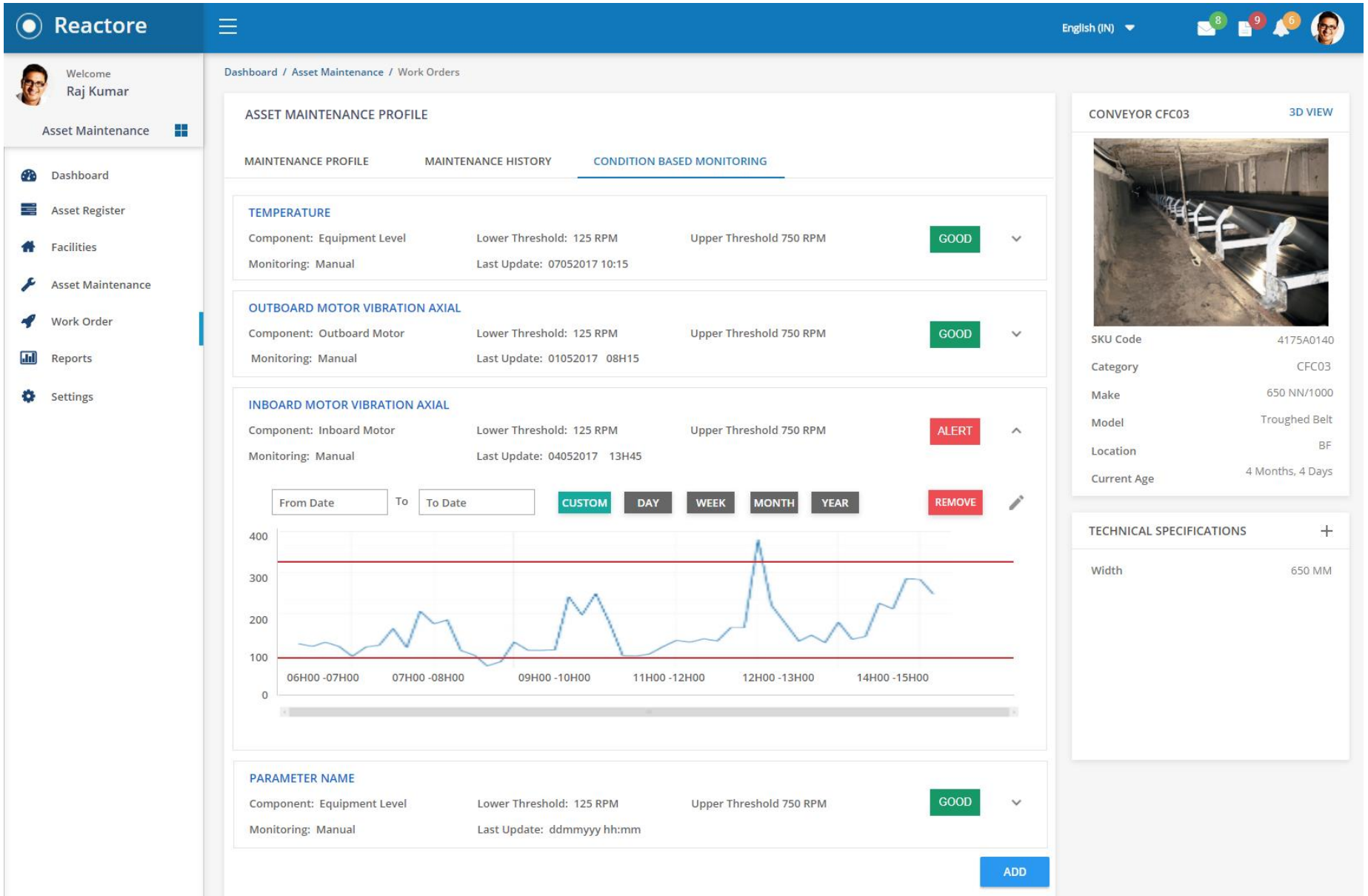
DETAILED MAINTENANCE HISTORY

- Complete audit trail of all maintenance, inspections and repairs undertaken.



