COSOL

TRANSPORT SUITE

The Advanced and Predictive Analytics Platform for Transport

Transport Module Factsheet

Made with Transport, for Transport.

COSOL's Transport Advanced & AI Analytics Suite is designed to elevate your transport operations and create incredible passenger experiences. We seamlessly, and continually, bring together data and extract meaning and predictive insights from multiple siloed sources across your transport organisation and serves as a single source of accurate and auditable truth. From operations to assets, sustainability to patronage, you'll have an accurate and complete view of your operations.

You can select only the modules you need, opt for a completely bespoke solution, or adopt one of our Decision Support Packages (The Maintainer, The Operator, The Business, and The Executive) that focus on common Jobs-To-Be-Done of each function and business goals.

So, what does each module include? You've come to the right place. And remember, the sky's the limit with the COSOL's Transport Advanced & AI Analytics – if the data exists, we can create it.

The Modules

Asset Lifecycle Management	Work Order Analysis	Test & Commission	Operations
Incident	Patronage	SIRI - Real-time based on SIRI Protocol	Passenger Experience
Predict & Scenario Modelling	Digital Twin	Subcontractor Performance	Service Payment Claims
Finance Hub	People Hub	Predictive People Analytics	Sustainability Suite

What to Expect

Below is a high-level overview of each module. However, we take pride in tailoring our solutions to your specific business needs, offering automated systems that adapt to your requirements.

Asset Lifecycle Management

Gain a comprehensive view of the asset lifecycle to inform capital expenditure and optimise asset longevity. This module monitors and analyses asset conditions, faults, outages, defects, scheduled maintenance, and reactive maintenance events, as well as asset availability, utilisation, and maintenance strategies to enhance reliability, extend asset life, and minimise costly emergency repairs. Asset events data can be extracted every 15 mins to give up-to-date information and to accelerate the maintenance cycle.

Example of Asset Lifecycle Management Insights and Reporting:

ASSET PERFORMANCE MONITORING

Asset Uptime & Usage	Monitor asset uptime percentages and usage rates to evaluate performance. Understand utilisation efficiency by asset type, location, or category. Identification of underutilised or overworked assets.
Real-Time Asset Monitoring	Access near-real-time data on the availability, performance, and condition of assets (trains, buses, infrastructure), trend identification of asset downtime (faults/outages, defects, scheduled maintenance, reactive maintenance) and causes.
Asset Performance Metrics	Track asset failure rates, average time between failures, and their impact on overall operations. Performance comparisons across assets, fleets and locations.

DEFECT AND MAINTENANCE MANAGEMENT

Defects Management	Near real-time reporting on defects associated with station equipment and assets, work orders logged against these assets, and previous maintenance performed. This includes integration for reactive maintenance to facilitate faster resolution lodgement.
Predictive and Maintenance Planning System	This system ingests and reports on preventive maintenance plans and possession schedules. It links corrective maintenance work orders to the appropriate defects and provides reports on asset and equipment audits captured in assessment reports.
Maintenance Task Breakdown	Differentiate between scheduled and unscheduled asset maintenance tasks to streamline workflows.

- **Maintenance Cost Analysis** — Analysis by asset type the repair costs vs. replacement value for optimal budgeting.
- **Monitoring Compliance with Maintenance Schedules** — Ensures all assets meet regulatory and operational standards.
- **Automatic Work Requests** — Information from monitoring systems (sequence of alarms and events) to trigger automatic creation of work requests in the AIS for assets requiring intervention.

ASSET LIFECYCLE INSIGHTS

- **Asset Age & Life Expectancy** — Assess the age and remaining useful life of critical assets for informed decision-making.
- **Depreciation Impact** — Analyse depreciation schedules to understand the financial implications of ageing assets.
- **Replacement Alerts** — Receive alerts for asset replacement or refurbishment based on usage metrics.
- **Cost-Benefit Analysis** — Evaluate the trade-offs between extending asset life and replacement costs.
- **Preventive Asset Maintenance** — Get tailored recommendations to enhance preventive maintenance schedules and minimise unexpected failures.

