



AVEVA WORLD

Predictive Maintenance of Prasarana's Metro Rail Assets

*Proof of Concept (PoC) in Collaboration with Tri-System
Engineering Sdn Bhd*

APRIL 08, 2025

Advancing Mobility, Enriching Experiences



COMPANY BACKGROUND



Owner & Operator

Since its inception in 1998, Prasarana role has significantly grown to be the national public transport owner and operator in urban cities within Malaysia



Joint-Systems Developer & Operator



Operator



Trisystems, a local company based in Shah Alam, Selangor, was founded in 1995 as a System Integrator for Schneider Electric, Det-Tronics, AVEVA, and other reputable organisations. Over time, it has become a leading player in the oil and gas industry, known for its extensive product and service offerings.

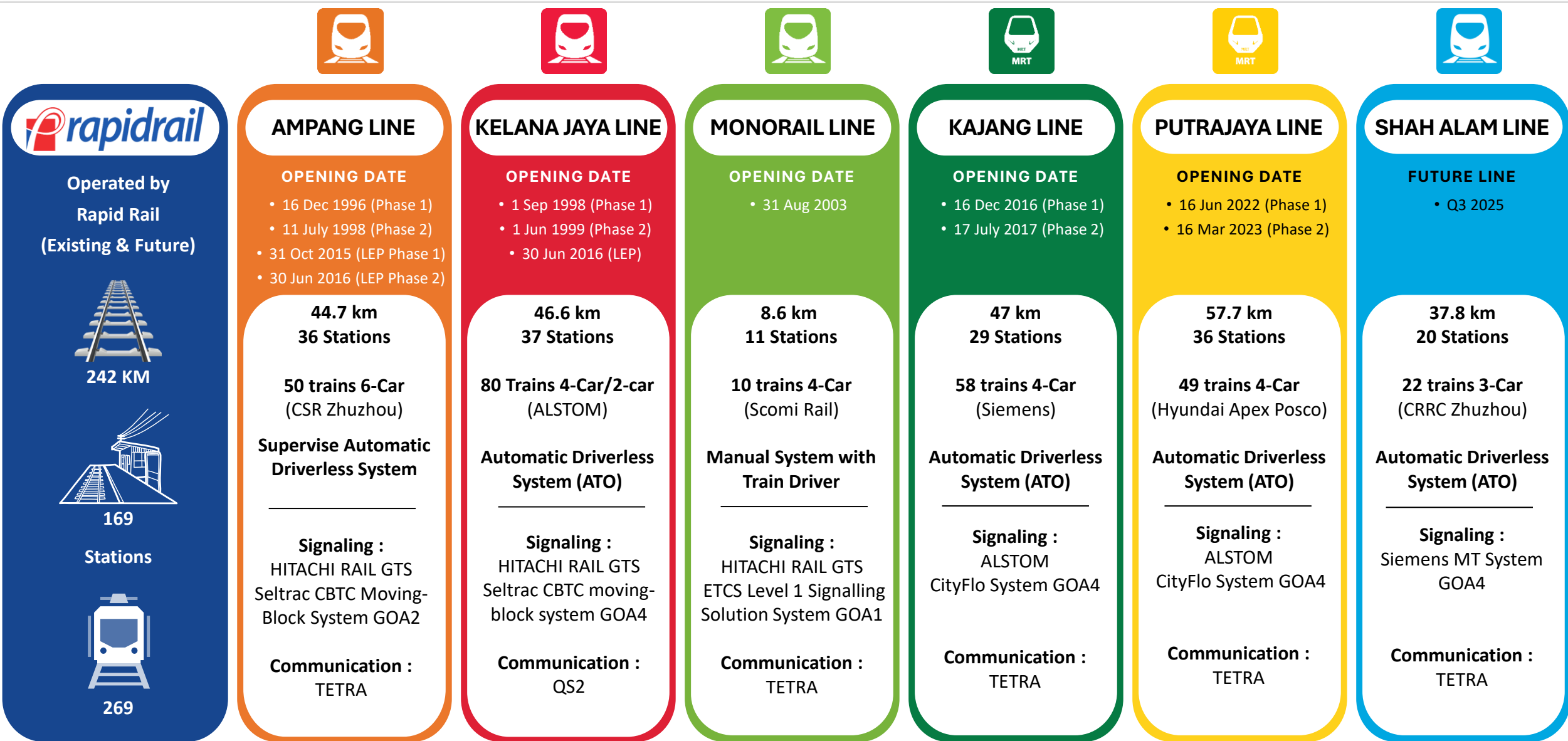
Trisystems Group of Companies, with a workforce of 160 employees, offers comprehensive safety solutions, software solutions, process packages, fire protection, filtration, combustion, pneumatic, and hydraulic systems. Each subsidiary specialises in a specific area to achieve technical excellence.