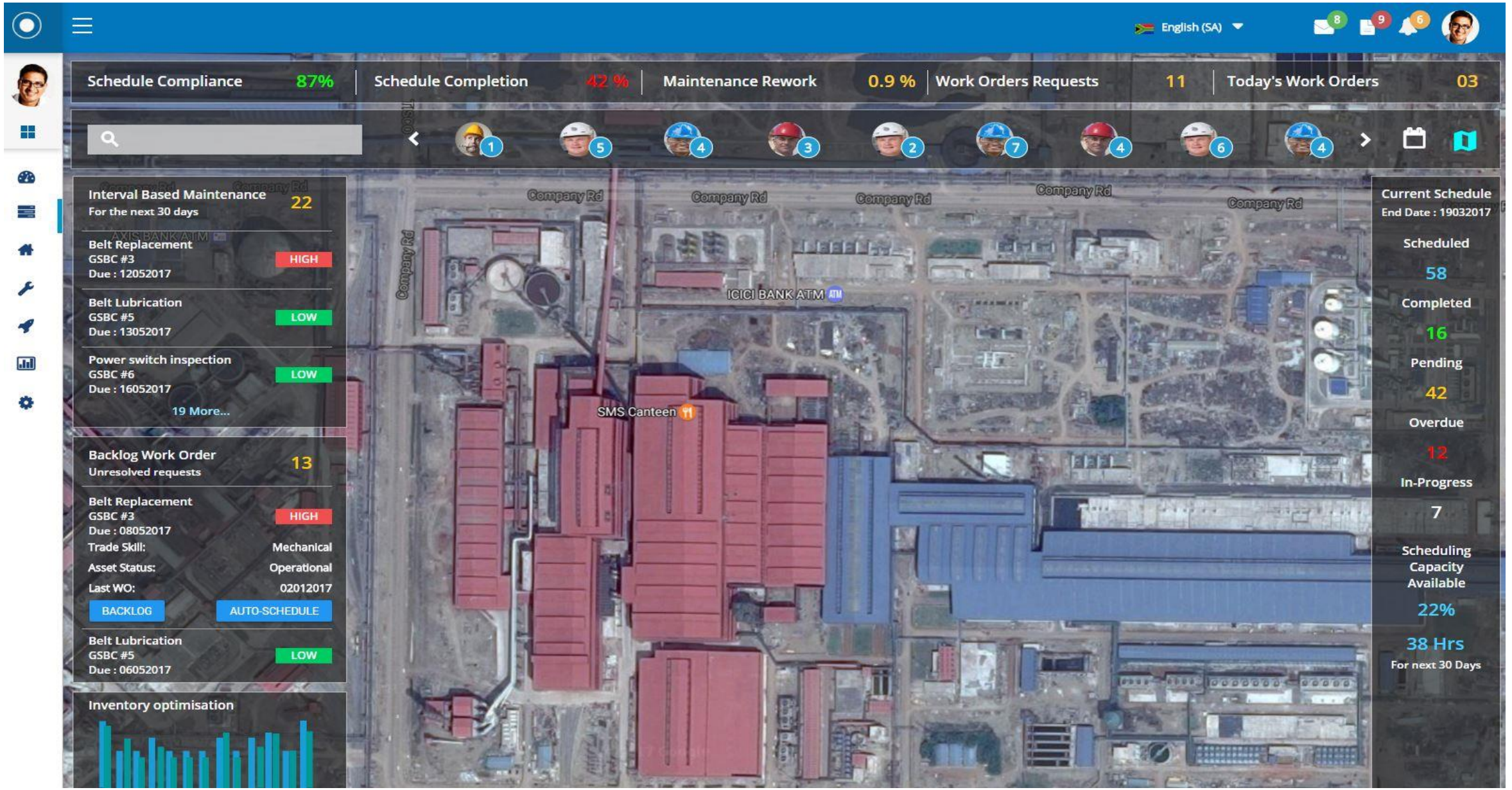
CONDITION BASED MONITORING

- Analytics based monitoring of equipment via direct sensor integration or via scheduled inspections.



