



CUBIC™

Product Overview



Cubic Transport Management Platform

8700-00004.A

21 Mar 2019

- Introduction
- Functional Areas
- Situational
- Event & Response
- Communications
- Connected
- Coordination
- Event Planning
- Analytics
- Enterprise
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Introduction

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Introduction

Cubic's Transport Management Platform (TMP) is an innovative, cloud-hosted product designed to support all aspects of transport operations. TMP is a modular, flexible and scalable product that allows transport management centers to proactively coordinate and manage multimodal transport networks, reduce the likelihood of congestion and accidents, and improve network efficiency.

TMP provides agency operators a Common Operational Picture (COP)—shown at right—for all modes of transport, delivering enhanced situational awareness for congestion, incident and event management.

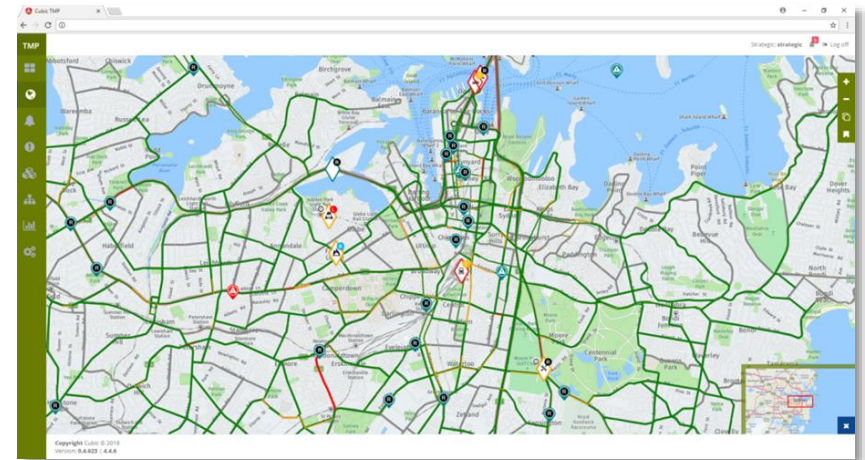
Multiple operators can log into TMP and work collaboratively to manage incidents and congestion across different modes of transport.

TMP can be configured to meet existing customer needs, and can support future agency capabilities. As an example, TMP can be configured to provide:

- A road-based traffic management solution, delivering coordinated responses across the road network
- A system-of-systems solution, integrating TMP with multiple systems and subsystems spanning all modes of road-based and non-road-based transport

Some Key Features Are:

- Real-time, integrated multimodal congestion, incident, and event management
- Urban, multimodal coordination and management, and improved decision support tools