AUDIT AND TREND ANALYSIS

- **Audit Reports** — Generate audit reports detailing asset assessments and current asset and maintenance statuses.
- **Emergency Repair Trends** — Analyse historical patterns of emergency repairs to assess their impact on asset performance.
- **Degradation Trends** — Identify trends in asset degradation with recommendations for timely asset replacements or refurbishments.
- **Root-Cause Analysis** — Link corrective asset maintenance work orders to specific defects for improved analysis and response.

ASSET INVENTORY

- **Asset Location Tracking** — Track asset locations and real-time availability.
- **Inventory Levels** — Monitor inventory levels of spare parts and consumables.
- **Asset Registration** — Register and categorise assets by type, function, and age.
- **Depreciation Analysis** — Analyse depreciation and value of inventory assets.
- **Replacement Alerts** — Receive alerts for asset replacement based on age and usage.

Work Order Analysis

Track, manage, and analyse work orders across the entire operation, providing insights into workforce efficiency and equipment performance to enhance operational productivity.

Example of Work Order Insights and Reporting:

- **Contractual Performance Metrics (not exhaustive)**
  - Services delivered in accordance with prescribed service counts, headway, journey timey, and others.
  - Service quality and key asset performance.
  - Safety and security performance and incident response.
  - Cost Variance - the difference between the estimated and actual cost of work orders.
- **Work Order Preview** — Overview of open, completed, and overdue work orders for performance monitoring.
- **Departmental Efficiency Analysis** — Departmental and work area analysis by asset type to identify efficiency gaps.
- **Work Order Timeliness Assessment** — Average time-to-completion for work orders compared against agreed timelines and SLAs.
- **Work Order Type Breakdown** — Breakdown of work order types (emergency, routine, preventive) and their frequency for trend analysis.
- **Quality Assessment of Work Orders** — Assessment of work order quality, including labour hours and costs associated with tasks.
- **Maintenance Task Backlog Identification** — Identification of maintenance task backlogs and their potential operational impacts.
- **Root-Cause Linkage** — Linking corrective maintenance work orders to specific defects for root-cause analysis and streamlined corrective actions.
- **Delay Prediction Insights** — Predicting potential delays in work order completion by flagging high-risk jobs using historical trends for better resource allocation.
- **Technician Performance Tracking** — Tracking technician performance to measure time taken for work orders, highlighting areas for training or process improvements.
- **Automated Prioritisation of Work Orders** — Automating work order prioritisation by assigning urgency levels based on asset criticality and operational impact.

Test & Commission

Manages and analyses the test and commissioning phases of assets to ensure approval, sign-off, and readiness for full operational use in transport.

Example of Test & Commissioning Insights and Reporting:

Asset Readiness Status	Overview of assets that are approved, pending approval, or rejected for operational use.
Test Results	Commissioning reports for new or repaired assets.
Time-to-Commission Analysis	Average time taken to commission different asset types compared to benchmarks.
Regulatory Compliance	Percentage of tests meeting safety and regulatory standards.
Defect Tracking	Number of defects identified during testing and their resolution status.
Post-Commission Performance Metrics	Key performance indicators (KPIs) comparing post-commissioning performance with pre-launch expectations.
Benchmark Monitoring	Comparison of performance metrics against industry benchmarks for similar asset types.
Condition Monitoring	Real-time data on asset conditions during the commissioning phase.
Resource Utilisation Analysis	Efficiency insights of resources (manpower, equipment) used during testing.
Risk Assessment Reports	Identification of potential risks during commissioning and suggested mitigation strategies.
Operational Readiness Checklist	Checklist of tasks completed before assets are operationally ready.

Operations

Provides a real-time overview of transport operations, enabling tracking of actual performance against schedules, identification of inefficiencies, and assessment of financial impacts for continuous improvement.

