



Gulf Region ITS (2021)

Applying Real-Time Performance Measures to
Optimize our Transportation Systems

Bob Edelstein

Performance Measures

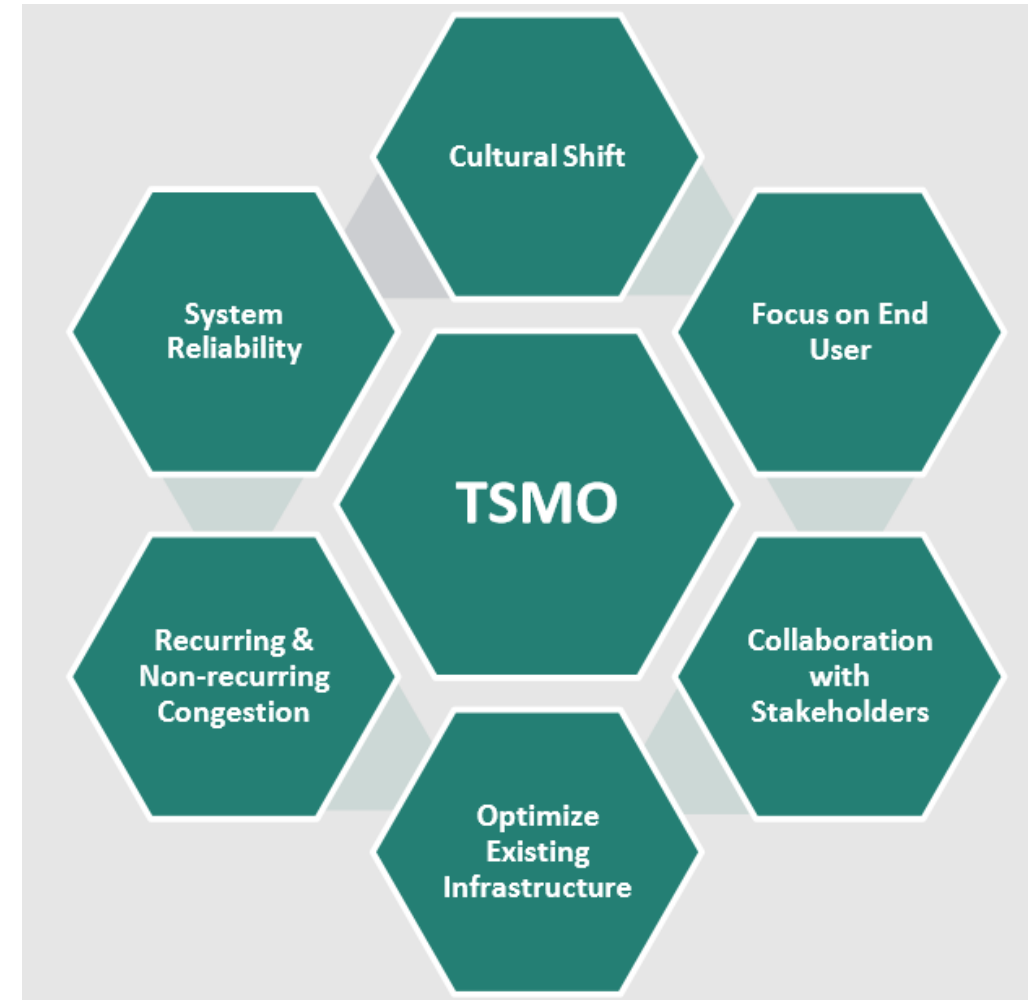
Current State of the Practice	
Transportation Planning	Ranking, Prioritization
Traffic Engineering	Benefit-Cost Analysis
TMC Operations	Real Time Performance Measures
TMC Operations	Predictive Analytics (Big Data)

Transportation Systems Management & Operations (TSMO)