Provide **comprehensive end-to-end services**, including system design, programming, installation, testing, commissioning, maintenance, and project management.

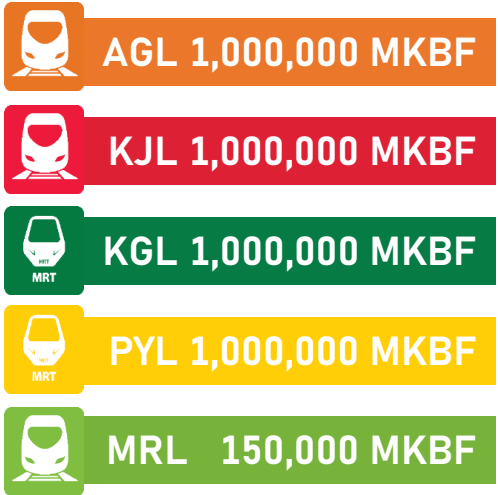
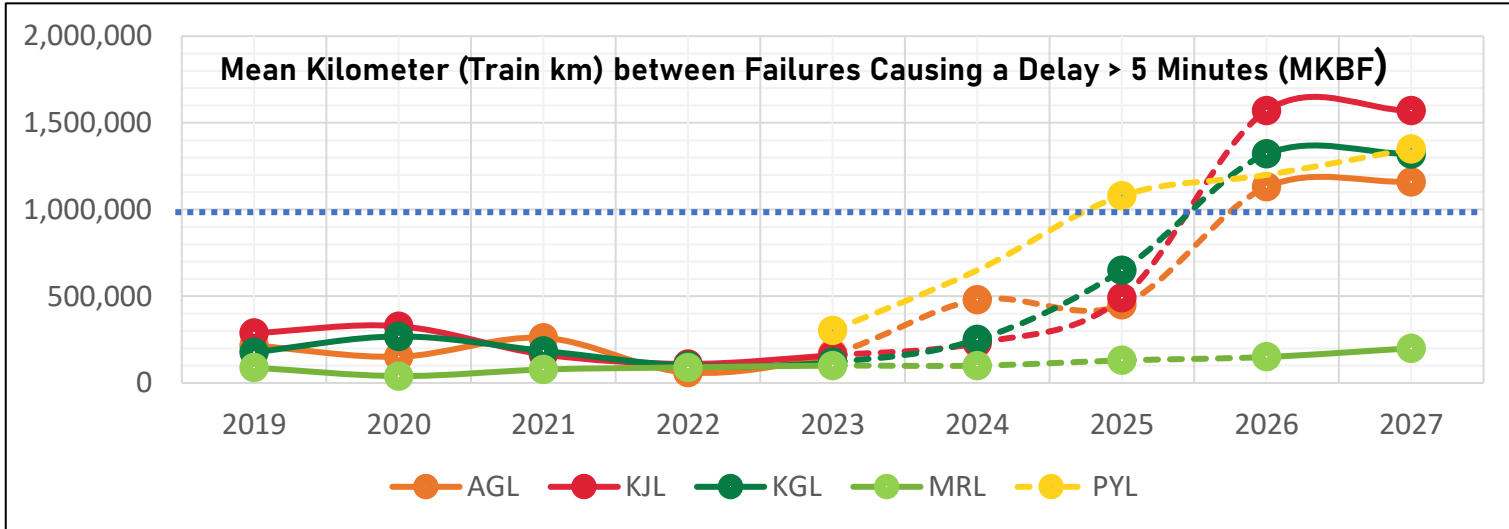
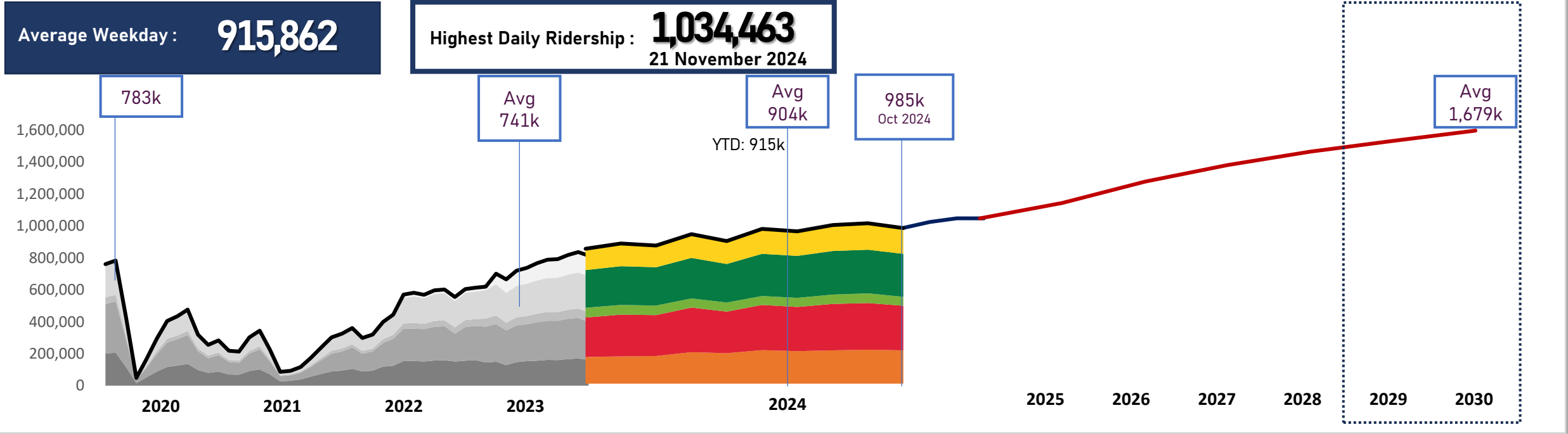
Specialist Solution Provider (SSP) for AVEVA in Malaysia, with over a decade of experience in system integration, was selected by Prasarana through an open bidding process to provide Predictive Maintenance services for Metro Rail.