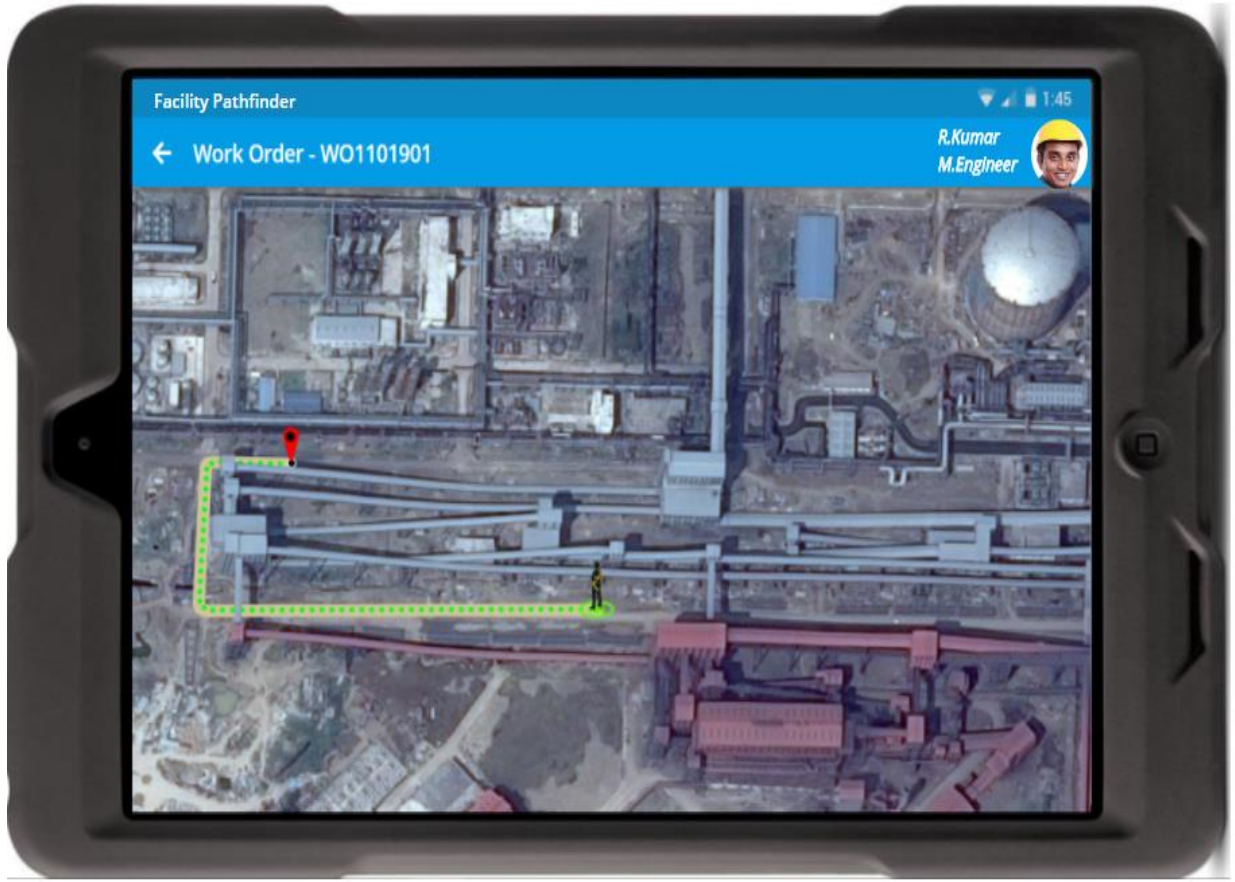
MAINTENANCE SCHEDULING

An intelligent business rules driven auto-scheduling feature that plots out an optimised maintenance schedule.



