AVEVAWORLD

AVEVA PI WORLD 2025

Smart **Data**, Smarter Recovery.

Ok Tedi's AVEVA™ PI System™ Journey with Mipac

Ok Tedi Mining Limited and Mipac partner for co-development

- Ok Tedi Mining Limited (OTML) is a 100% PNG-owned company and contributed 7.4% to the nation's economy.
- It mines copper, gold and silver at Mt. Fubilan in the Western Province of Papua New Guinea.
- OTML operates the longest-running open-pit mining 240kt of overburden and 60kt of ore daily at a rate of 24Mtpa.

- Our mission is to provide high-quality solutions to enhance operational performance and improve our clients' productivity, safety and efficiency.
- A global leader in operational technology, control systems and engineering services.
- Combine our operational experience, engineering and software development capabilities to deliver tailored solutions.
- AVEVA Partner with AVEVA PI Accredited Engineers.

Over the past

3

decades Mipac's team of

125

engineering professionals have delivered more than

720

projects across

55

countries for more than

110

site/operations

1.

Background

Mining and Processing Operations

ORE MINED → CRUSHED AND GROUND → COPPER, GOLD, SILVER EXTRACTED → DRIED AND STORED → EXPORTED

- Ore is mined and processed at an onsite flotation processing plant capable of treating up to **24 million** tonnes per annum (Mtpa).
- The plant currently recovers copper, gold and silver into a saleable concentrate.
- Final concentrate is transferred to a silo and storage vessel before being exported (using commercial shipping) to customers in Japan, the Philippines, Germany, South Korea and India where it is refined to produce copper metal and gold and silver bullion.

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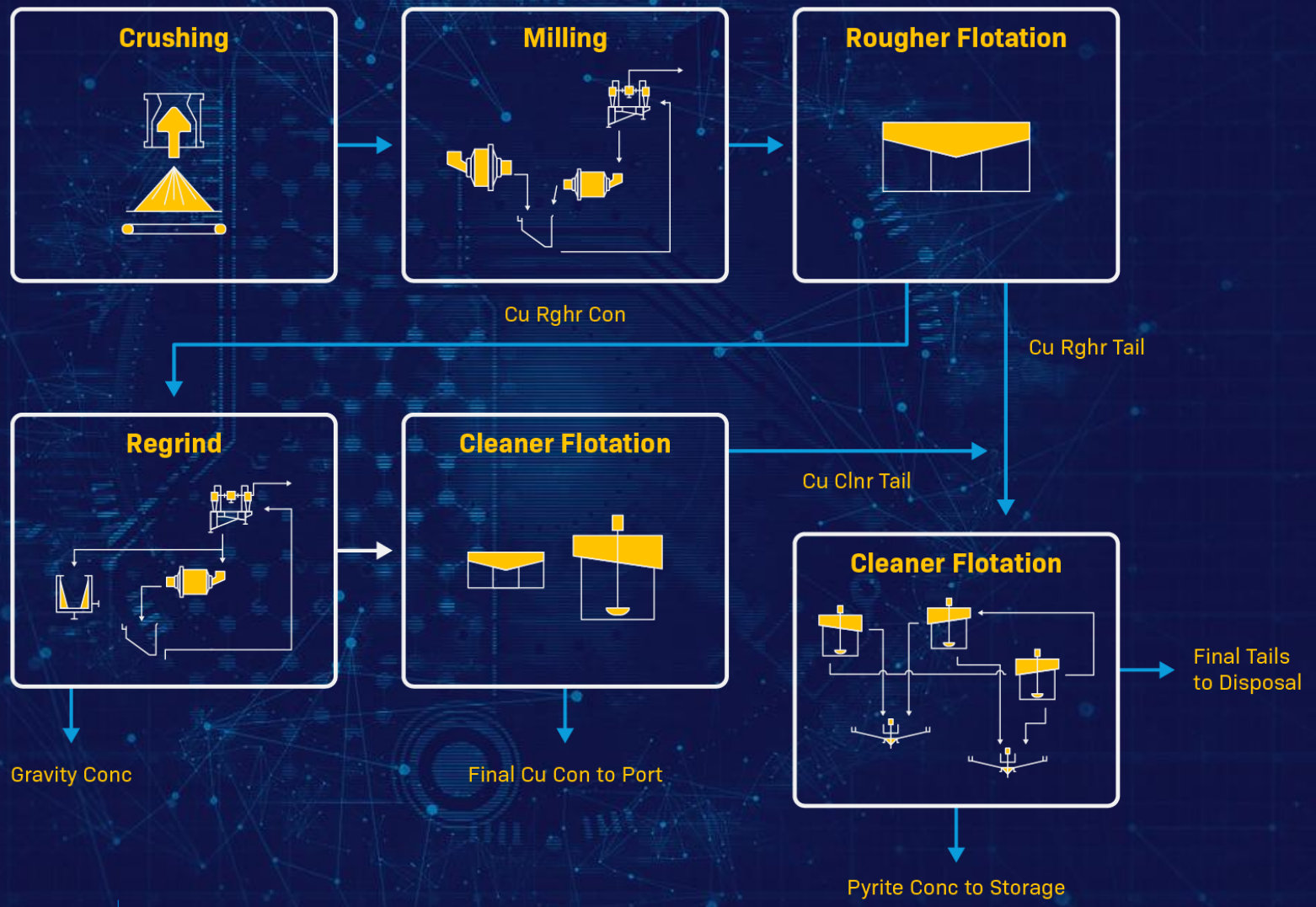
Process Flow



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2.

The Challenge

Low Recovery

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Problems at Ok Tedi

- Low gold and copper recovery
- Insufficient digital maturity for business intelligence
- Unstable operation, reacting and firefighting
- Manual operation

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Solution:
Automation Roadmap

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Data and Business Intelligence Roadmap