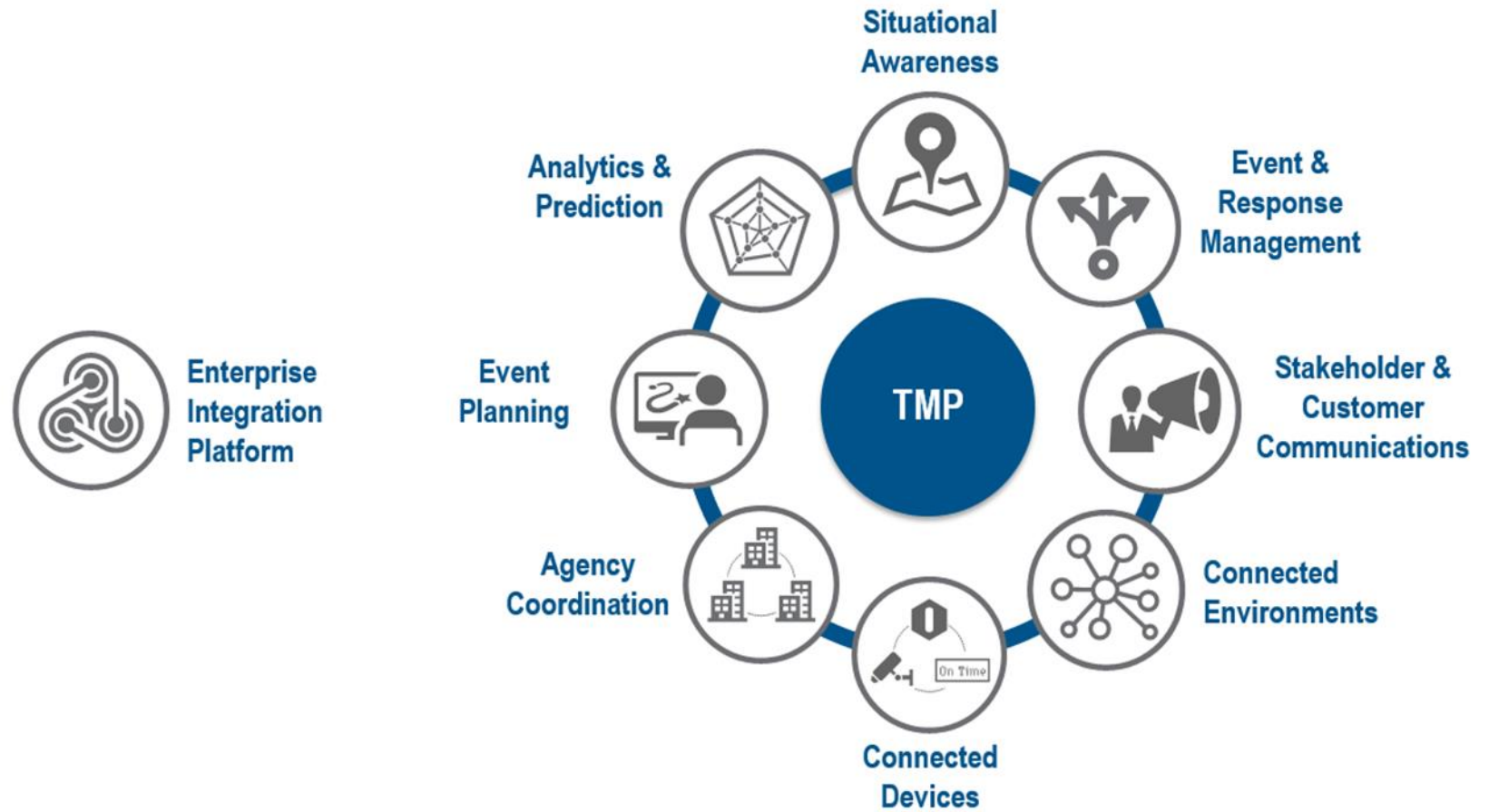


- Browser-based interface with no software installation required to operate
- Predictive demand management, analytics, and advanced simulation
- Traffic and public transport profiling
- Flexible, configurable, and algorithmic rule-based responses
- Cloud-hosted environment, enabling flexible procurement models such as Software-as-a-Service (SaaS)
- An open platform capable of integrating with new and existing systems
- Modular design to help deliver a tailored expandable solution that meets agency needs
- Offering an expandable range of modules to deliver enhanced functionality

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Functional Areas

The functional areas are illustrated and described in the figure below.



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Situational Awareness

The TMP user interface (COP) is the primary situational awareness tool that interfaces with external systems to allow the operator to directly monitor the transport network.

The TMP operator interface is browser-based, with no footprint on the operator's machine other than the browser itself. Users will find the interface intuitive and easy to use. TMP can be accessed on desktop or laptop computers, and on tablets.