Example of Operations Insights and Reporting Outputs:

Real-Time Performance Data	Access real-time data on transport performance and operational efficiency, including on-time performance and schedule adherence.
Benchmark Comparison	Compare operational performance against benchmarks and schedules, with alerts for asset malfunctions or disruptions.
Bottleneck Identification	Gain insights into bottlenecks caused by asset downtime or inefficiencies, with centralised visibility of daily operations.
Bottleneck Alerts	Receive real-time alerts for operational bottlenecks affecting service continuity.
Efficiency Reports	Measure turnaround time and vehicle capacity utilisation to identify process improvements.
Scheduling Optimisation	Optimise driver and crew scheduling to align labour with service needs, while tracking fuel and energy consumption for cost reduction and sustainability.

Incident

Provides detailed tracking and analysis of incidents to help reduce risks, improve safety, and enhance operational resilience. Near real-time incident monitoring and automated alerts offer proactive tracking of performance, while detailed attribution and cause-effect insights help streamline resolution and operational improvements.

Example of Incident Insights and Reporting:

Incident Frequency & Timing	Tracks the frequency and timing of incidents for better operational oversight and risk management.
Root Cause Analysis	Identifies the underlying causes of incidents, offering insights to prevent future occurrences.
Real-Time Incident Monitoring	Enables near real-time monitoring and automated alerts for incidents affecting asset performance or operations.
Incident Attribution	Correlates incidents with specific assets, categories, or locations to pinpoint areas of concern.
Cause & Effect Analysis	Analyses the severity and impact of incidents on operations and customer experience, providing actionable insights for improvement.
Incident Resolution Times	Measures the time taken to resolve incidents, helping to improve response efficiency.
Stakeholder Performance Metrics	Tracks subcontractor performance in maintaining assets, providing insights into third-party impact on operations.
Underperforming Asset Identification	Identifies assets causing delays or increased costs due to repeated failures, maintenance needs, or incidents.
Response Time Measurement	Monitors incident response times to ensure quick and effective resolution, minimising downtime.
MTTR (Mean Time to Repair)	The average time taken to repair an asset after a failure.
MTBF (Mean Time Between Failures)	The average time between successive failures of an asset.
Automated Notifications	Sends automatic notifications to staff when incidents occur, ensuring timely communication and response.

Patronage

By ingesting patronage data and overlaying it with journey data, you can track passenger movement, patterns, and behaviours to optimise service levels, improve passenger experience, and enhance asset utilisation.

Example of Patronage Insights and Reporting Outputs:

Passenger Load Analysis	Identifies under- and over-utilised services to support schedule optimisation and resource allocation.
Passenger Journey Time Analysis	Highlights delays and inefficiencies within the network to improve overall service delivery.
Demand Forecasting	Predicts future capacity needs based on travel patterns to inform scheduling, investment, and asset utilisation.
Revenue-per-Passenger Insights	Provides analysis on revenue generation per passenger, helping to refine pricing models for profitability and customer satisfaction.
Ticketing Data Integration	Utilises ticketing data to measure patronage and enhance demand planning.
Weight-Based Patronage Estimation	Uses train weight data to estimate passenger numbers and refine capacity planning.
Passenger Growth Analysis	Tracks trends in passenger growth to help anticipate demand and improve future service planning.
Predictive Scheduling	Forecasts optimal scheduling based on historical and real-time patronage data to meet customer demand efficiently.

Real-Time Data based on SIRI Protocol

Implements the SIRI protocol for real-time operational data, enabling seamless integration of transport information across platforms and ensuring timely communication and alternatives routes to both passengers and operational teams, especially during disruptions.

Example of Real-Time Data based on SIRI Protocol Insights and Reporting:

Real-Time Vehicle Monitoring	Tracks vehicle locations and schedules, providing operational teams with live updates for enhanced route and fleet management.
Automated Scenario-Based Messaging and Service Disruption Alerts	Automatically delivers live updates on service disruptions and alternative options to passengers and teams, ensuring quick response and communication.
Service Performance Benchmarking	Compares real-time operational data across various timeframes, using SIRI data to identify performance improvements.
Dynamic Schedule Adjustments	Automatically adjusts schedules within seconds based on real-time data to reduce delays and enhance service efficiency.
SIRI Data Processing	Utilises the SIRI processing engine for production timetables, estimated timetables, vehicle monitoring, situation exchange, and facilities monitoring, all integrated within your real-time dashboard.
Multimodal Data Integration	Facilitates integration with open data platforms, mobile applications, journey planning tools, Google Maps, and disruption management systems for seamless communication with passengers.
Carousel Enhancement	When a scenario is selected from the carousel, we automatically notify the passenger, including details such as delays and platform changes.
Contractual Reporting	Automated, trusted, and accurate operational reporting to meet contractual obligations.