Online Knowledge Base, Support Desk and Project Management Platform

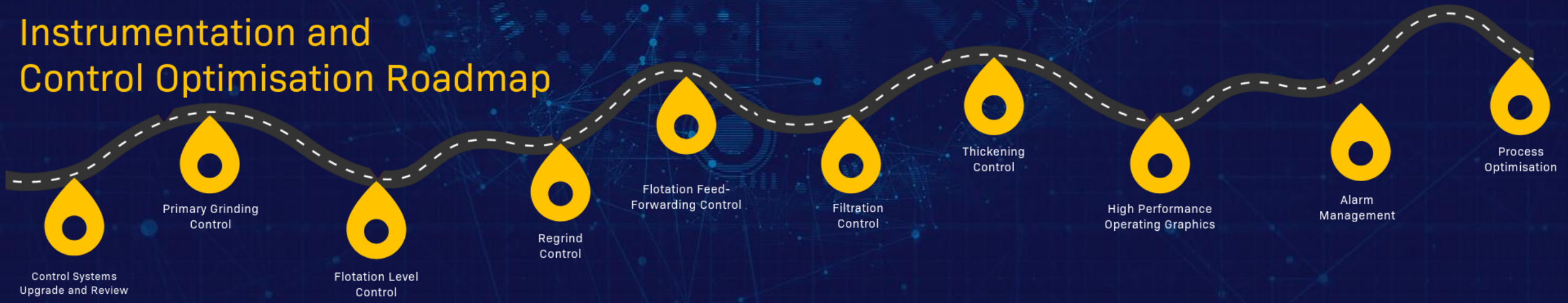
Training | Upskilling | Mentoring

Capability Development and Support

Project KPI Monitoring

2019 2020 2021 2022 2023 2024 present

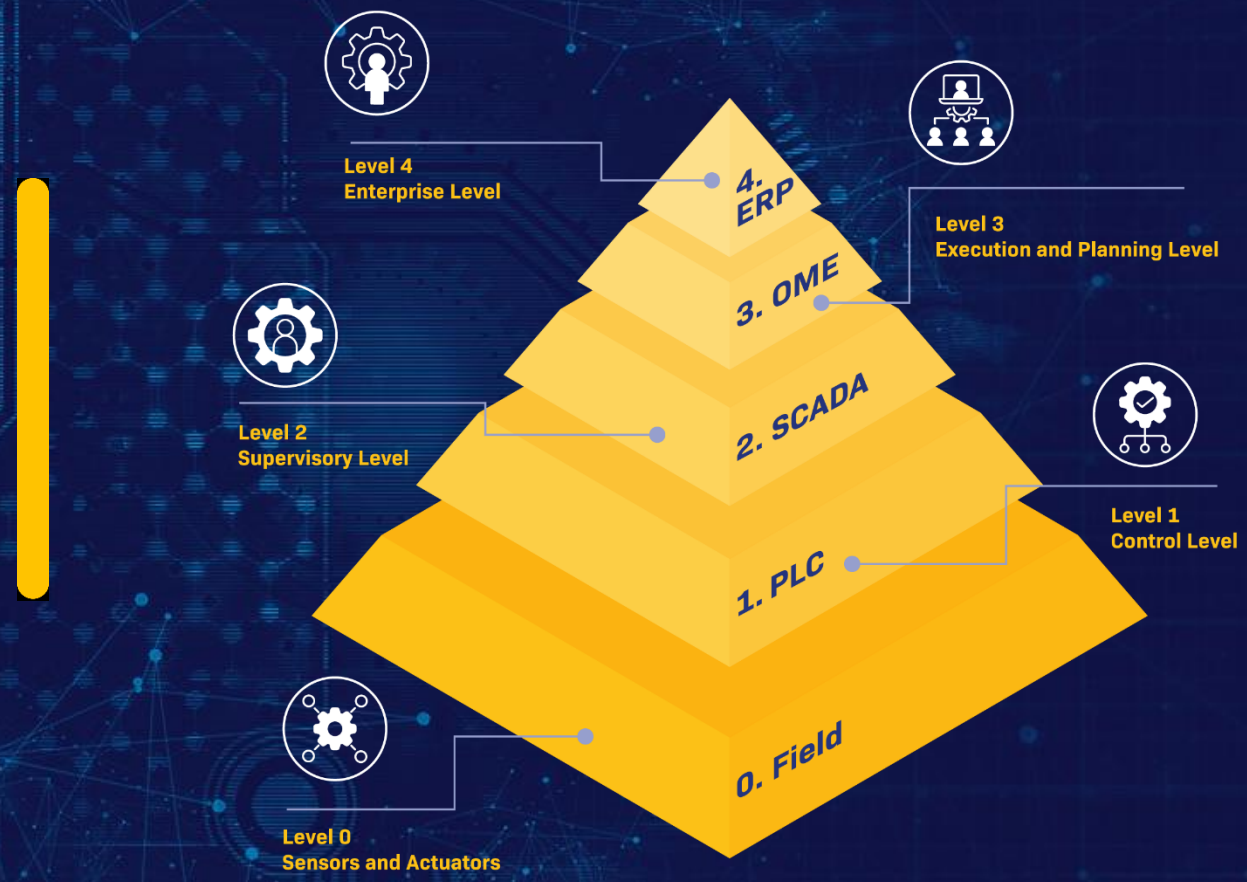
Instrumentation and Control Optimisation Roadmap



A stable data platform centering on the AVEVA PI System

Starting at the bottom and working our way up

- AVEVA Production Management – Crushing and Grinding areas with KPI (Availability and Utilisation)
- AVEVA Plant SCADA – Power generation HMI
- AVEVA PI System – Data historization and calculations
- Mipac MPA – Data visualisation
- Instrumentation upgrades and asset renewal



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Problem: Insufficient digital maturity for business intelligence

Solution:
Digital infrastructure with the AVEVA PI System as the backbone

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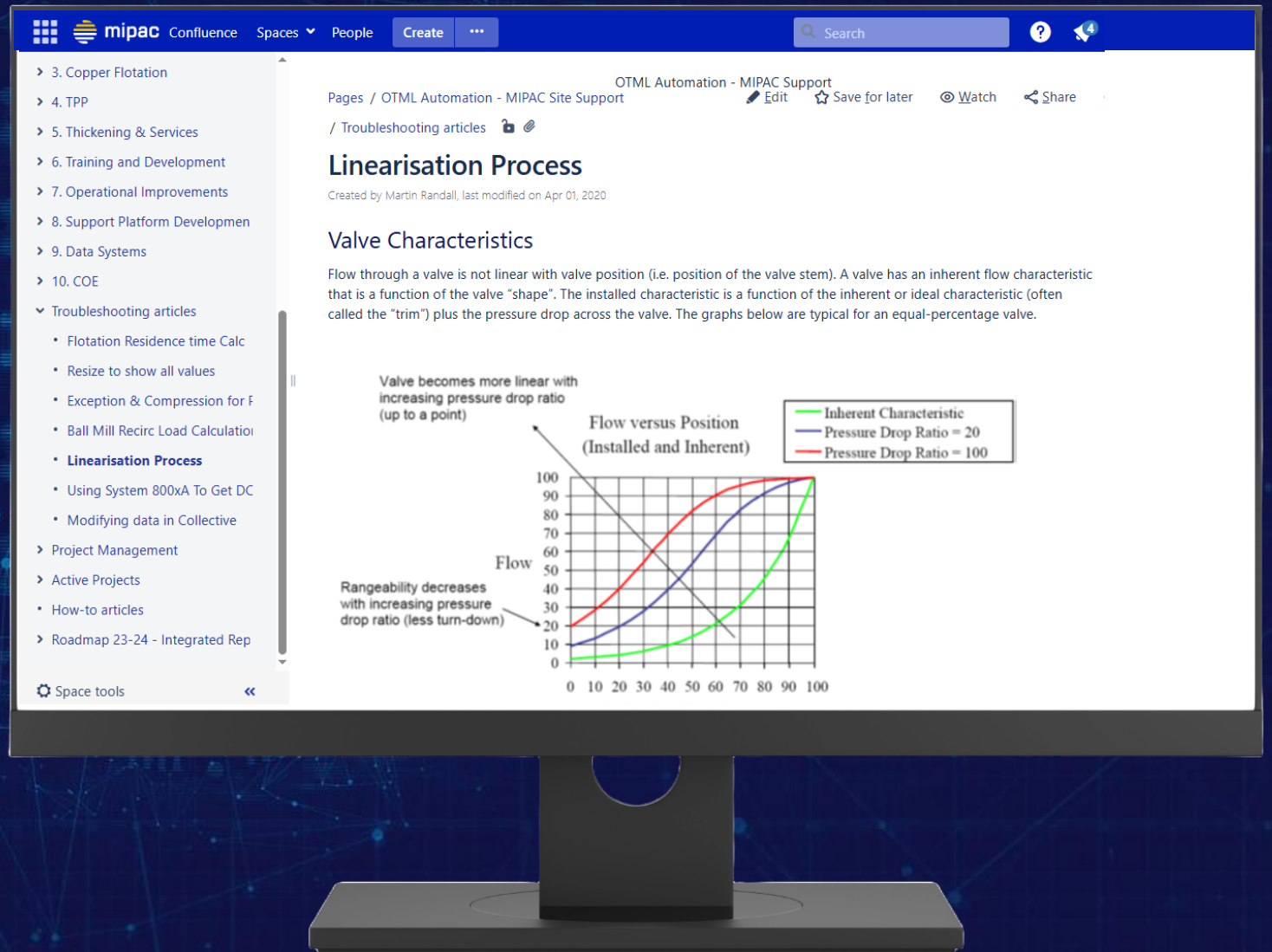
Automation Roadmap – People and Processes