Key to the COP is the range of information available to the operator through the map display. All integrated subsystems and data sources are displayed on the COP, and include:

- **Live Traffic Congestion**—Sourced from HERE
- **Live Traffic Incidents**—Sourced from HERE and Waze
- **Field Equipment**—Includes dynamic message signs, lane control signs, and variable speed limit signs
- **ITS Assets**—Includes CCTV and traffic signals
- **Points of Interest**—Key points of interest to the agency, including relevant agency-specified, location-based information
- **Public Transport Status**—Live public transport location and status
- **Alerts and Events**—Live alerts, live and planned events

Event & Response Management

Event and response management provides improved planning, visualization, and impact assessment for major planned events and roadworks. Additionally, it offers:

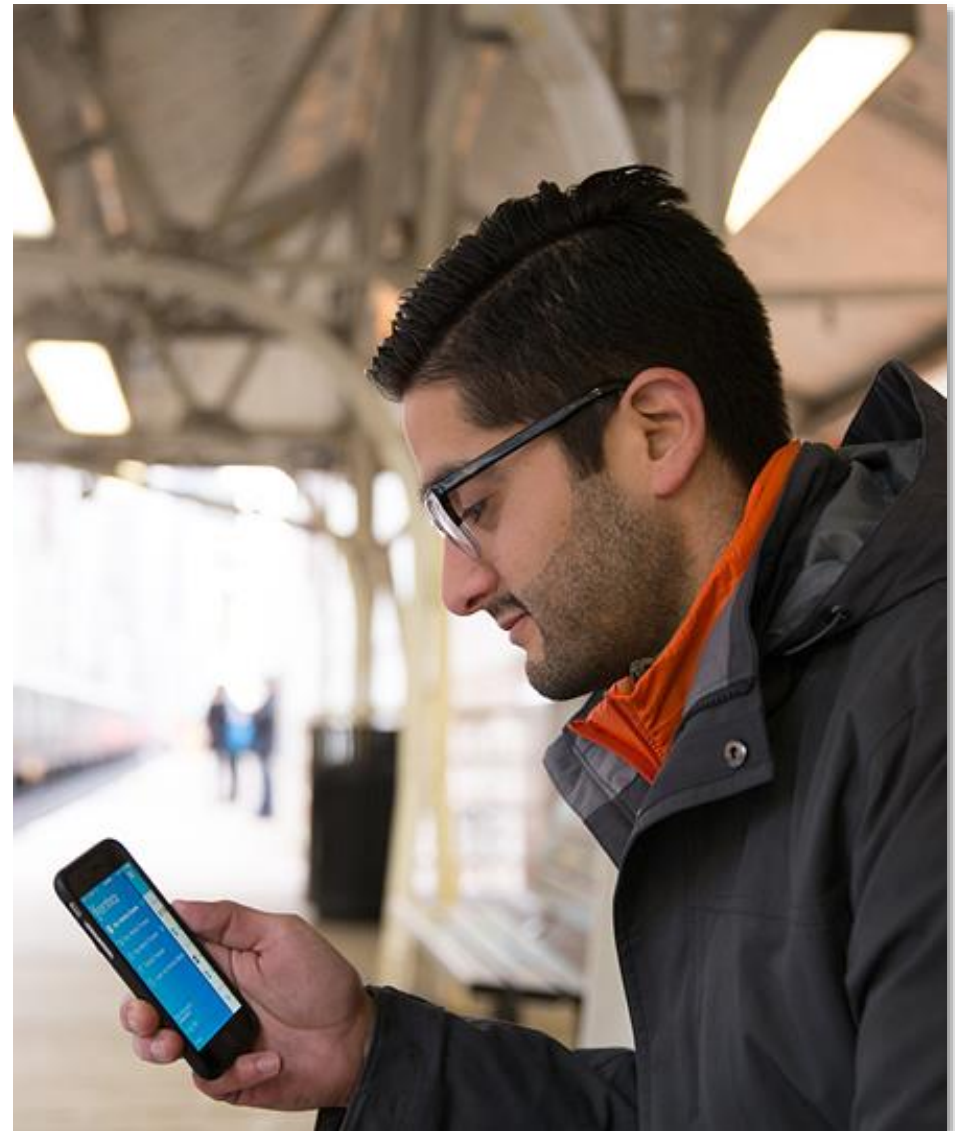
- Congestion and Incident Management Lifecycle
 - Traffic-Based Congestion and Incident Responses
 - Multimodal Coordinated Responses
- Public Transportation Impact Assessment
- Response Impact Assessment
- Configurable Algorithmic Rule-Based Responses
- Stakeholder Communications
- Roadside Device Control
- Connected Environment Control and Coordination
- Agency Coordination
- Field Crew Dispatch
- Traffic Signals / Green Runs

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Communications — Stakeholder & Customers

This module provides a range of managed communication channels—including email and social media—which enable authorized agency staff to pre-plan message templates aligned to agency policies and approved language. This improves consistency and quality of messaging, while also decreasing the time taken to inform travelers.