WORK ORDER MANAGEMENT

- Mobile apps for technicians and mechanics providing maintenance and inspection instructions for real-time monitoring.



MODULE 8: SALES AND DISTRIBUTION

SALES AND DISTRIBUTION SOLUTION

END TO END MANAGEMENT OF SALES AND DISTRIBUTION CYCLE

Integrated solution - A solution that seamlessly links stock availability, client demand, dispatch logistics and 3rd party accounting and ERP systems.

Logistics Scheduling - Intelligent system guided logistics scheduling features for optimised product distribution for both internal and visiting vehicles.

Administration - Administrative and financial back office features that seamlessly link with each step of the dispatch process.

- **Plant integration** - Integrate with plant data to track grade and output produced.

- **Material Balances** - Real-time stock balances for clients, agents and back office.

- **Centralised control and monitoring** - All steps of the process can be scheduled and monitored through a real-time dashboard and dedicated mobile app.

- **Security** - Validated, automated entry and exit procedures for internal and visiting vehicles.

- **Dispatch** - Track vehicles and delivery status in real-time. Driver's are assisted with a mobile app which relays all required information including real-time route suggestions.

- **Weighbridge integration** - Integration with weighbridge hardware/systems ensures validated accurate information with instant invoicing and order updates.

- **Product dispensation** - FEL Operators automatically receive product dispensation requirements as per order requirements, ensuring that the correct product and quantity is issued to the correct vehicle.

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CLIENTS AND AGENTS

- Client and agent access portal for order placement and tracking.

Client and Agent Sales Portal

Clients

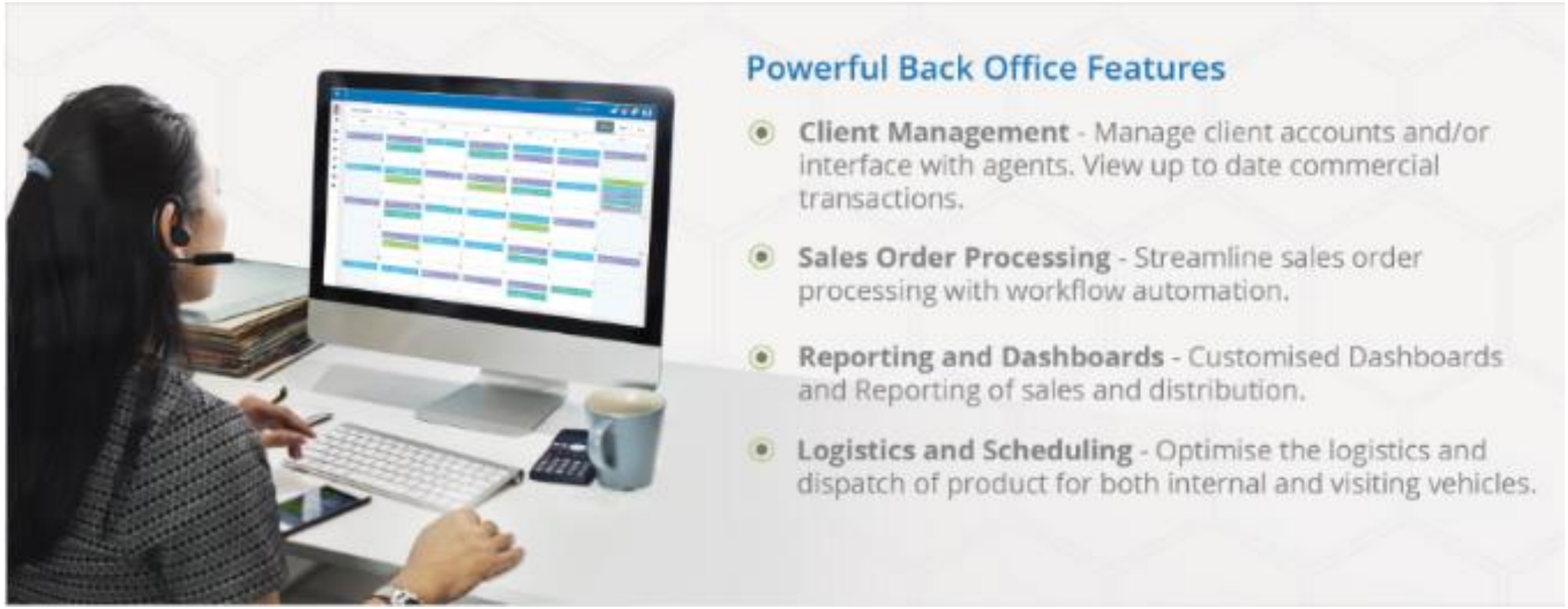
- Manage and place orders
- View stock on hand
- Self manage your sales account
- Make payments
- Track deliveries
- Communicate directly with supplier