Bringing people along as part of the automation roadmap

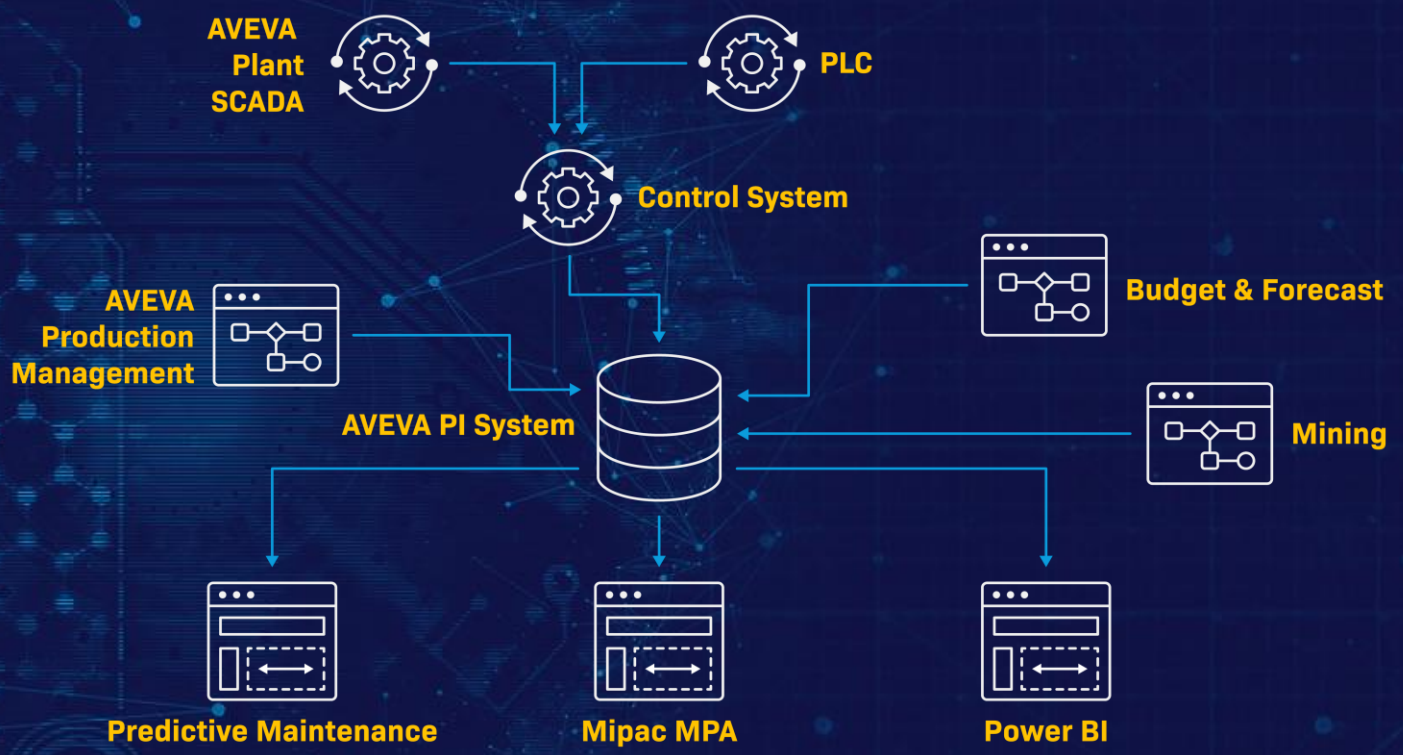
- Training and upskilling of site personnel.
- Improvement of confidence in the data and ways of working for operators.
- Creation of a web-based wiki-style knowledge base so that information can be created, organised and shared with Ok Tedi and their partners.
- Establishment of a Centre of Excellence (CoE) to continue improvements.



Automation Roadmap – Infrastructure

Updated and Upgraded Infrastructure

- Buffering configured for all interfaces and connectors to data sources.
- Updated the PI system software and OS.
- Data was already consolidated on the SCADA side, PI interfaces consolidated to point only to the main SCADA system.
- Updated security to use PI identities.
- Creation of documentation.



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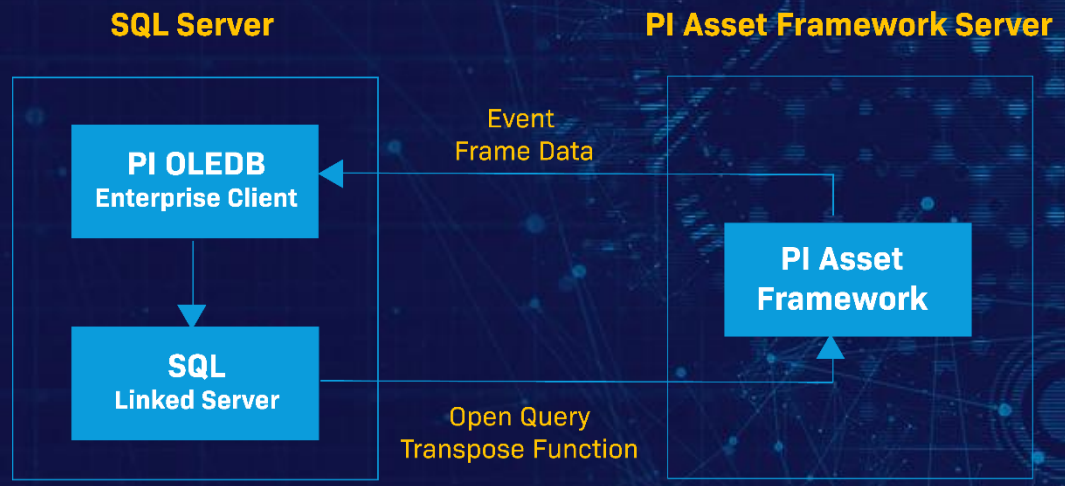
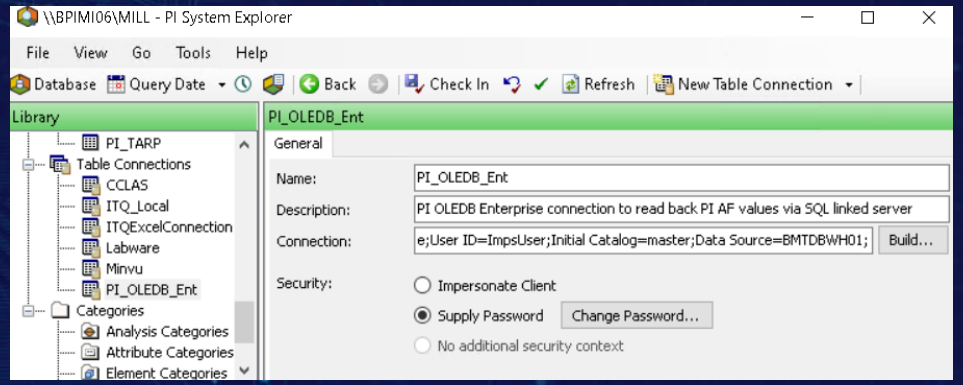
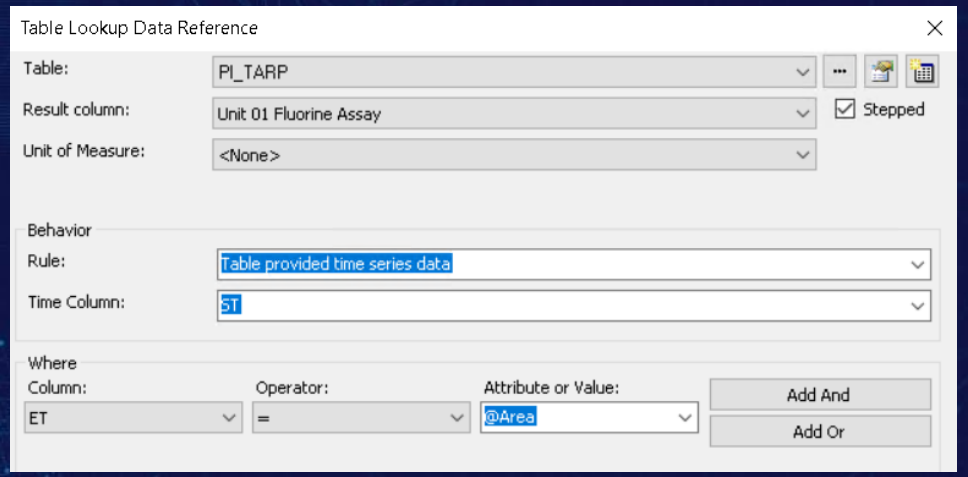
Automation Roadmap – AF Development and Calculations