Passenger Experience

Integrates CRM data with live patronage information to provide a complete view of the customer journey, capturing real-time feedback and sentiment to help improve service quality and customer satisfaction.

Example of Passenger Experience Insights and Reporting:

- **Real-Time Feedback Monitoring** — Captures immediate passenger feedback on service performance, enabling rapid adjustments to enhance customer experience.
- **Sensor Data Insights** — Monitoring critical infrastructure through sensor data, including track geometry, trolley wire, and arc detection, to identify factors that could affect passenger experience (e.g., poor track quality impacting ride comfort or arcing sounds causing passenger concern).
- **Net Promoter Score (NPS) Tracking** — Gauge customer loyalty and predict future service uptake, based on direct customer feedback. Compare NPS against journeys, locations, time of day etc.
- **Incident & Complaint Correlation** — Correlates operational disruptions (e.g., delays) with customer complaints, and NPS, providing actionable data to reduce the impact of service failures on passenger satisfaction.
- **Patronage Trend Analysis** — Analyses patronage trends in relation to customer satisfaction to ensure service levels meet demand.
- **Complaint Resolution Tracking** — Monitors how quickly and effectively customer complaints are resolved, providing insight into service quality and operational responsiveness.
- **Holistic Customer Journey View** — Combines various data sets (e.g., CRM, patronage, and journey data) to provide a comprehensive view of the customer's journey and overall experience within the network.
- **Customer Behaviour & Staff Mobilisation** — Identifies where staff should be deployed based on patronage levels and satisfaction data, ensuring the right resources are allocated to improve the passenger experience.
- **Customer Interaction & Journey Correlation** — Overlays customer interaction data with journey information to better understand root causes of dissatisfaction and operational issues affecting the passenger experience.
- **Sentiment Analysis** — Utilises data from surveys and social media to analyse customer sentiment, identifying areas of frustration and areas for service improvements.

Predict & Scenario Modelling

Predictive and scenario modelling analytics use historical data and advanced algorithms to forecast future events and assess the impact of various operational scenarios. This approach helps transport operators optimise resources, plan for disruptions, and improve decision-making by simulating outcomes in areas like demand, maintenance, and budgeting.

Example of Predict & Scenario Modelling Insights and Reporting:

DEMAND FORECASTING & SCENARIO MODELLING

- **Demand Forecast Models** — Provides forecasts for future ridership or demand patterns, enabling better service planning.
- **Predictive Analytics for Demand Spikes** — Anticipates high-traffic events and prevents service overloads by predicting demand surges.
- **Impact Analysis of Service Changes** — Tests how varying service schedules and frequencies affect ridership, operational costs, and service efficiency.
- **Disruption Impact Analysis** — Evaluate how potential disruptions will impact operations, allowing for contingency planning.

RESOURCE OPTIMISATION

- **Workforce Deployment Optimisation** — Models labour needs based on projected demand to ensure optimal staffing levels for different scenarios.
- **Resource Optimisation Scenarios** — Identifies the most efficient allocation of resources, including vehicles and staff, for different operational needs.
- **Scenario Modelling for Budget Allocation** — Compares different financial strategies for maintenance or asset investments to inform budget planning.

ASSET PERFORMANCE & MAINTENANCE

- **Asset Predictive Maintenance** — Predicts when and why assets will require maintenance, allowing for proactive scheduling before performance deteriorates or financial impacts occur.
- **Failure Prediction Alerts** — Utilises data inputs to predict imminent asset failures, enabling preemptive actions to prevent service disruptions.
- **Reliability, Availability, and Maintainability (RAMs) Performance** — Tracks asset performance against RAM targets, helping refine the Asset Management Plan and determine life cycle adjustments.

