

Cubic Transport Management Platform

Overview



Cubic Transport Management Platform

OVERVIEW

Cubic's Transport Management Platform (TMP) is an innovative, next-generation software solution designed to collectively support all aspects of transport operations. Underpinning Cubic's TMP is a flexible and scalable integration platform that allows transport management centers to proactively manage multimodal transport networks and provide safe, secure and reliable journeys for all users.

Cubic's TMP represents the significant and ongoing investment the company has made in the Transportation Management domain over the past 30 years. Through the on-going market tracking Cubic has undertaken it became clear the evolving needs of the multimodal transportation market could not be met by simply 'bolting on' additional functionality to existing products. The decision was made to invest in the ground up development of a modern, cloud-based platform, capable of meeting current advanced traffic and transportation management system needs, as well as the evolving needs of multimodal transport networks well into the future.

TMP Vision

Cubic's TMP was designed to address the core needs of Transport Management Centres (TMCs) and their stakeholders. Every TMC has its own unique operational and technical design, specific to the operating agency, stakeholders and technologies with which it interacts.

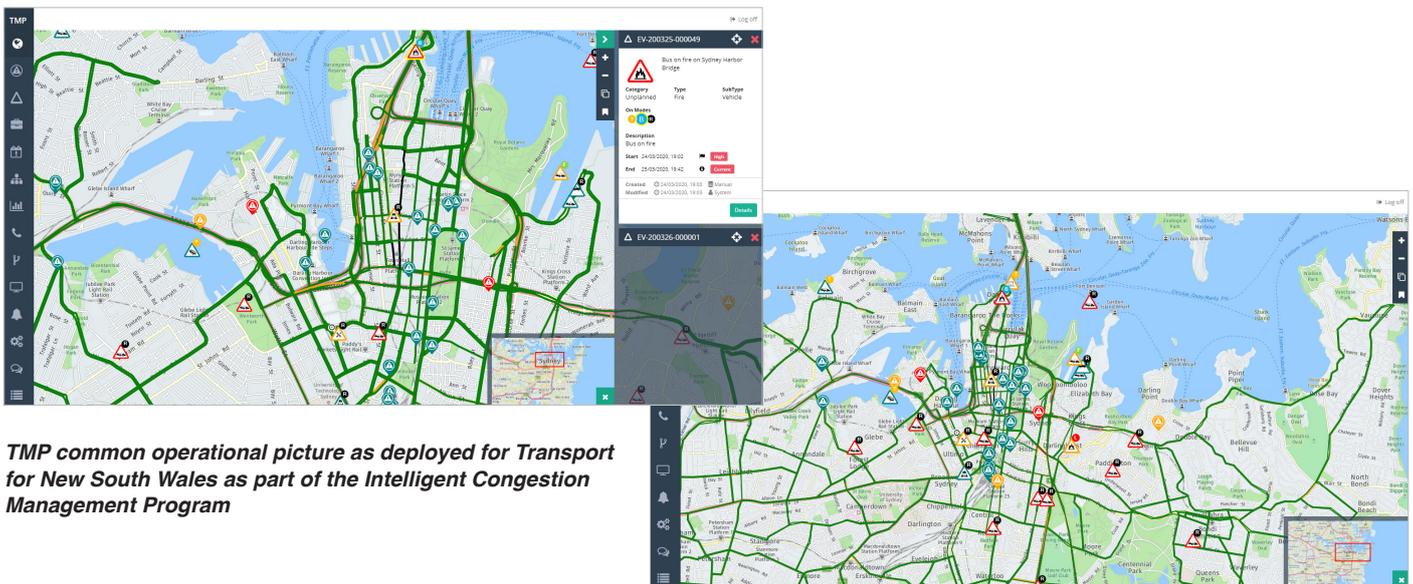
The TMP was built on a modern, flexible and expandable architecture to meet the needs and budgets of a wide range of potential customers. The solution has the flexibility of being hosted either in the cloud or on premise. It has been designed to simplify integration with a wide range of current and legacy systems and services, to allow customers to protect their existing investments while giving them the flexibility for future evolution and expansion.