Combining time series and event data in AVEVA PI

- Reading event frame data using PI OLEDB Enterprise into PI AF linked tables, using the tabled provided time series data rule in table lookups to view the data as time series.
- Using SQL functions to group data to find event-weighted averages/totals of attributes in event frames for a shift, day etc.

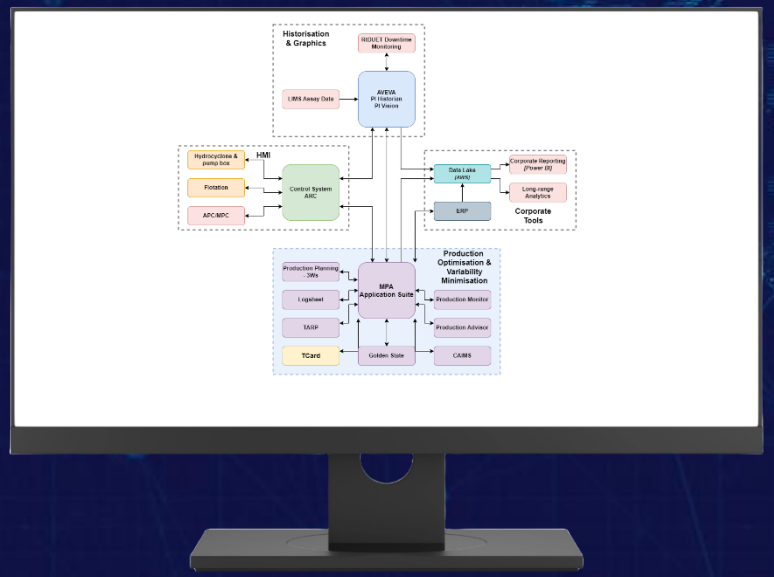






MPA is Mipac's suite of integrated applications designed to:

- **Visualise** plant processes live
- **Detect** production deviations early
- **Respond** accurately to issues
- **Save** time with reporting



Problem:
Unstable operations of the plant

Solution:
Short Interval Control and other displays and dashboards

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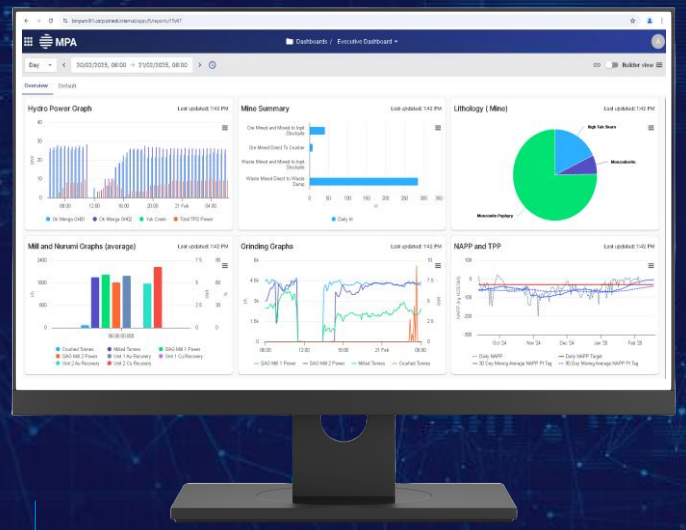
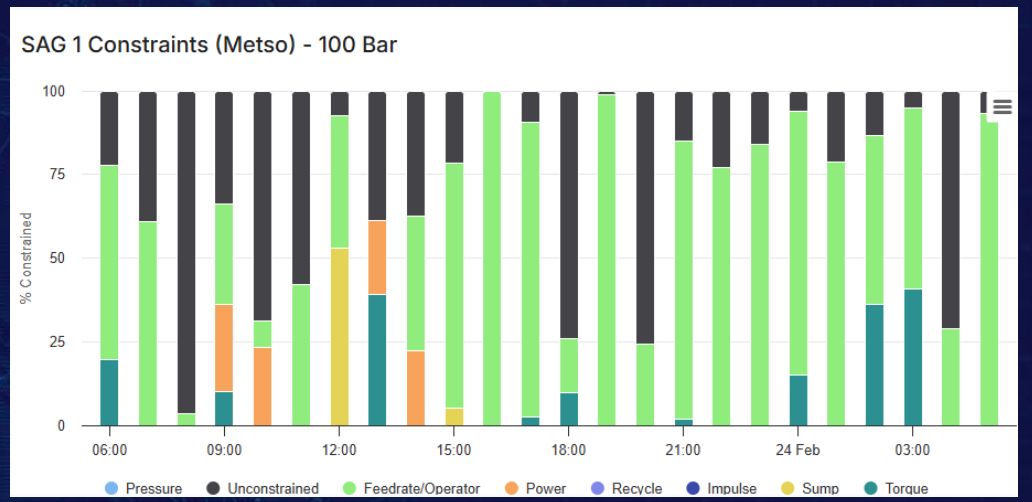
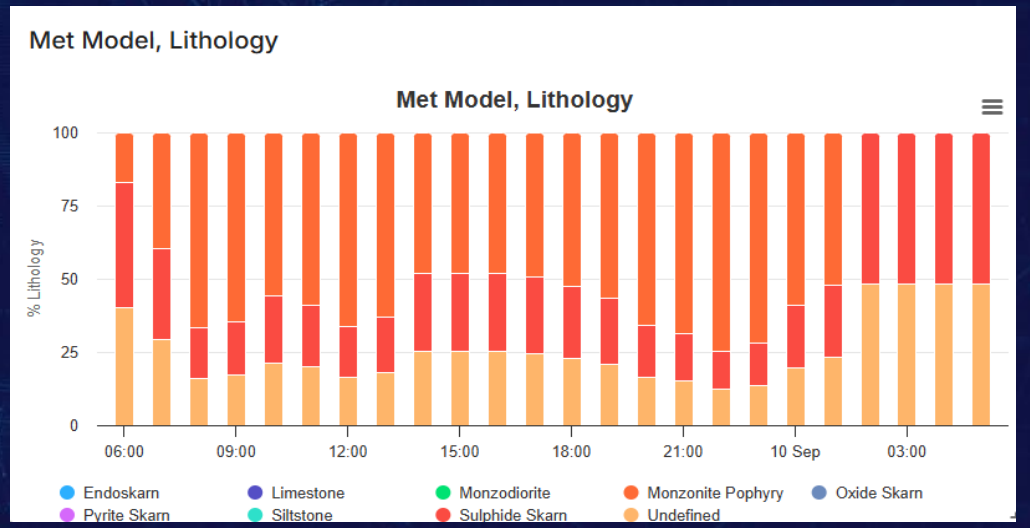
Automation Roadmap –Visualisation