INTRODUCTION TO CURRENT SYSTEM OF LRT AND INFRASTRUCTURE MANAGEMENT METHOD



RIDERSHIP AND SERVICE RELIABILITY



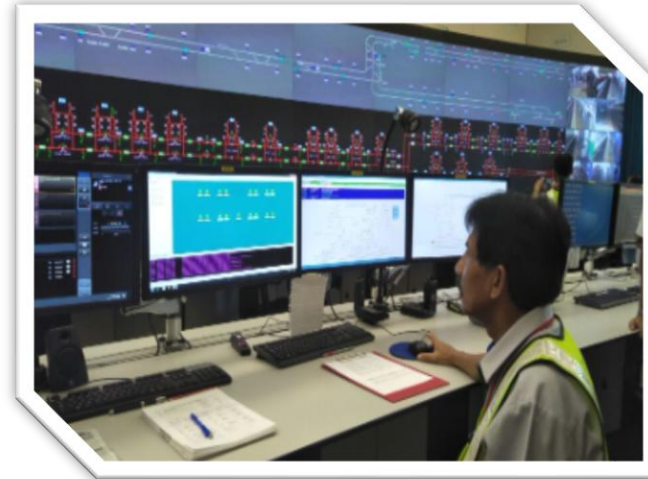
1,000,000
Mean Kilometre
Between Failures
(MKBF)

By 2026

KEY CHALLENGES



1. Improvement of system reliability and availability as a strategy to reduce the numbers of private vehicle on the road.
2. Preventive and Corrective Maintenance schedule as recommended by the manufacturer.
3. Unexpected equipment failures during operations contributed to the disruption of revenue services.
4. Tools selection criteria for Predictive Maintenance solution i.e., system, parts, sensor, etc.
5. Unstructured and non-integrated of maintenance record caused lack of capability to analyze failure behavior for prevention.