There will be different demographics and characteristics specific to each local area where TMP is implemented. These must be understood and drive the need for a flexible approach. The fundamental issues behind local transport problems and the current operational environment may result in solution specific configurations of TMP.

Supported by its flexible integration platform, industry standard interfaces and supporting open data principles, Cubic's TMP provides a sophisticated capability to easily leverage both industry standard subsystems and devices, as well as agency specific capabilities. Existing legacy capabilities do not need to be replaced and can be incorporated into TMP to provide a solution tailored the demands of individual agencies and their local infrastructure and environments.

Superior Real Time Visibility of Network

Central to TMP is a map based Common Operational Picture (COP) that prevents operators with a unified live view across the entire transportation network. This view incorporates traffic-based information, real time public transport information and non-roadbased transportation modes. This provides the operator with rapid means of identifying incidents, as well as the real time understanding of its impact across the whole network. Only through understanding the overall network status and the impact on travellers can operators implement effective responses.



TMP common operational picture as deployed for Transport for New South Wales as part of the Intelligent Congestion Management Program

Key to the COP is the range of information available to the operator through the COP display. All connected roadside devices, traffic conditions, public transport information and other available data sources are all displayed. All future technologies and data feeds will continue to be integrated into the COP, supporting the paradigm of a single operational management system.

Flexible Operation and Deployment

The Cubic TMP is browser based with no desktop client install required to enable more flexible ways of working. Field crews, maintenance teams and other remote agency resources can access the TMP in the field, improving on-location situational awareness and communication between the field and decision makers in the TMC. It also simplifies remote working and, in the event of not being able to physically access the TMC, it simplifies disaster recovery procedures.

Cubic’s TMP can be deployed in the cloud or on premise, aligning with each agency’s IT and security strategies. It is built on modern web-enabled, off-the-shelf technologies, allowing it to scale from managing a single road or small town, up to national or state-wide operations.

The TMP Architectural Approach

Cubic’s TMP provides an open data integration platform with flexible and configurable business logic at its heart to deliver multimodal situational awareness and understanding. Transport Management Centre Operators need to be able to manage incidents tactically but also understand how that incident can be managed more strategically. Integrating data from every modes’ tactical system can provide a city with powerful insights and help them better plan and respond to unplanned events.

In turn, the TMC can truly understand how the entire transportation network is operating and push out dynamic multimodal travel information to inform the public directly (or via integration with 3rd party applications) about any impact to their preferred travel mode.

TMP is designed to support easy integration with external systems, services and devices. Wherever possible, this integration is via open interfaces that conform to modern, web-enabled industry standards. Where necessary, specialist adaptors are added to the TMP to implement bespoke interfaces to specific systems or devices.



Cubic’s Transport Management Platform

Modules							
Congestion & Incident Management 	Stakeholder Communication 	Data Warehousing & Analytics 	Predictive Congestion & Scenario Simulation 	Public Transit Status 	Event Management 	Major Event Planning 	Road Occupancy Planning
Configurable Responses 	Traffic Signal Management 	Intersection Management - Video 	CCTV Video Management 	Field Device Management 	Inter-Agency C2C Connectivity 	Internet of Things 	Management Reporting

TMP provides a modular capability in order to support agency specific needs.

Integrated Data Sources

The Cubic TMP leverages a wide range of data sources ranging from live congestion data and multi modal public transit data, to data gathered from other connected traffic systems and centres. This data is presented on the TMP's Common Operational Picture to provide operators with an enhanced situational awareness capability.