Agent

- Manage clients
- Track and add sales leads
- Manage and place orders
- Track deliveries
- Interact with back office
- Communicate with client

BACK-OFFICE FEATURES

- Back office administration features for client and order management.



3RD PARTY SYSTEM INTEGRATION

- Integration with payment gateways, ERP’s and accounting packages.

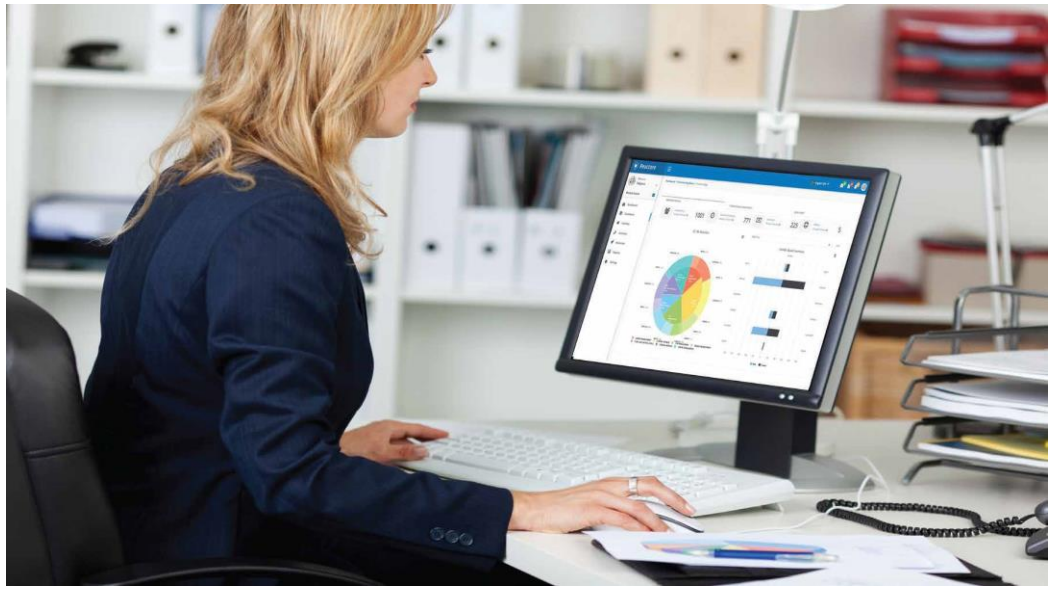
MODULE 9: HUMAN RESOURCE MANAGEMENT

HUMAN RESOURCE MANAGEMENT

A Human Resource management solution designed specifically for the mining industry.

Can serve as a stand alone or work in conjunction with existing HR packages.

Employee services and contractor management features.