Support of open APIs and integration with mobile apps to deliver personalized notifications and real time journey information is on the TMP roadmap.



Connected Environments & Devices

Connected Environments

Connected environments provide improved network efficiency and eliminate the overhead of managing multiple, unconnected systems. They do this by coordinating with these systems so that complex legacy systems or specialist expert systems do not need to be replaced, or do not need to remain as stand-alone systems. Connected environments can include:

- Public Transportation Systems
- Private Road Operators
- Field Crew
- Operational Control
- SCATS Traffic Signals
- CCTV Management System
- Ramp Meters
- Internet of Things (IoT)
- Kerbside Management
- External Systems To Alert Operators
 - HERE Based Alerts
 - Waze Based Alerts
- Public Transportation Alerts
- Traffic Data
- HERE Traffic Data
- GTFS / GTFS-R Based Transportation Data Systems
- SIRI Based Transit Data Systems
- Connected Vehicle Systems / DSRC

Connected Devices

TMP can connect to and control devices, obtain data, and detect faults. Some of the devices that can be managed by TMP include:

- Dynamic Message Signs
- Dynamic Lane Control Signs
- Mobile Electronic Message Signs
- Bluetooth Sensors
- Weather Sensors
- Radar Detectors
- V2X Sensors

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Coordination Across Agencies

TMP provides centralized coordination across agencies, allowing for consistent and combined multi-agency responses. Agencies include:

- Inter-Agency Center-To-Center (C2C) Based Communications
- Emergency Services
- Transportation Security
- Travelling Public
- MaaS Transport Providers

Event Planning

TMP assists agencies with prior offline event planning and impact assessment, as well as real-time event management. Support event types include:

- Major Planned Events such as concerts and sporting events
- Road Occupancy Planning which create traffic network constraints



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Analytics

Analytics and predictive modeling and event simulation assist with reducing the likelihood of accidents and congestion. Analytics can also drive network efficiencies and environmental benefits through use of the following features:

- Robust Analytics Platform—Integrated with Cubic's Data Management Application Platform (DMAP)
 - Algorithmic Based Responses
 - Data Profiling
 - Demand Assessment
 - Machine Learning
- Business Intelligence and Management Reporting
- Predictive Traffic Modelling and Impact Assessment
- Multimodal Predictive Modelling
- Video Based Analytics
- Profiled Data
 - Traffic Profiling
 - Public Transportation Passenger / Tap-and-Go Data

Enterprise Integration Platform

The MS Azure-hosted Enterprise Integration Platform sits at the center of TMP and allows external systems to integrate with the product. The state-of-the-art stability and performance offered includes:

- Browser-based Interface with Portable Device Support
- Choice of Regional Hosting Locations
- Cloud Security Validated Against SD Elements Standards
- Automated Application Monitoring using MS Application Insights
- ServiceNow 24/7 Global Support through the Cubic Global Operations Centre
- Disaster Recovery with > 99.95% System Availability
- MS Service Fabric Delivering:
 - Scalability—Expanding Capacity During Peak Load
 - Reliability—Self Healing Environment
- Automated Environment Provisioning and Management
- Full Audit Logging

Benefits

Agency Challenges & Benefits

Limited Real-Time Network Visibility

The TMP COP presents the operator with a single live view across the entire transportation network, incorporating traffic-based and public transport real-time information. This allows rapid incident identification, real time understanding of the impact, and effective response to the incident.