Integrated Devices

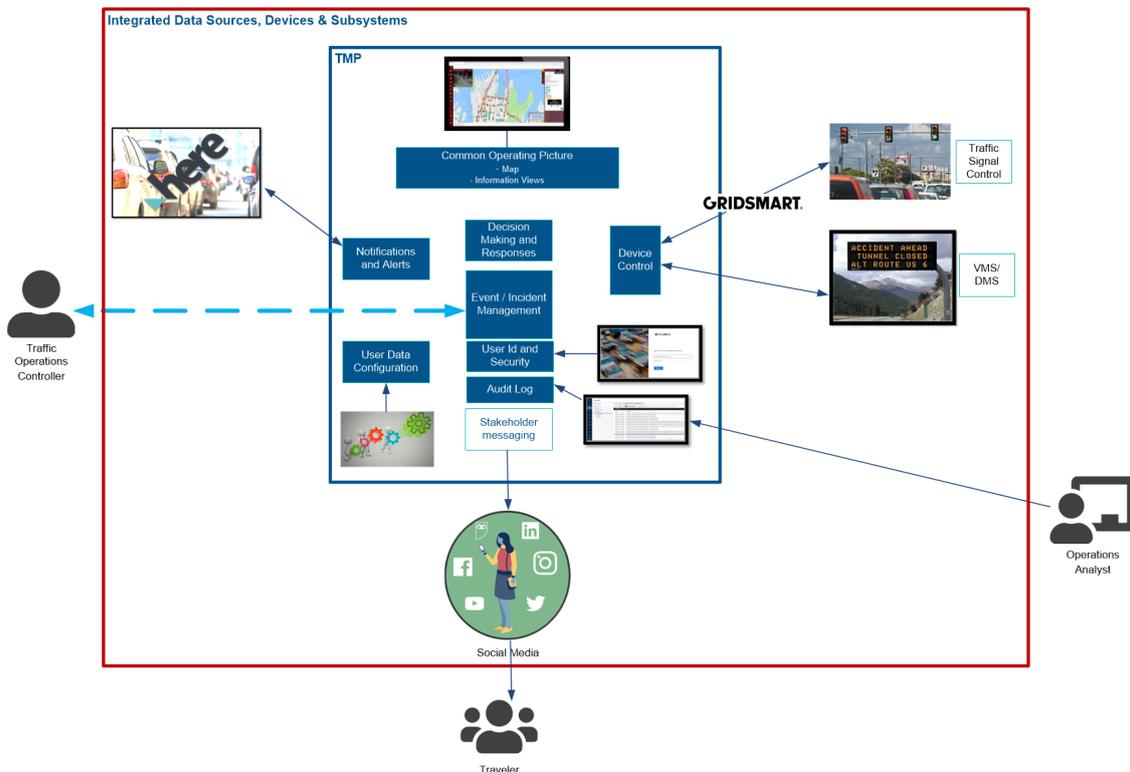
Roadside devices are integrated into the TMP. Their status is visualised on the Common Operational Picture. Operators can then control and manage their roadside infrastructure through TMP. Manual control of devices is provided in the TMP and through its incident management workflow, devices can be controlled and set as part of a coordinated response capability.

Integrated Subsystems

Cubic's TMP leverages existing and future subsystem capabilities such as CCTV or traffic signal control to deliver a wide range of traffic management capabilities. The TMP leverages best of breed control systems, such as those from Cubic GRIDSMART and Trafficware to deliver a coordinated control solution, all of which can be controlled through the platform.