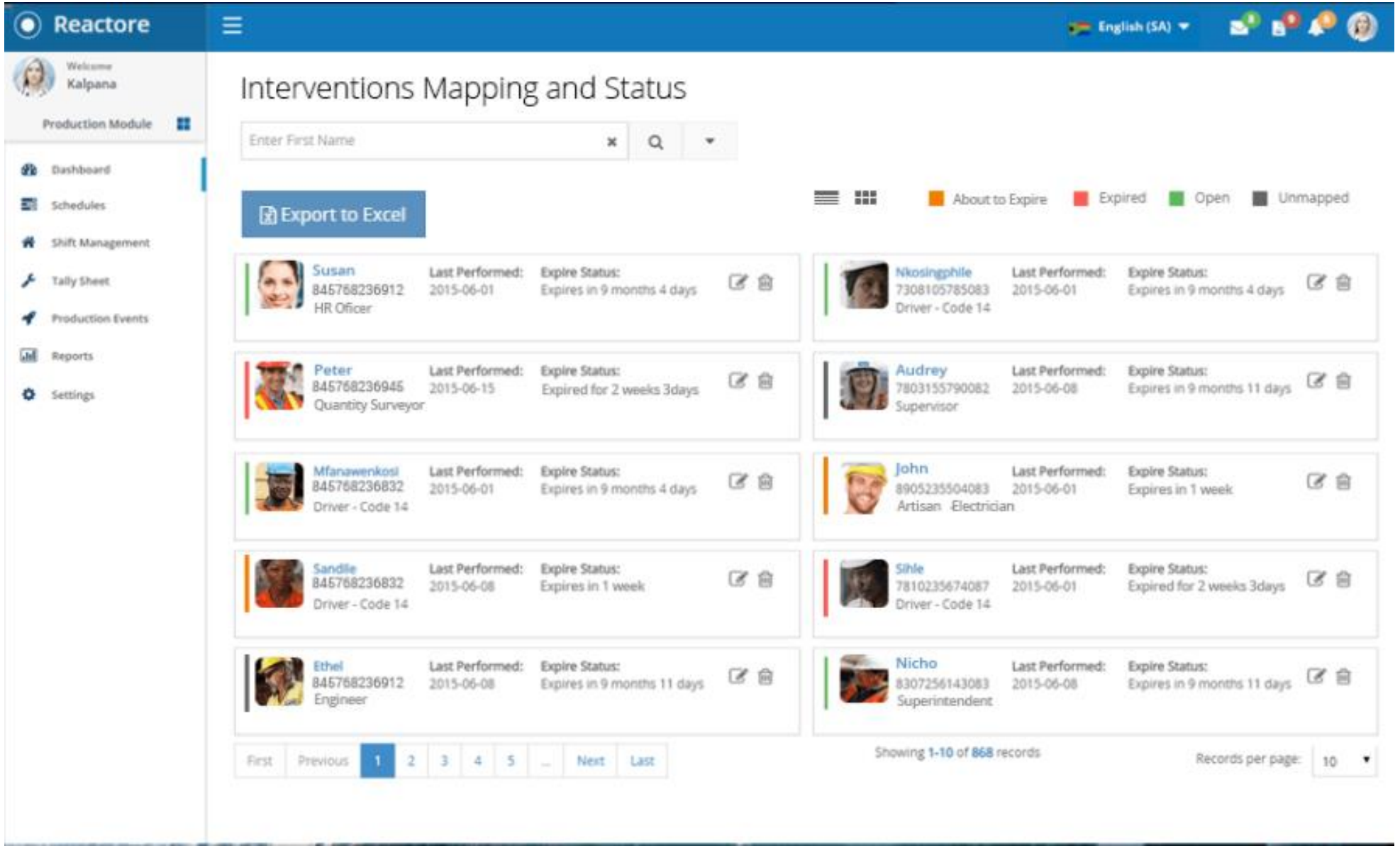
Training Administration - Manage employee skills development programs and internal training interventions with ease including SOP's, PTO's and safety induction requirements.

Time and Attendance – direct integration with biometric hardware or software systems.