High-level operational overview dashboards allowing easy access and interpretation of data

- High-level displays showing values against targets to easily identify deviations and process issues.
- Drill down functionality to quickly diagnose deviations.
- Short interval control (SIC)
- Expert system constraints (SAG Mill)
- Lithology of the feed coming into the plant
- Errors between assays (lab vs in-stream analyser)







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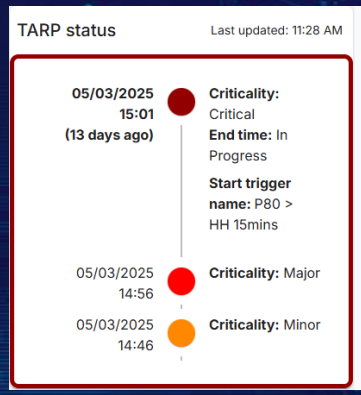
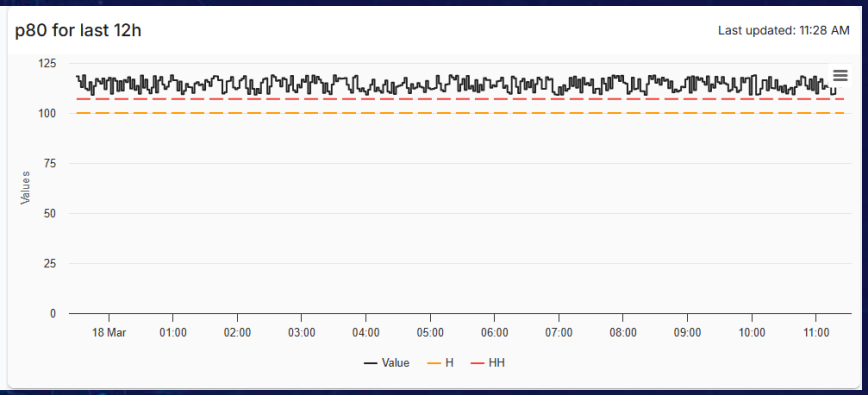
Automation Roadmap –Visualisation

Trigger Action Response Plan (TARP)

- A plan with a set of actions required when certain abnormal situations occur.
- Triggered automatically from process conditions.
- Flow chart requiring both actions and comments from different parties using event frames.





TARP actions - in progress (last 30 days)

Last updated: 11:28 AM

What	TARP criticality level	Start Time	Event Frame Duration	Actions
Operations|Control Room Operator				
Notify shift supervisor and plant metallurgist	Critical	05/03/2025, 15:02	13 days	
Change out any underperforming cyclones	Critical	05/03/2025, 15:02	13 days	
Adjust circuit SPs as directed by Shift Supervisor and Plant Metallurgist	Critical	05/03/2025, 15:02	13 days	
Operations|Flotation Operator				
Manually screen the rougher feed and calculate percent passing 90 µm	Critical	05/03/2025, 15:02	13 days	
Continuously monitor rougher cell amps on DCS or PI	Critical	05/03/2025, 15:02	13 days	
Operations|Grinding Operator				
Manually check cyclone feed, O/F and U/F density	Critical	05/03/2025, 15:02	13 days	
Laboratory|Technician				
Take PSI calibration samples and communicate results at discretion of plant metallurgist	Critical	05/03/2025, 15:02	13 days	
Metallurgy|Plant Metallurgist				
Review SAG feed size and all mill load and power draw data	Critical	05/03/2025, 15:02	13 days	
Make recommendations to Shift Supervisor	Critical	05/03/2025, 15:02	13 days	

TARP actions - all (last 30 days)

Last updated: 11:28 AM

TARP criticality level	Start	End	Duration	What	Actions
Operations|Control Room Operator					
Critical	13/01/2025, 16:49	21/02/2025, 13:09	a month	Notify shift supervisor and plant metallurgist	
Critical	21/02/2025, 13:41	04/03/2025, 14:07	11 days	Notify shift supervisor and plant metallurgist	
Critical	04/03/2025, 15:15	05/03/2025, 14:45	a day	Notify shift supervisor and plant metallurgist	
Critical	13/01/2025, 16:49	21/02/2025, 13:09	a month	Change out any underperforming cyclones	
Critical	21/02/2025, 13:41	04/03/2025, 14:07	11 days	Change out any underperforming cyclones	
Critical	04/03/2025, 15:15	05/03/2025, 14:45	a day	Change out any underperforming cyclones	
Critical	13/01/2025, 16:49	21/02/2025, 13:09	a month	Adjust circuit SPs as directed by Shift Supervisor and Plant Metallurg	
Critical	21/02/2025, 13:41	04/03/2025, 14:07	11 days	Adjust circuit SPs as directed by Shift Supervisor and Plant Metallurg	
Critical	04/03/2025, 15:15	05/03/2025, 14:45	a day	Adjust circuit SPs as directed by Shift Supervisor and Plant Metallurg	
Major	21/02/2025, 13:36	21/02/2025, 13:41	5 minutes	Change out any underperforming cyclones	
Major	04/03/2025, 15:10	04/03/2025, 15:15	5 minutes	Change out any underperforming cyclones	

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Problem:
Manual operation of the plant

Solution:
Control Loop Reports via MPA identifying loops in manual mode

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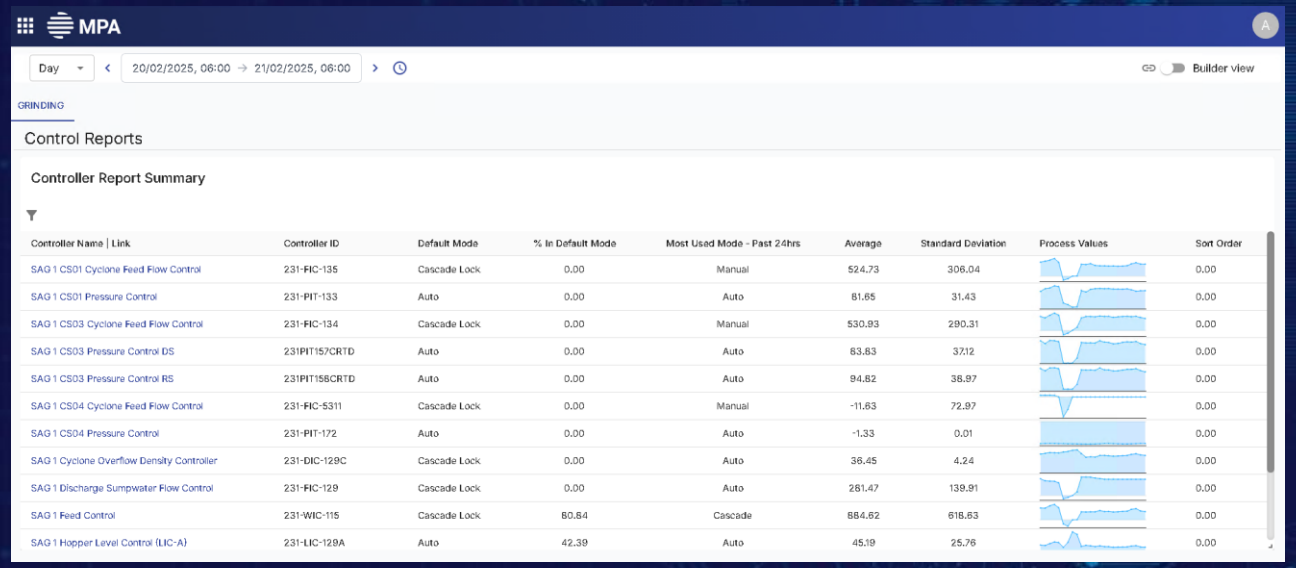
Automation Roadmap –Visualisation (Controller Reports)

Improving efficiency by building confidence in the data

- Identifying controls in manual and providing training to the operators
- Identified opportunities in the data and introduced cascade control around water addition and auto control of cyclones utilizing pressure and feed-forward control in cell-level controls.