TMP Configurations

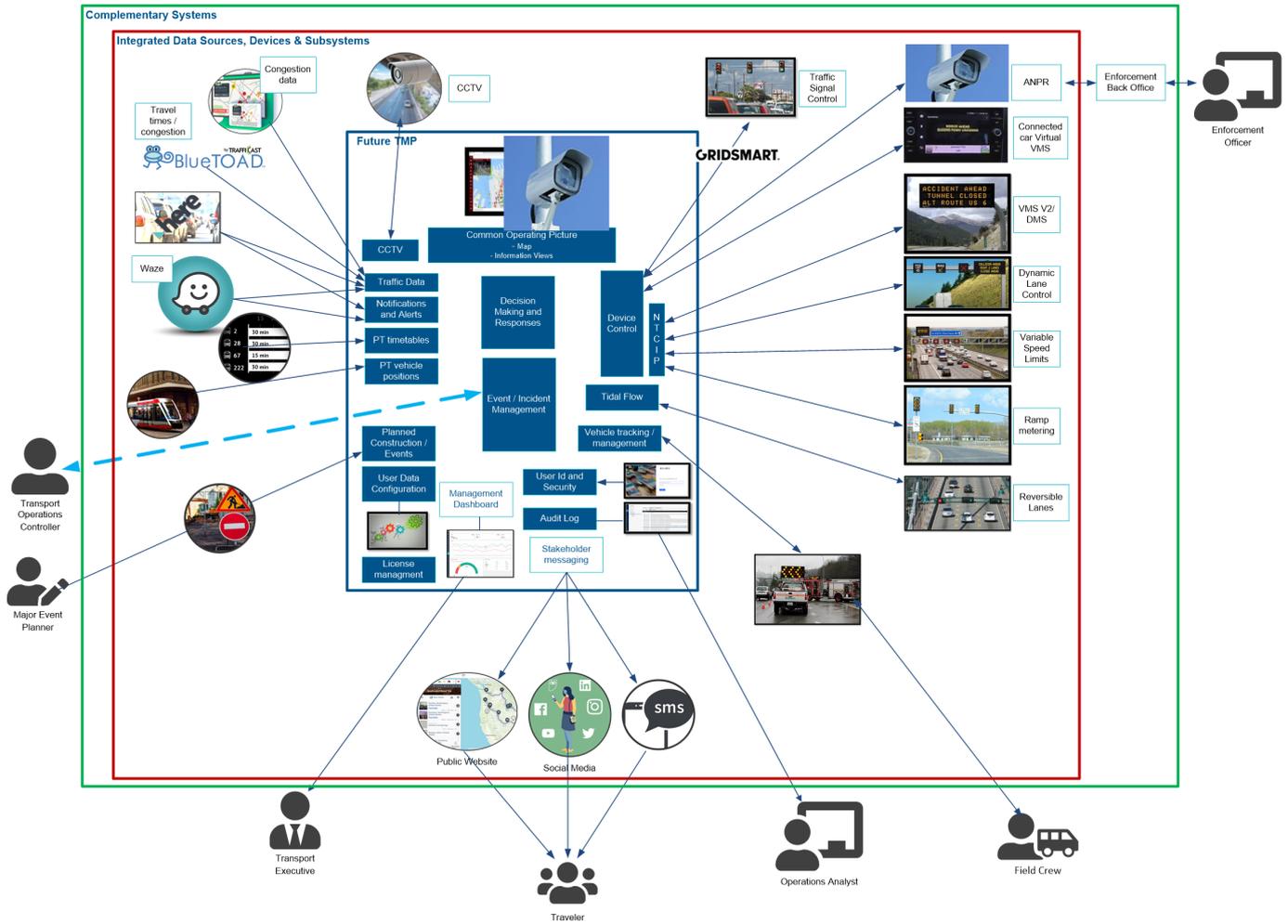
The Cubic TMP provides a core capability to support integrations. We leverage industry leading solutions which are then harnessed into TMP's COP and operational support logic to provide a holistic approach to transport management. A typical small scale TMP implementation is shown below.



In the example above, core TMP capability is shown by the blue box. The surrounding red box shows the connected data sources, devices and subsystems that TMP has integrated with. For example, live congestion data from HERE is being displayed on the map based common operational picture. There are also GRIDSMART cameras providing data and images to TMP operators.

Operators interact with TMP using the web browser user interface and have access to the full range of capabilities including the integrated data sources, devices and subsystems.

In the more complex example below, the TMP supports a wider range of data sources, devices and subsystems. These additional data points and capabilities are all supported through the map based common operational picture which forms the heart of the TMP user interface.