Subcontractor Performance

A real-time digital replica of physical transport assets (e.g., stations, vehicles) that enables transport operators to simulate performance, predict maintenance needs, and optimise operational efficiency. The Digital Twin provides a virtual environment for asset navigation, analysis, and even remote training, helping to drive smarter decision-making.

Example Digital Twin insights and reporting capability:

Visual Asset Representation for Training	Provides a 3D visual environment for easier asset identification and remote training of staff, improving operational knowledge and preparedness.
Asset Navigation and Remote Management	Enables operators to navigate through virtual representations of assets, offering a comprehensive view of asset performance and health.
Real-Time Condition Monitoring	Continuously tracks the status and condition of critical assets, providing insights into asset health and projected lifespan.
Predictive Failure Simulations	Simulates potential asset failures to allow for proactive maintenance and mitigation strategies.
Scenario-Based Maintenance Planning	Models different maintenance schedules to analyse the impact on costs, service levels, and asset longevity.
Energy Usage Optimisation	Monitors and simulates energy consumption in real-time, helping to reduce resource usage and meet sustainability goals.
Asset Performance Simulations	Tests asset performance under various conditions to optimise utilisation and improve overall efficiency.
Predictive Maintenance Models	Uses data-driven insights to forecast potential maintenance issues or failures before they occur, minimising disruptions.
Operational Scenario Testing	Simulates operational changes or upgrades in a virtual environment before real-world implementation, reducing risks and improving decision-making.
Environmental Impact Simulations	Model the environmental impact of different operational scenarios to align with sustainability targets.
Safety Incident Simulations	Simulate potential safety incidents to develop better response strategies and prevent real-world occurrences.

Subcontractor Performance

Monitors and evaluates subcontractor performance to ensure compliance with service level agreements (SLAs) and contractual obligations. It helps optimise workforce efficiency, improve asset reliability, and drive continual improvement across the transport sector.

Example of Subcontractor Performance Insights and Reporting:

- **Labour Hours Tracking** — Monitors the time subcontractors spend on maintenance tasks, offering insights into workforce efficiency.
- **Task Completion & Quality Reviews** — Evaluates subcontractors based on their ability to complete tasks on time and maintain high-quality standards.
- **Cost & Productivity Comparisons** — Compares the cost and productivity of subcontractors against benchmarks and internal staff to inform decision-making.
- **Training & Skill Gap Identification** — Highlights areas where subcontractors may require additional training, addressing skill gaps in maintenance teams.
- **Subcontractor vs. Asset Reliability** — Correlates subcontractor performance with asset reliability and uptime, identifying potential areas for improvement.
- **Subcontractor KPIs** — Tracks key performance indicators (KPIs) such as timeliness, quality of work, and cost-efficiency to assess subcontractor service delivery.
- **Trend Analysis for Contract Renewals** — Offers performance insights over time, aiding in contract renewal decisions or supplier negotiations.
- **Subcontractor Risk Assessment** — Identifies subcontractors that frequently miss targets or underperform, helping mitigate risks in operations.
- **Cost-Performance Analysis** — Analyses the cost-effectiveness of subcontractor services, supporting better budget allocation and financial planning.
- **Subcontractor Turnover Rates** — Monitor turnover rates among subcontractors to assess stability in the supply chain and its potential impact on service delivery.
- **Incident Reporting and Analysis** — Track incidents related to subcontractor work, analysing the frequency and types to identify trends and areas for improvement.
- **Customer Feedback Integration** — Collect and analyse feedback from end-users regarding the quality of subcontractor services, using this information to assess performance and drive improvements.
- **Financial Performance Metrics** — Analyse financial performance indicators, including return on investment (ROI) for subcontractor services, to assess overall value delivered to the organisation.
- **Workforce Utilisation Rates** — Measure how effectively subcontractor labour is utilised across projects, helping identify underuse or overuse of resources.

Service Payment Claims

Automates the tracking, submission, and analysis of service payment claims between operators and subcontractors to ensure timely and accurate payments, improve cash flow, and maintain contract compliance. This module offers highly visual reporting tools, such as interactive Train Graphs that compare actual performance to schedules, along with executive-level KPIs that allow users to drill down into detailed insights.