- Performance Management
- Customised Leave management
- Recruitment administration.
- Public information kiosk features available for workers to interact with their HR department digitally.
- Seamless integration with 3rd party systems and other Reactore modules.

INTERVENTIONS AND TRAINING

- Administration of training and statutory safety interventions



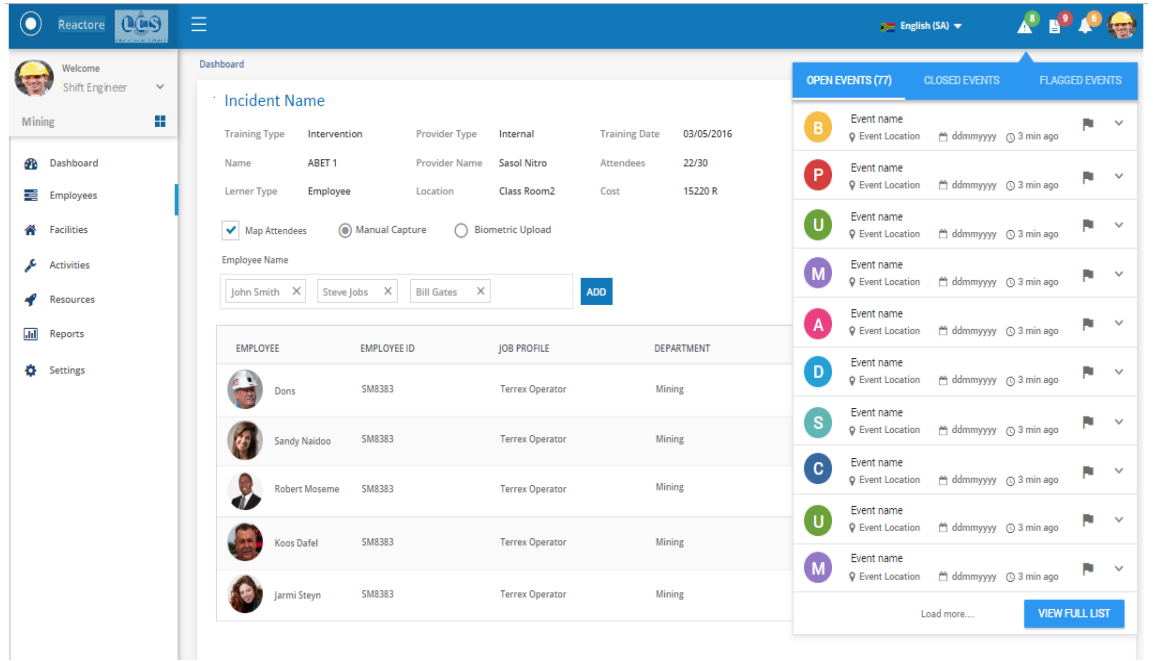
MODULE 10: HSE AND LEGAL COMPLIANCE

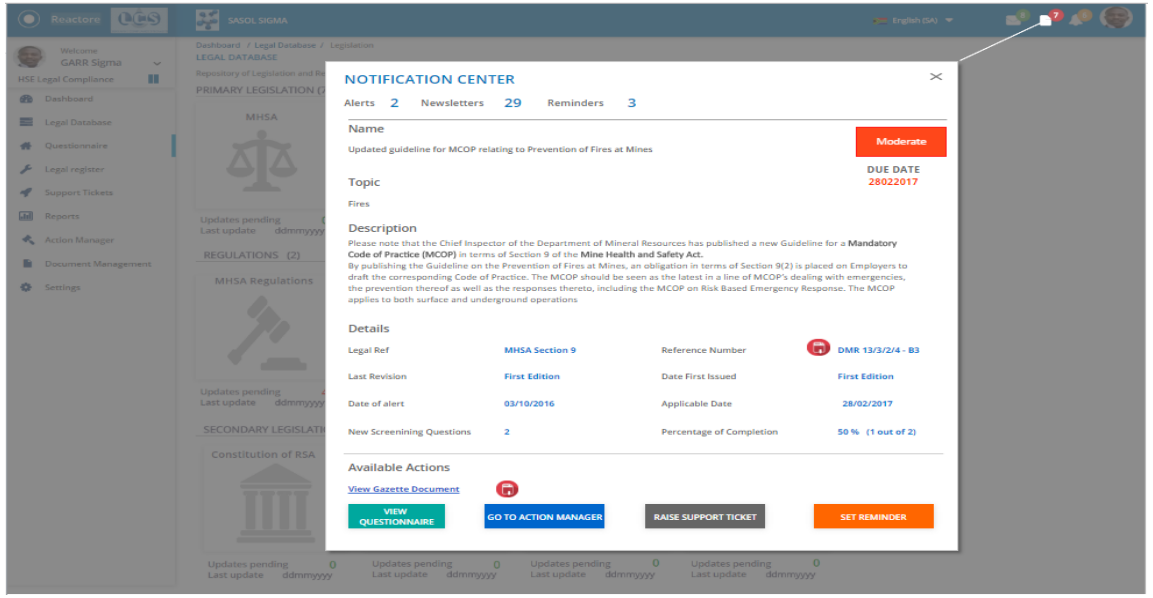