In this example, automatic number plate recognition cameras are integrated into TMP. Along with the other roadside infrastructure, they are controlled and managed through TMP. However, the offence processing is done through a separate specialist offence processing solution which is integrated with TMP.

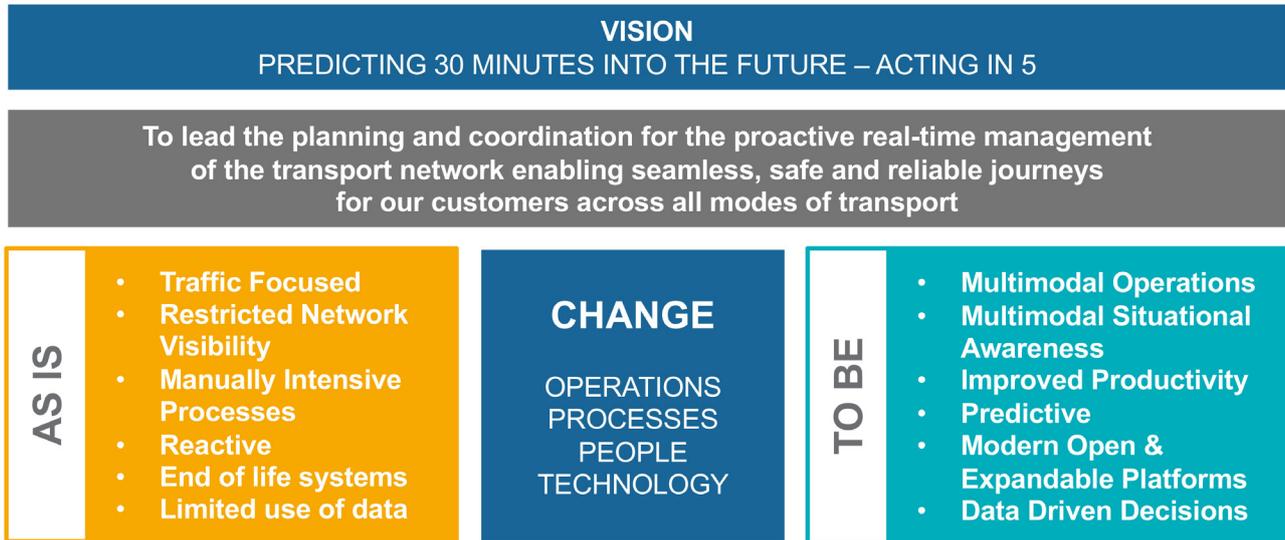
Intelligent Congestion Management Program

CASE STUDY

The Intelligent Congestion Management Program for Transport for New South Wales in Australia will transform Sydney's multimodal Transport Management Centre into a truly predictive, data driven, multimodal operation that optimises the entire transport network and helps the city manage end-to-end journeys rather than disparate modes. This will deliver the very latest congestion management technologies and demonstrate the benefits that taking an integrated multimodal approach to data an incident management can have on our cities.

As more people move to urban areas, and new modes of transport increase the complexity of our journeys, traffic and congestion will only worsen, unless cities can address the growing need for intelligent, real-time, user-centric, and connected congestion management.