Example of Service Payment Claims Insights and Reporting:

DATA INGESTION & JOURNEY ANALYSIS

- **Train Journey Event Data Ingestion** — Automatically ingests train journey event data from the train management system, enabling real-time monitoring and analysis.
- **Journey Data Interpretation** — Summarises train journey events (e.g., ARRIVAL, DOOR OPEN, DEPART) at each station, allowing for detailed journey analysis.
- **Real-Time Data Processing** — Processes data in near real-time, subject to the source system's data frequency, ensuring up-to-date reporting.
- **Missing Data Detection** — Detects and alerts users of missing data points, generating "dummy" values to maintain accurate service metrics.
- **Journey Assignment** — Assigns each train journey to the correct service period and direction of travel for precise performance tracking.
- **Additional Operational Data** — Surfaces operational insights, such as speed, acceleration, distance, carriage weight, and alarm analysis, enhancing decision-making beyond payment calculations.

SERVICE PAYMENT CALCULATIONS

- **Contractual Payment Monitoring** — Calculates overall service payments based on defined contractual obligations, ensuring payment accuracy.
- **Claim Approval Time Tracking** — Monitors how quickly claims are processed and approved, offering insights for process improvement.
- **Claim Error Analysis** — Identifies common discrepancies in claims, helping prevent future mistakes.

ABATEMENT RELIEF MANAGEMENT

- **Relief Management Interface** — Provides a user-friendly interface for managing various types of Abatement Relief, such as Journey Relief and Platform Closure relief, improving compliance and transparency.
- **Regulatory Agreement Storage** — Allows storage of regulator agreements linked to each relief definition, ensuring proper documentation.

Service Payment Claims Cont.

SERVICE CHANGE MANAGEMENT

- **Service Schedule Management** — Supports both short- and long-term service schedules, allowing operators to plan and adjust service frequency.
- **Short-Term Schedule Interface** — Offers an interface for defining short-term schedules by service period and headway, improving operational flexibility.
- **Carousel Management** — Manages service adjustments through a carousel system, ensuring smooth scheduling changes.

AVAILABILITY ANALYSIS

- **Delivered Service Percentage** — Tracks the percentage of services delivered as planned, highlighting areas for operational improvement.
- **Missed Service Tracking** — Measures missed services against short- and long-term schedules, providing insights into service reliability.
- **Platform Closure Management** — Calculates the impact of platform closures on service delivery, enabling better decision-making.
- **Journey Time Analysis** — Analyses journey times, including technical and customer dwell times, and sectional running time, offering a complete view of performance.
- **Customer Delay Measurement (CDM JT)** — Measures customer delays in journey times, providing insights into passenger experience.

TIMELINESS ANALYSIS

- **Frequency Customer Delay Measure (CDM FQ)** — Tracks delays in service frequency, helping operators improve timeliness.
- **First and Last Train Tracking** — Considers the punctuality of the first and last trains of the day, improving service reliability.
- **No-Service Period Analysis** — Identifies periods with no service, helping operators optimise schedules.
- **Platform Weighing Incorporation** — Includes platform weightings across service periods, enhancing performance accuracy.

SERVICE QUALITY DEDUCTION

- **Service Quality Data Ingestion** — Ingests service quality data, such as customer surveys and feedback, to track service satisfaction.
- **Service Quality KPI Calculation** — Calculates service quality KPIs based on defined thresholds and weightings, ensuring contractual compliance.

Service Payment Claims Cont.

ASSET FUNCTIONALITY DEDUCTION

- **Asset Data Ingestion** — Automatically ingests asset logging and metering data, providing insights into asset performance.
- **Asset Functionality KPI Calculation** — Calculates asset functionality KPIs against thresholds and weightings, ensuring optimal asset performance.

PATRONAGE ANALYSIS

- **Customer Usage Analysis** — Analyses customer usage data, where available, to track performance on a per-customer basis, providing insights into service demand.

MANAGEMENT OF KEY PARAMETER AND INPUT DATA

- **Reference Data Management** — Allows users to maintain key reference data for operational reporting and service payment calculations, ensuring accurate and up-to-date inputs.