Controller Name | Link	Controller ID	Default Mode	% In Default Mode	Most Used Mode - Past 24hrs	Average	Standard Deviation	Process Values	Sort Order
SAG 1 CS01 Cyclone Feed Flow Control	231-FIC-135	Cascade Lock	0.00	Manual	524.73	306.04		0.00
SAG 1 CS01 Pressure Control	231-PIT-133	Auto	0.00	Auto	81.65	31.43		0.00
SAG 1 CS03 Cyclone Feed Flow Control	231-FIC-134	Cascade Lock	0.00	Manual	530.93	290.31		0.00
SAG 1 CS03 Pressure Control DS	231PIT157CRTD	Auto	0.00	Auto	83.83	37.12		0.00
SAG 1 CS03 Pressure Control RS	231PIT158CRTD	Auto	0.00	Auto	94.82	38.97		0.00
SAG 1 CS04 Cyclone Feed Flow Control	231-FIC-5311	Cascade Lock	0.00	Manual	-11.63	72.97		0.00
SAG 1 CS04 Pressure Control	231-PIT-172	Auto	0.00	Auto	-1.33	0.01		0.00
SAG 1 Cyclone Overflow Density Controller	231-DIC-129C	Cascade Lock	0.00	Auto	36.45	4.24		0.00
SAG 1 Discharge Sumpwater Flow Control	231-FIC-129	Cascade Lock	0.00	Auto	261.47	139.91		0.00
SAG 1 Feed Control	231-WIC-115	Cascade Lock	80.84	Cascade	884.62	616.63		0.00
SAG 1 Hopper Level Control (LIC-A)	231-LIC-129A	Auto	42.39	Auto	45.19	25.76		0.00

Problem:

Equipment reliability leading to unstable operation of the plant

Solution:

AVEVA Production Management and Predictive Maintenance

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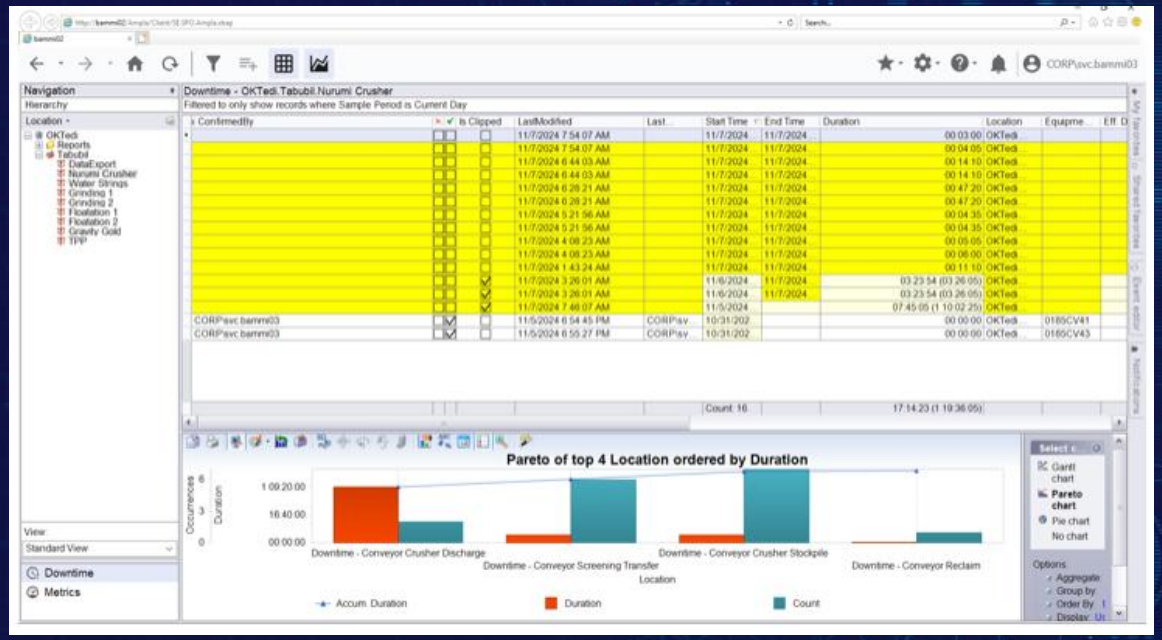
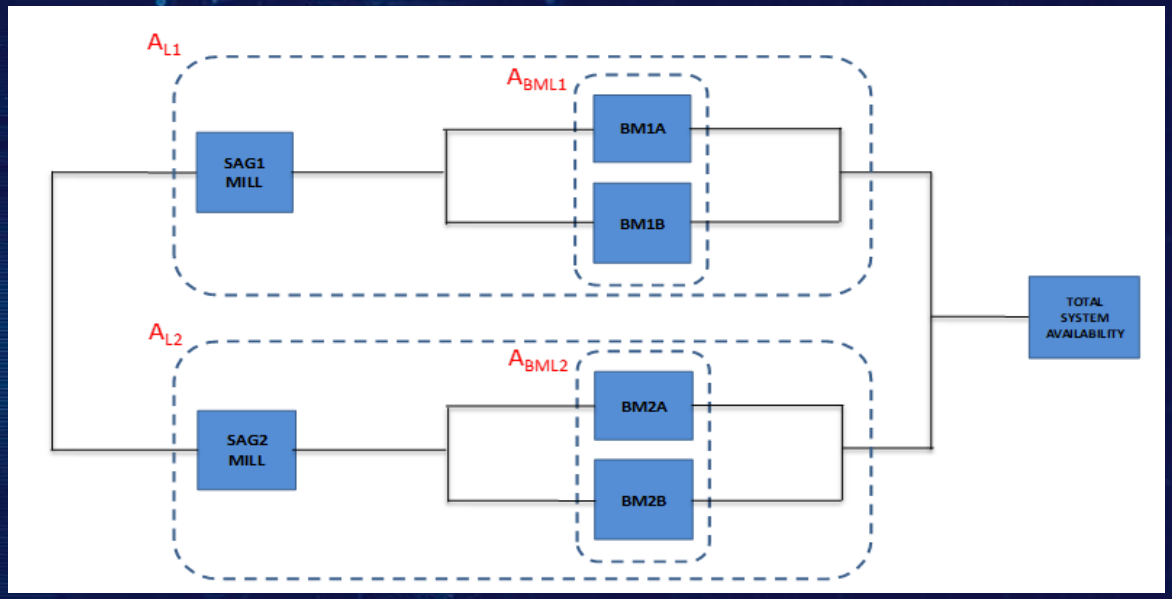
Automation Roadmap – Reliability (Production Management)

Capturing and classifying plant and equipment downtime data for insights into improvements

- Data from Production Management is used as inputs for further analysis such as predictive maintenance.