Transforming the TMC

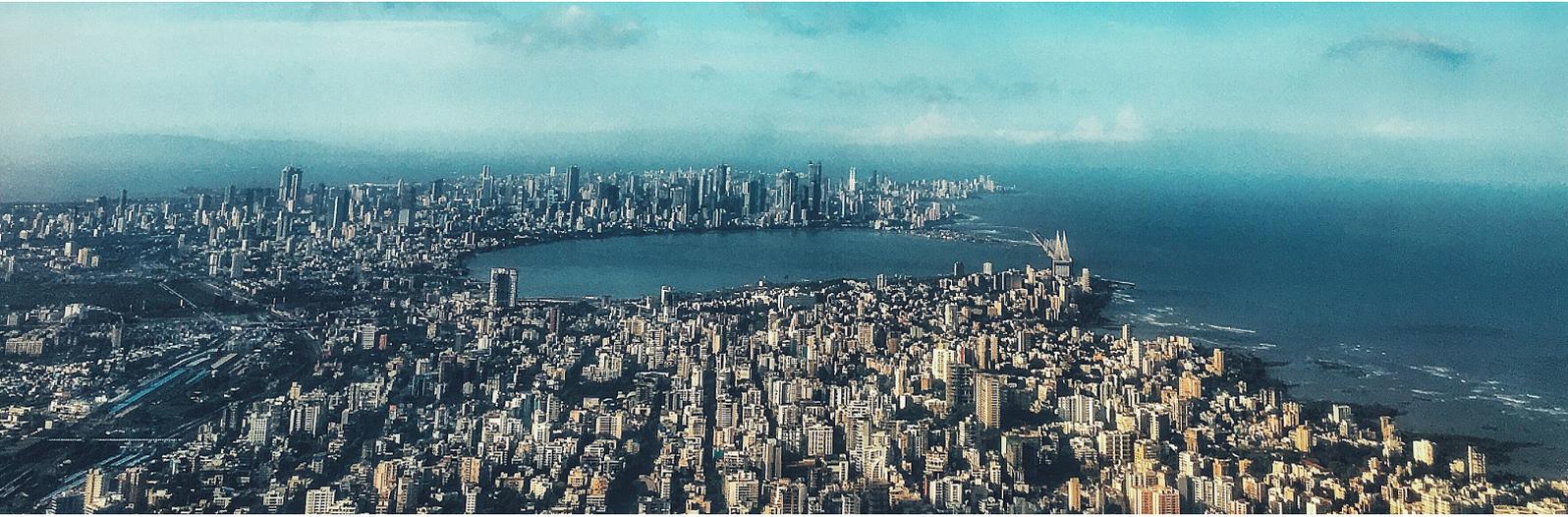


The NSW Transport Management Center (TMC) is one of the world’s most complex multimodal TMCs and a critical asset responsible for the planning, coordination, and proactive real-time management of the entire New South Wales state road network, covering 111,846 miles and serving a growing population of over 7.5 million. Once completed, ICMP will transform the TMC into a truly predictive, data-driven, multimodal operation that optimises the entire transport network and helps the city manage end-to-end journeys rather than disparate transport modes.

Cubic’s Transport Management Platform (TMP) running on Microsoft’s Azure cloud platform, sits at the heart of the ICMP solution. By leveraging the power of the Azure cloud, the TMP ingests numerous data sources and delivers actionable insights to those who need them most, improving the city’s overall situational awareness and providing a common operating picture across the state’s entire transit network.

The system enhances the monitoring and management of the road network across the state, coordinates the public transport network across all modes, improves the management of clearways, planning of major events and incident clearance times. It will equip city operators and first responders with the tools needed to effectively deal with any challenges, including accidents, emergencies, or natural disasters, while also providing the public with real-time information about disruptions and traffic conditions and offering personalised, predictions-based journey advice. Optimising the transport network and providing information to travellers is critical in reducing the impact of congestion and in making public transport the mode of choice.

A significant element of ICMP includes a focus on smart traffic signal control – a key enabler of an efficient and effective city traffic management. Sydney will increase its investment into the industry’s fastest-growing adaptive traffic control technology that relies on cost-efficient data sources, such as connected vehicles and in-road sensors. Those smart traffic controls can rapidly adapt to changing traffic conditions, minimising traffic immobility and increasing throughput at city intersections.



Improved Situational Awareness

Cities and regions are getting more and more complex as they grow in population, scale and complexity of transportation. In many cities different modes of travel are operated by disparate organisations. Irrespective of how these modes of travel are operated, they are closely linked and a strategic approach to managing these operations is essential to improve how people travel around a city and how the city can respond to incidents that occur. We must focus on delivering services in the way the customer wants to receive them rather than in a way that suits the way government is organised.