Lack of Live System Integration

The lack of integration between existing agency and external systems creates operational inefficiencies in Transport Management Centers (TMC), resulting in increasing agency response time and making coordinated responses difficult to implement and manage. Through TMP's open architecture and enterprise integration platform, subsystems and data sources are rapidly combined into a single control system, and data is presented to the operator in a single live COP.

Lack of Multimodal Coordination

Transport modes being viewed in separate systems makes efficient responses difficult for agencies and their stakeholders. The live views of multiple transport modes and TMP's advanced rule-based responses enable coordinated multimodal responses. TMP's flexible and scalable architecture helps agencies adapt to changing traveler behavior and increased urbanization.

Complex & Manual Operational Processes

The lack of automated processes leads to the need for manual control of field equipment, causing operational inefficiencies, slower response times, and more complex response procedures. Through automated detection, managed incident response lifecycle, and rule-based decision support, TMP increases automation and improves control room operational processes. This allows operators to focus on critical tasks, while TMP manages the routine tasks.

Reactive Rather Than Predictive

Reacting to unplanned events and congestion is operationally ineffective for agencies. Through integration with PTV Optima (offered as part of the TMP solution capability), TMP delivers an integrated predictive traffic capability:

- **Congestion levels** can be predicted across the road network up to thirty minutes into the future, with TMP alerting operators to potential congestion before it occurs. This allows them to act upon informed decisions, disseminate information to devices, and better manage travel experience and network demand.
- **Impact assessment** of pre-prepared event and incident response plans can be undertaken to determine the best course of action prior to implementing a response in real time. This can reduce the likelihood of accidents, and provide environmental benefits.

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Legacy Solutions

The use of legacy systems reduces TMC productivity due to rigid workflows, poor user experience, and limited capabilities.

Replacing these systems with TMP and its intuitive workflows—which are tailored to modern control rooms—brings improvements to operational processes.

Recognizing that legacy subsystems and field equipment cannot always be replaced, TMP can either integrate with, or provide a wrapper for, older legacy systems. Agencies can therefore choose to retain or replace legacy subsystems.

Traveler Challenges & Benefits

Segmented Travel Information

Receiving mode-specific information that travelers must piece together causes confusion and frustration. TMP allows agencies to issue multimodal communications to enable better, more informed travel decisions, resulting in a more positive experience.

Outdated Information

Travelers make decisions based on the information available at the time. Outdated information leads to poor decisions that can further compound network congestion. Real time information, along with agency-approved messaging via channels that include social media, improves traveler experience by highlighting the best journey plans.

Network Congestion

By having routes that are not adaptable, travelers experience crowding at peak times. By implementing TMP, agencies can predict congestion and likely events that may impact traveler journeys, and proactively plan additional capacity or alternate

routes. This improved demand planning gives travelers a better overall experience through reduced crowding or journey time.

Incident Impact

Without real time incident information, agency response times can be slow, allowing congestion to increase and negatively impact traveler journeys. TMP provides pre-planned and tested event responses, allowing improved response times and more efficient clearing of incidents. This reduces the impact of the disruption, congestion, and traveler journey times.

Event Planning

Without multimodal visibility the transportation network can be overstretched during planned events, and agencies can struggle to predict the impact of large traveler volumes. TMP's predictive scenario analysis allows additional routes, modes, and frequency of public transportation to be planned, and traffic management measures to be actioned. This improves traveler experience with safe and convenient transport available when it is most needed. For road users, clear diversions and better messaging result in less stressful journeys.

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Conclusion

Integrated transport and traffic management are critical elements of the multimodal transportation networks of the future—providing agencies the ability to more effectively manage and communicate with travelers, operators, and the emergency services.

Our modular, cloud-based intelligent transportation management platform is the first its kind and facilitates flexibility and scalability, allowing for the continued operation of legacy systems, while reducing costs of operation.

TMP provides state-of-the-art operational management of transport networks, with the capacity to adapt and grow as those networks evolve.