DESIGN CRITERIA

1 TRAIN & SENSOR



Two Nos of KLAV-14

- Train in fair condition in operation within 5 years to 10 years
- Data reliability and availability

Sensor

- Bogie sensor for vibration & temperature monitoring.
- Running rail condition monitoring.
- Trackside scanner for wheel profiling condition monitoring.

2 NETWORK



Local Network at Stabling Yard

- Data transfer on daily basis once train entering the depot where the network infra is being setup.
- Processing in on-prem Server for data privacy
- Enhanced data security as in local environment
- Improve reliability with no internet connectivity issue
- Cost efficiency in long run for expansion

3 WHY AVEVA?



Data-Driven Software

- Experienced in data analytic in various sectors such as oil and gas, power generation, manufacturing, transportation and others.
- Cost effective as Trisystems is AVEVA local System Integrator and Partner
- Worldwide support
- Have various of software solution provide comprehensive, integrated that enhances efficiency, safety and performance.

4 DATA

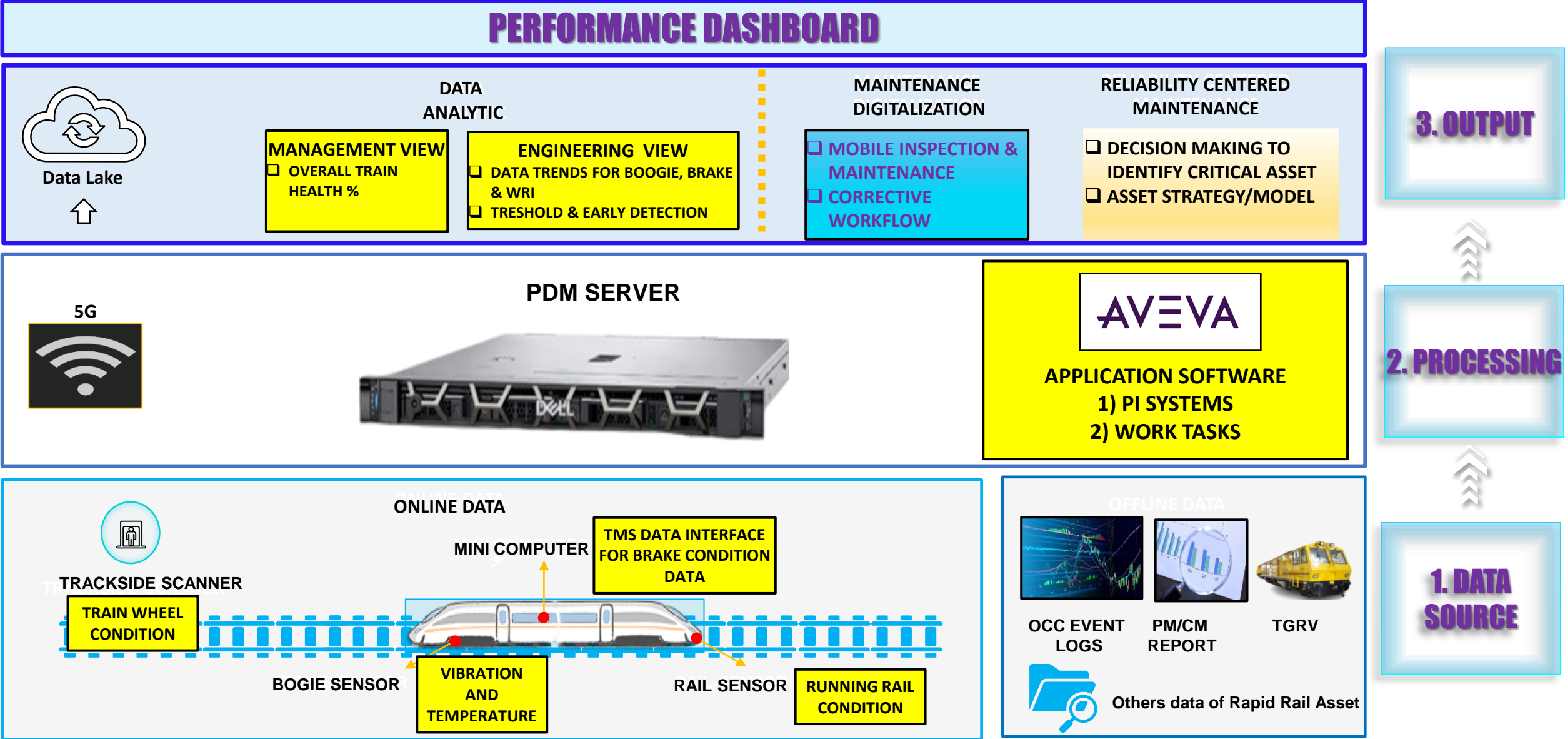


Data Source

- Online Data – Sensors i.e., Bogie & Rail including TMS
- Offline Data – OCC Event logs, PM/CM report



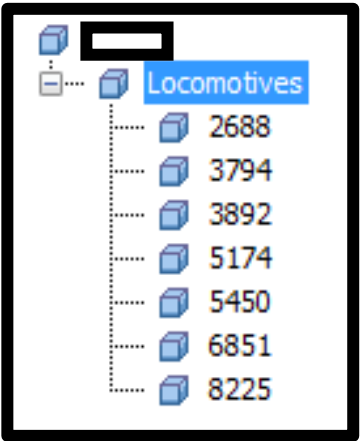
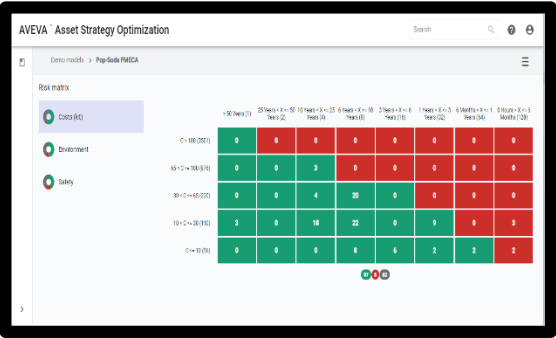
PREDICTIVE MAINTENANCE SYSTEM ARCHITECTURE



MODULES AND APPLICATION

Reliability Centered Maintenance

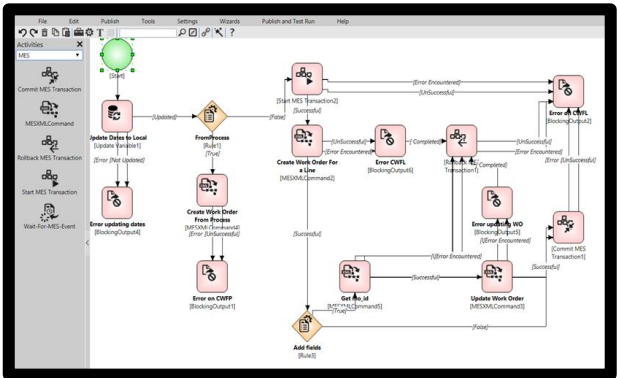
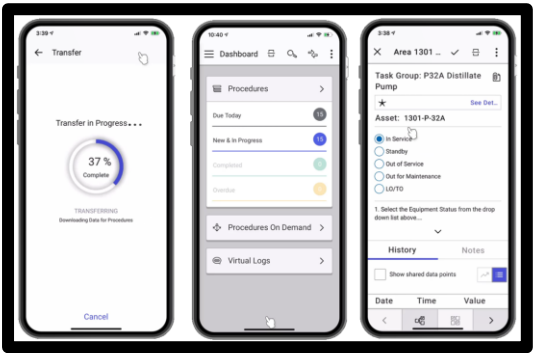
- **Define asset strategy.** - by leveraging data integration, risk assessment and performance modeling.
- **Define asset model.** - by encompasses asset hierarchies, risk assessments, simulation results and optimization recommendations.