HUMAN RESOURCE MANAGEMENT

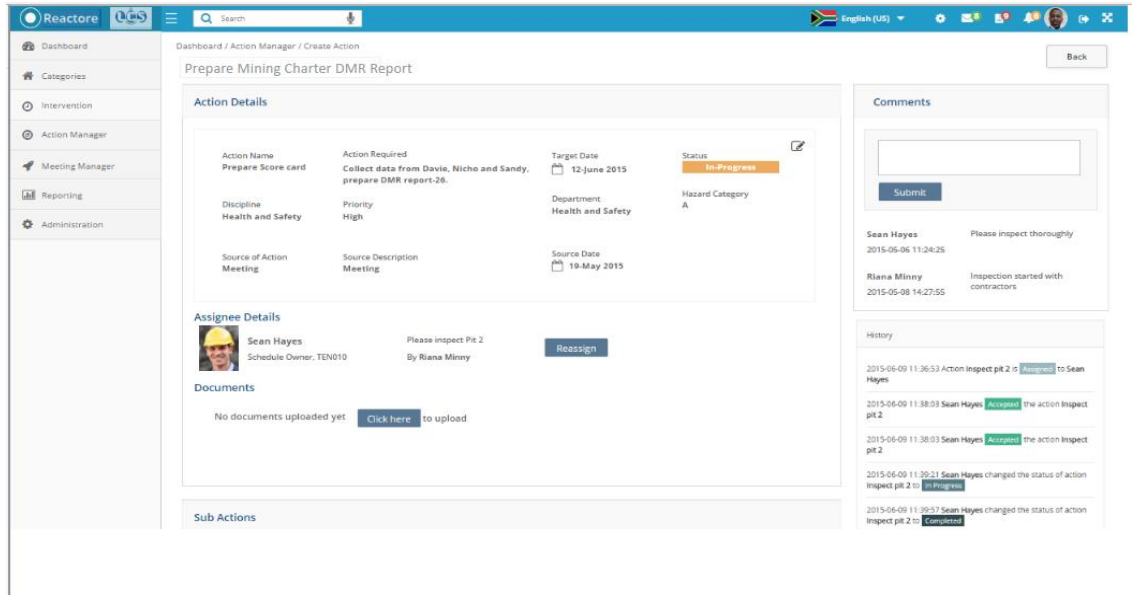
A solution designed in close collaboration with legal and safety experts to systematically manage risk and adherence to legislative requirements.

- Custom Legal Register
- Auditing and Verification
- Legal advice and Support
- Dashboard and Reporting
- Legal Appointments
- Contractor Management
- Document Management

HSE AND LEGAL COMPLIANCE FEATURES







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