Downtime Records - Automated Report — OK Tedi Mining

Plant Area: Crushing

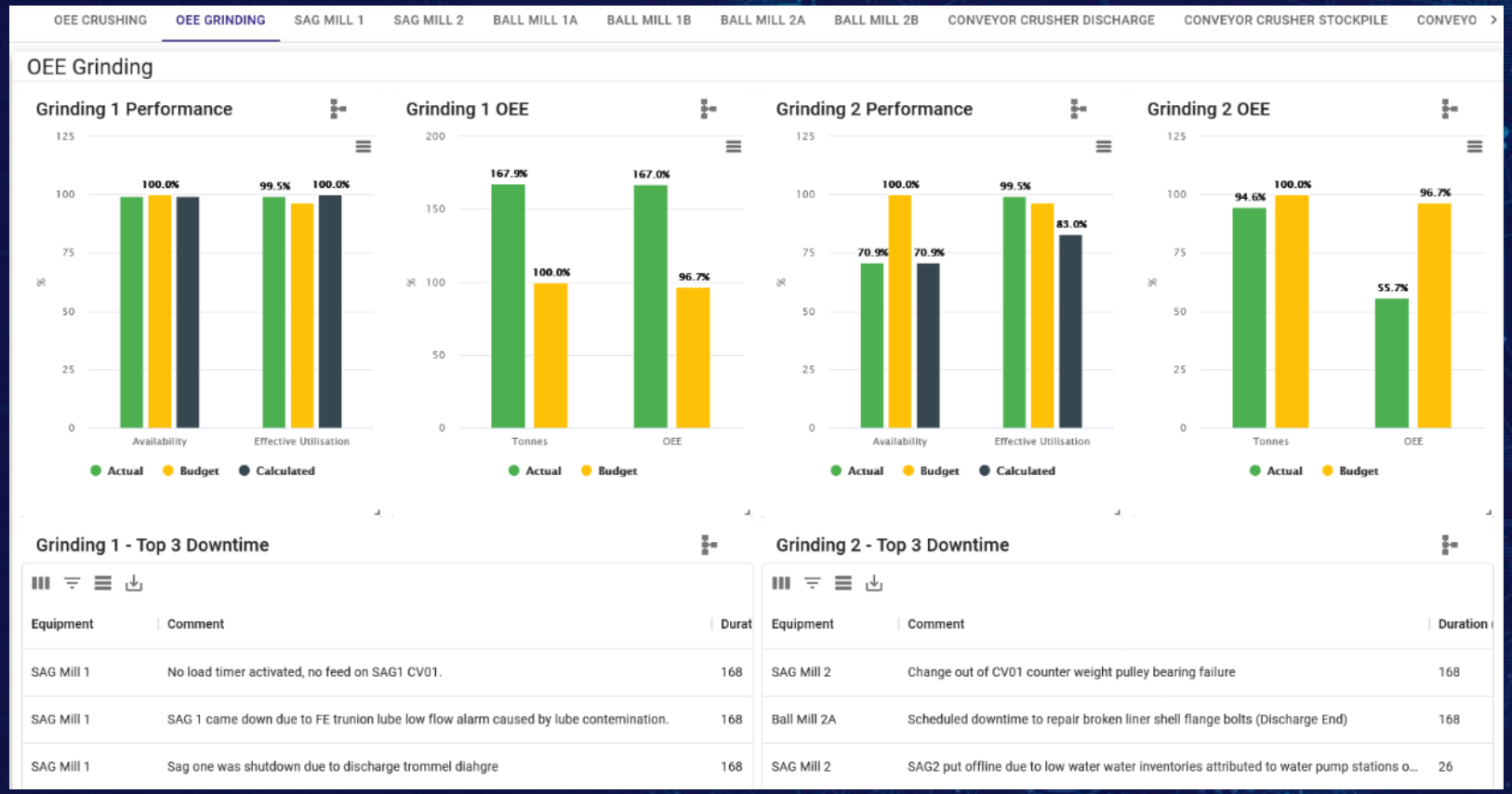
Location	OKTedi.Tabubil.Crushing with recurse
Filter	Deleted={False}, RecordValidated={True}
Report Period	From 05/02/2020 06:00 AM to 06/02/2020 06:00 AM

Total Records	Records Completed	Records Confirmed	Records Validated
30	28	28	17
100.0%	93.3%	93.3%	56.7%

Start Time	End Time	Eff. Dur.	Location	Cause Location	Cause	Classification	Comments	Crew	Shift	Shift Supervisor
05-Feb-20 22:41:49	06-Feb-20 01:08:58	02:27:09	Feeder Apron Crusher FE02	Crushing	No Feed	Operating Standby (OS)	No Feed	Crew C	Night Shift	Visek Jaknam
05-Feb-20 21:58:43	05-Feb-20 22:00:40	00:01:57	Conveyor Inpit Crusher Discharge	Crushing	No Feed	Operating Standby (OS)	No Feed	Crew C	Night Shift	Visek Jaknam
05-Feb-20 21:01:44	05-Feb-20 21:02:45	00:01:01	Conveyor Inpit Crusher Discharge	Crushing	No Feed	Operating Standby (OS)	No Feed	Crew C	Night Shift	Visek Jaknam
05-Feb-20 20:51:41	05-Feb-20 20:52:44	00:01:03	Conveyor Inpit Crusher Discharge	Crushing	No Feed	Operating Standby (OS)	No Feed	Crew C	Night Shift	Visek Jaknam
05-Feb-20 19:36:43	05-Feb-20 19:37:45	00:01:02	Conveyor Inpit Crusher Discharge	Crushing	No Feed	Operating Standby (OS)	No Feed	Crew C	Night Shift	Visek Jaknam
05-Feb-20 19:20:43	05-Feb-20 19:21:44	00:01:01	Conveyor Inpit Crusher Discharge	Crushing	No Feed	Operating Standby (OS)	No Feed	Crew C	Night Shift	Visek Jaknam
05-Feb-20 19:14:41	05-Feb-20 19:15:42	00:01:01	Conveyor Inpit Crusher Discharge	Crushing	No Feed	Operating Standby (OS)	No Feed	Crew C	Night Shift	Visek Jaknam
05-Feb-20 18:45:40	05-Feb-20 18:46:45	00:01:05	Conveyor Inpit Crusher Discharge	Crushing	No Feed	Operating Standby (OS)	Waiting for Copper trucks from loading units	Crew C	Night Shift	Visek Jaknam

Automation Roadmap – Reliability (Production Management)