Maintenance Digitalization



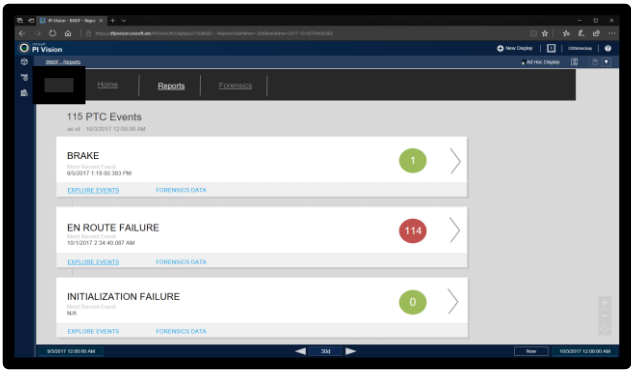
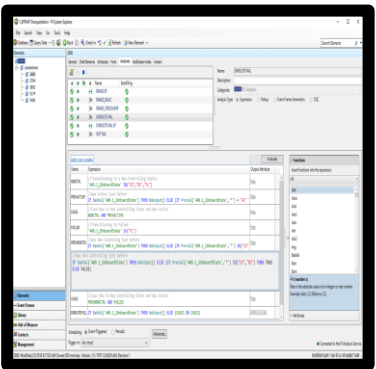
- Mobile inspection and maintenance
- Implement corrective workflows



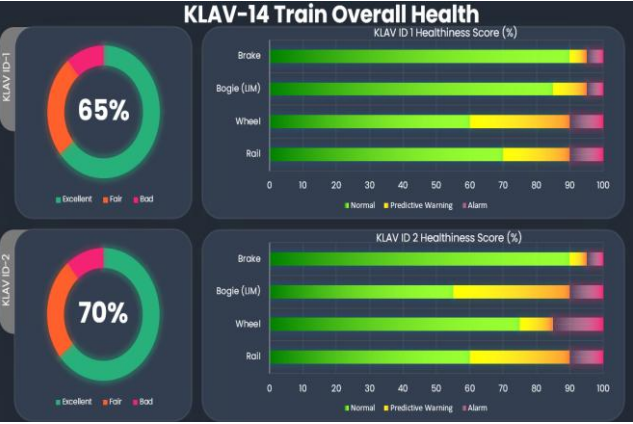
Data Analytic



- Capture anomalies
- Report and analyse



SYSTEM DASHBOARD (using AVEVA PI Vision)



1

MANAGEMENT VIEW:

- ✓ Shows Overall Train Health
- ✓ Train Health percentage indicate alarm occurrences

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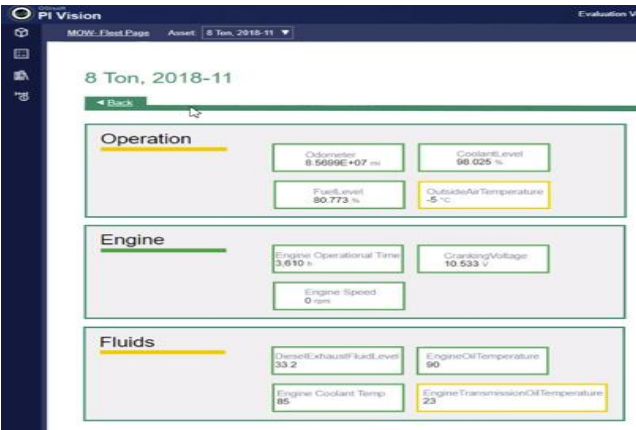
ENGINEERING VIEW:

- ✓ Shows overview data trends for Bogie, Brake & WRI
- ✓ Shows the limit threshold for early warning detection

2

GENERAL VIEW:

- ✓ Shows the train component operation status
- ✓ Shows train's other general info



Alerts					
Event Name	Asset	Start Time	End Time	Duration	
TMOverload_Warning	NBSR.6304	2/20/2021 5:53:00 PM	2/20/2021 5:55:00 PM		
TMOverload_Warning	NBSR.6304	2/22/2021 2:35:00 PM	2/22/2021 2:40:00 PM		
TMOverload_Critical	NBSR.6318	3/2/2021 4:30:00 PM	3/2/2021 5:05:00 PM		
TMOverload_Warning	NBSR.6304	3/15/2021 2:45:00 PM	3/15/2021 3:00:00 PM		