Cities need to leverage the benefits of an integrated multi modal approach to data and incident management, demonstrating the benefits that taking such an approach can bring and making the case for a more holistic approach to managing our cities in the future.

Example ICMP Use Cases

There are many use cases that are able to demonstrate the benefits of a common operating picture. A few are detailed below.

Major Accident or Road Closure

Imagine a major arterial bridge being closed due to a bus fire. The initial tactical response is designed to keep people safe, to put out the fire, attend to any injured people and to get traffic moving again. But these events take time to deal with and have knock on impacts that cause a domino effect across the transport system. Situations like this require more than just a tactical response, they require a strategic approach.

TMPs strategic approach is to assess the wider impact of the event, identify the impacted public transport services and inform the service providers. Through integrated stakeholder communications the travelling public can be made aware of the transport issues. Additional capacity across other modes can be utilised with travellers guided to preferred alternatives.

This approach not only considers the localised impact but considers the knock-on effect to other modes as well as to those travellers not directly travelling through the impacted area but are affected by the secondary congestion it has caused.

In this use case, travellers are diverted to alternate modes such as ferries, bus companies are then notified of the additional demand getting passengers to and from ferry terminals. Communications also being sent out encouraging travellers who have not started their journeys to delay their trip. The impact is managed holistically across all modes.

Utility Works

Utility works on the road network can cause significant issues as a result of lost capacity. An improved approval process for these works and real time information sharing when the works actually start and stop can be extremely beneficial to managing the road network, but also to understanding how bus routes may be affected so that

operators can be informed and plan for the potential rerouting of buses. How do incident managers know not to reroute traffic down a road that will have roadworks starting in a few hours? As part of the impact assessment TMP provides operators with details of all impacted public transport services as well as the relevant contact details for those service providers.

As part of ICMP we support the planning process by providing visual impact assessment tools for any planned roadwork request. Any event is assessed against other known planned to assess if there is a greater combined impact. For example, to ensure that utility works does not occur at the same time and location as a major sporting event or concert.

Public Transport Disruption

Disruption to public transportation can have a big effect on the road network. Sharing of information about planned or unplanned disruption to public transportation allows road network operators to better manage the likely increase in traffic during that period. It allows them to plan the right alternatives in advance.

TMP provides templatised managed communications across a range of channels including social media and email. Live incident updates are pushed from TMP out to a range of stakeholders including other transport agencies and the travelling public using consistent standardised agency approved messaging.

Transit Travel Data

Transit travel data can provide significant insights into how busy buses and trains are. Not only does it help with planning of services and timetable adjustments, when planned or unplanned incidents occur this information can be used to inform potential impacts on other modes of travel as people change their travel patterns. It gives improved situational awareness of stations that are becoming overcrowded or services that are already full.

ICMP provides operators with information on capacity and traveller movements. This enables operators to implement more accurate responses such as supporting more accurate emergency bussing operations. ICMP uses this data to understand where people are likely to travel, bus availability, assignment and live location. In cases of incidents this understanding enables operators to put in place the correct transportation alternatives and then guide travellers to those alternatives.

Tactical Incident Management

Tactical Incident management is about helping people navigate through or around an incident (such as a tunnel closure). Understanding where people will arrive from and where they are going allows them to adjust their route well in advance to avoid the incident impacted area completely.

ICMP provides the situational awareness tools for operators to understand the impact. The rule-based response capability guides operators to manage the incident in accordance with agency preferred operational process. Simulations enable operators to then assess the relative benefits of alternate response plans to determine the best course of action.

Real Time Data

Real time data from buses and their adherence to schedule can be used as a potential source of incident detection. A bus that comes off its schedule by a significant amount in a short period of time could be an indication that it is in an area of congestion or an incident.

ICMP supports real time location visualisation of all Public transport vehicles through the common operational picture. Both GTFS and SIRI protocols being supported. Adherence to schedule is also tracked and late running services are visually identified on the common operational picture.



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