Data from AVEVA Production Management is used to produce reliability KPIs



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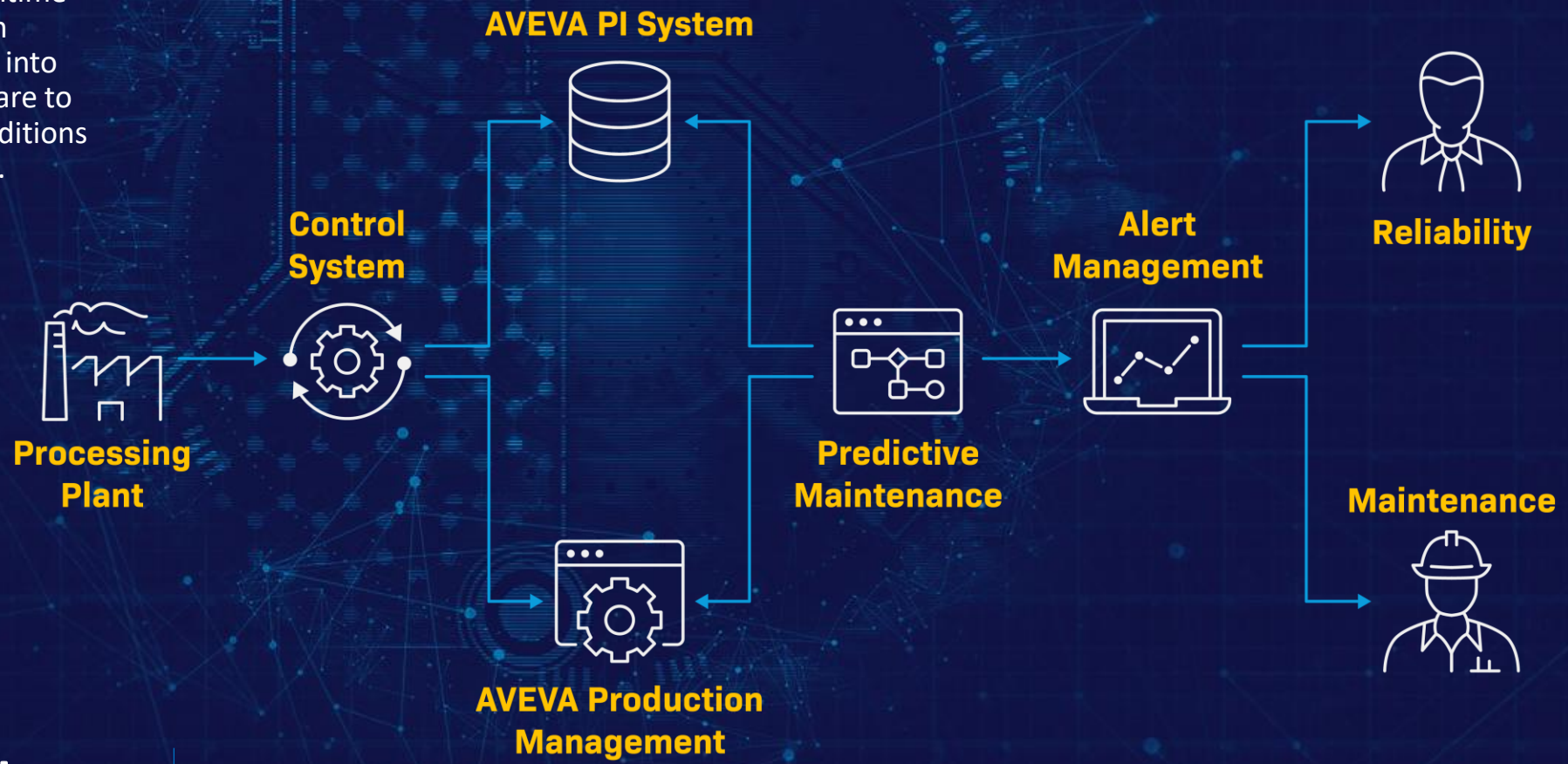
Automation Roadmap – Next steps and the Future

Predictive Maintenance using PI data

- Combining live and historical time-series data from AVEVA PI with downtime events from AVEVA Production Management and feeding this into predictive maintenance software to create alerts on abnormal conditions detected on major equipment.



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Summary

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Ok Tedi Mining improves Recovery

Challenge

- Low gold & copper recovery
- Insufficient digital maturity for business intelligence
- Unstable operation, reacting and fire-fighting
- Manual operation

Solution

- Deployed AVEVA PI System to streamline data collection, access, analysis and reporting
- Deployed AVEVA Production Management to capture downtime and produce KPI
- Deployed Mipac's MPA software to visualise AVEVA PI data and gain process insights

Results

- Improved **Au recovery** from 55% to 70%
- Improved **Cu recovery** from 83% to 89%

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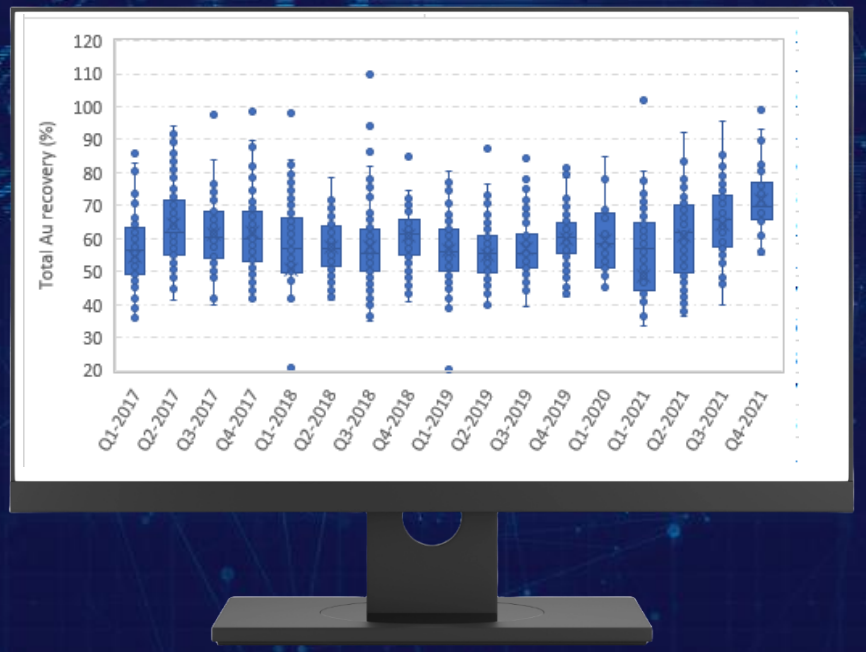
Outcomes

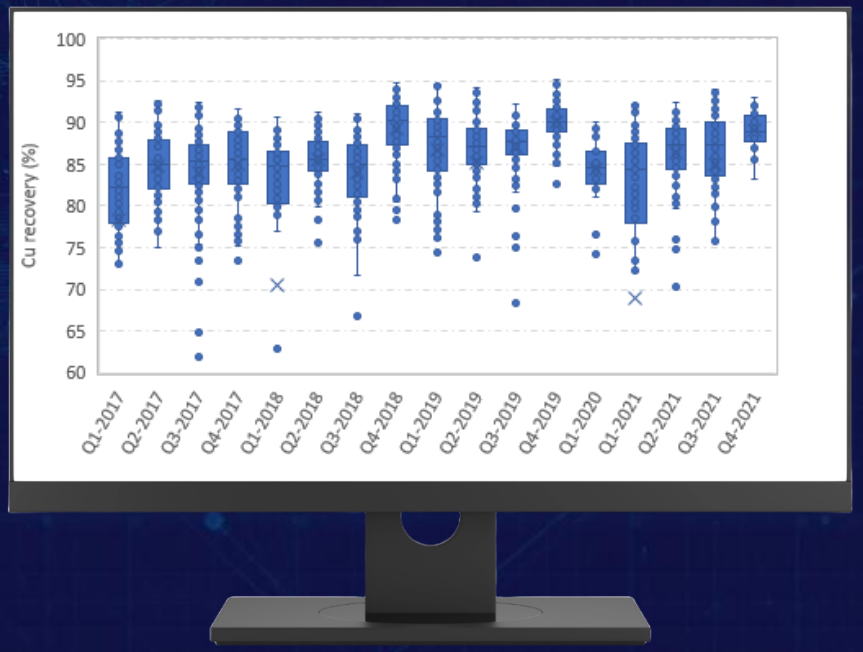
Contribution to increased recovery:

Au 55% to 70%
Cu 83% to 89%

Enhanced digital maturity

Stable, automated operation and time for improvements





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Questions?

Please wait for the microphone.

State your name and company.

Please remember to...

Navigate to this session in the mobile app to complete the survey.

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ABOUT AVEVA

AVEVA is a global leader in industrial software, sparking ingenuity to drive responsible use of the world's resources. The company's secure industrial cloud platform and applications enable businesses to harness the power of their information and improve collaboration with customers, suppliers and partners.

Over 20,000 enterprises in over 100 countries rely on AVEVA to help them deliver life's essentials: safe and reliable energy, food, medicines, infrastructure and more. By connecting people with trusted information and AI-enriched insights, AVEVA enables teams to engineer efficiently and optimize operations, driving growth and sustainability.

Named as one of the world's most innovative companies, AVEVA supports customers with open solutions and the expertise of more than 6,400 employees, 5,000 partners and 5,700 certified developers. With operations around the globe, we are headquartered in Cambridge, UK and listed on the London Stock Exchange's FTSE 100.

Learn more at www.aveva.com

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