1

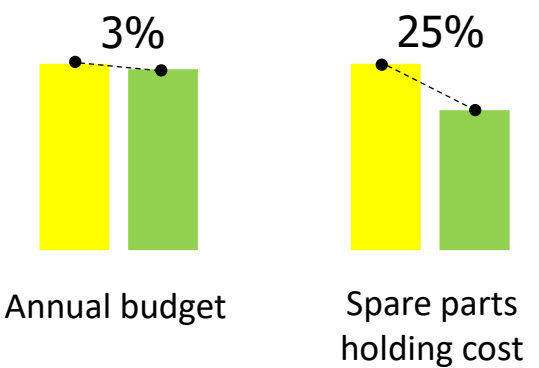
ALARM VIEW:

- ✓ Alert notification page
- ✓ List of alert with timestamps



EXPECTED OUTCOME

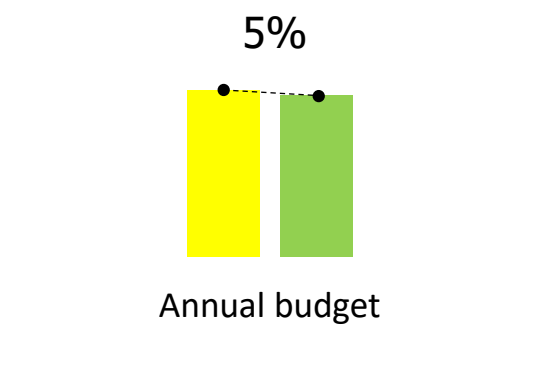
1. Maintenance Budget



- Labor Cost
- Labor Manhour
- Tools & Parts Cost

Expected Cost Saving :
✓ **3%** annual budget per year
✓ **25%** spare parts annual budget per year

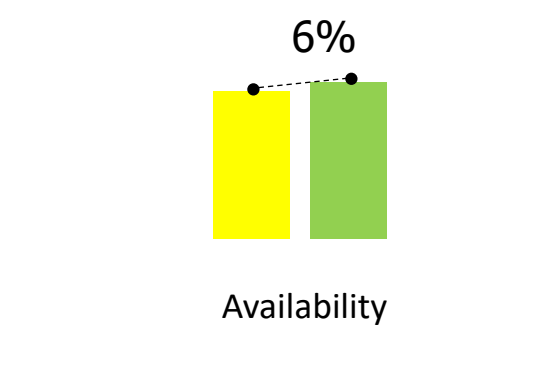
2. Unplanned Downtime



- Repair Cost
- Passenger Disruption
- Ineffective Operation Manhour

Expected Cost Avoidance :
✓ **5%** per year

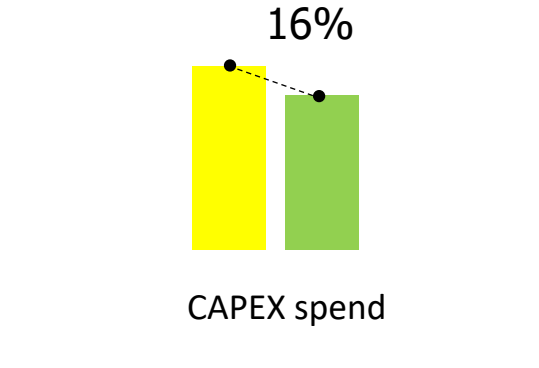
3. Availability



- Train Operation Time
- Spare Parts Inventory Management
- Increase Ridership

Expected Cost Saving :
✓ **6%** per year

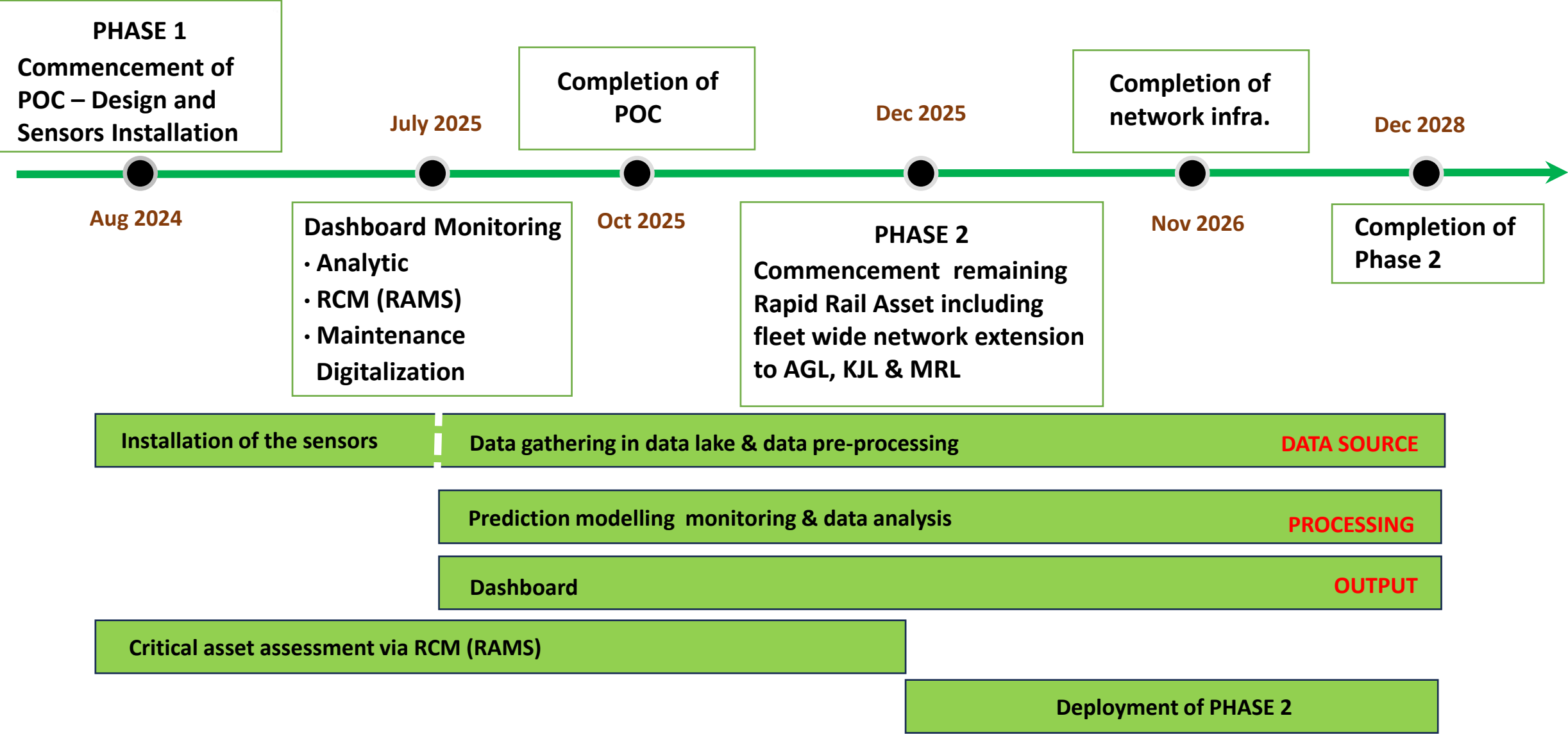
4. Asset Life



- Train Lifespan
- Company Reputation
- Passenger Comfort

Expected CAPEX deferral :
✓ **16%** per year

PREDICTIVE MAINTENANCE ROADMAP



Prasarana optimizes maintenance to prevent unplanned repairs and achieve 1,000,000 MKBF by 2026.

Challenge

- Kuala Lumpur faces heavy traffic, making reliable Metro services essential to reducing private vehicles.
- Equipment condition is only assessed during scheduled maintenance.
- Unexpected failures disrupt revenue services.
- Unstructured, non-integrated maintenance records hinder failure analysis and prevention

Solution

- Development of centralize system performance dashboard for system equipment behavior monitoring via data analytic and prediction modelling.
- Deployment of AVEVA™ PI System™ and Work Tasks for predictive modelling, digital transformation of work processes and reporting.

Results

Finalized the design concept to streamlines the data gathering where the critical parameters were defined for implementation of predictive maintenance system and further expansion.



Thank you

Q&A

Advancing Mobility, Enriching Experiences