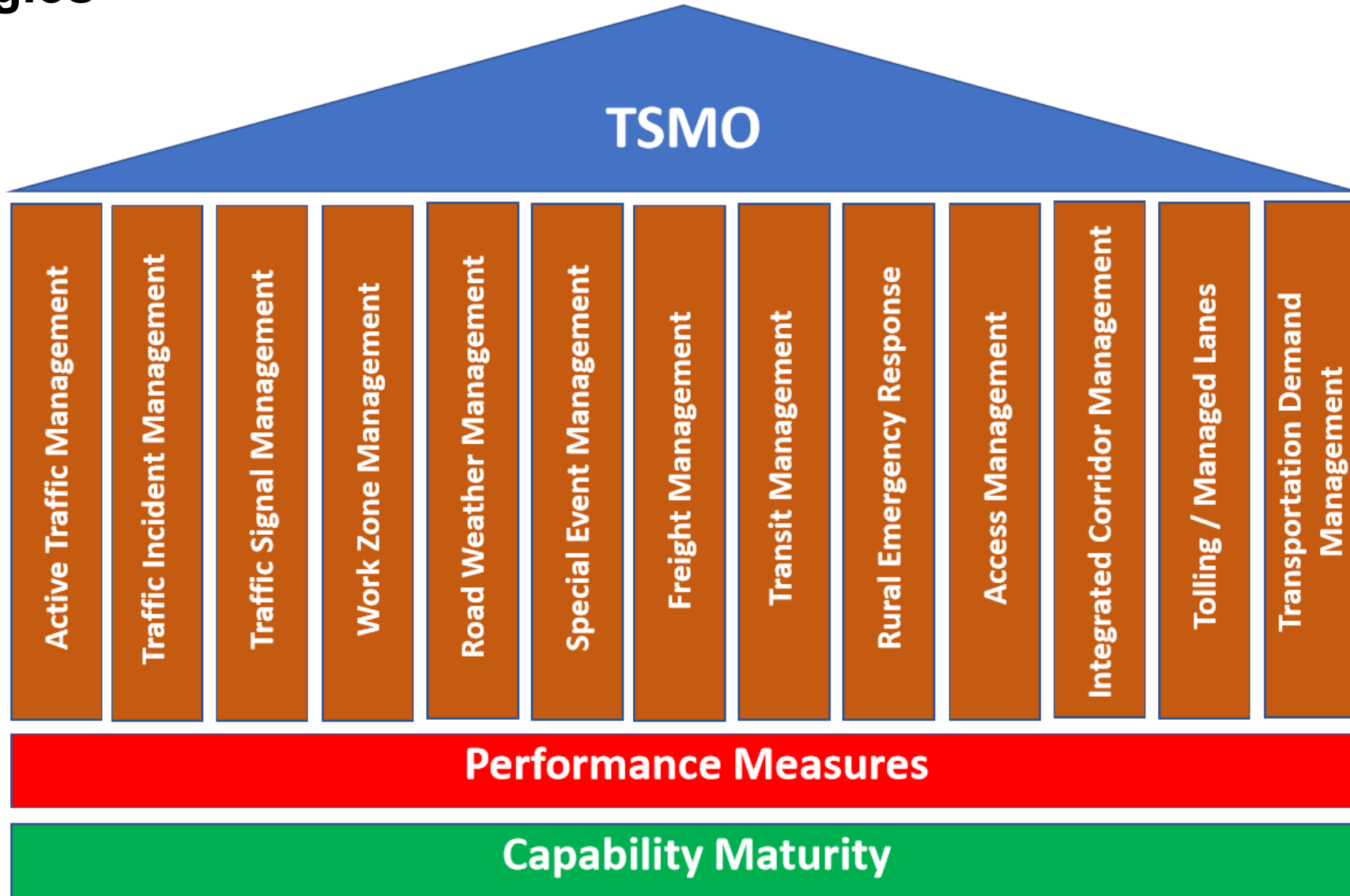
Federal Legislation (“MAP-21”)

Transportation Systems Management & Operations (TSMO) Definition:

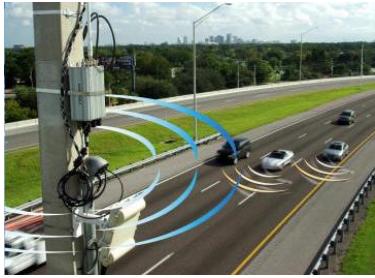
“Integrated strategies to **optimize** the **performance** of existing infrastructure through the implementation of **multimodal** and intermodal, **cross-jurisdictional** systems, services, and projects designed to **preserve capacity** and improve **security, safety**, and **reliability** of the transportation system.”



TSMO Strategies



Emerging Technologies



Connected Vehicles



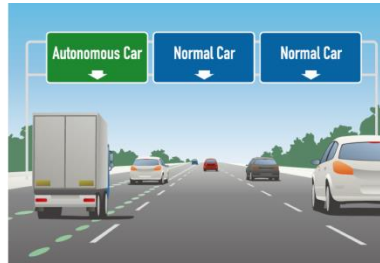
Mobility on Demand



Smart Mobility Hubs



Enterprise Data Mgmt



Automated Vehicles



Road User Charging



Smart Signals



Flex Zones



EV Charging



Pedestrian-Bike Apps

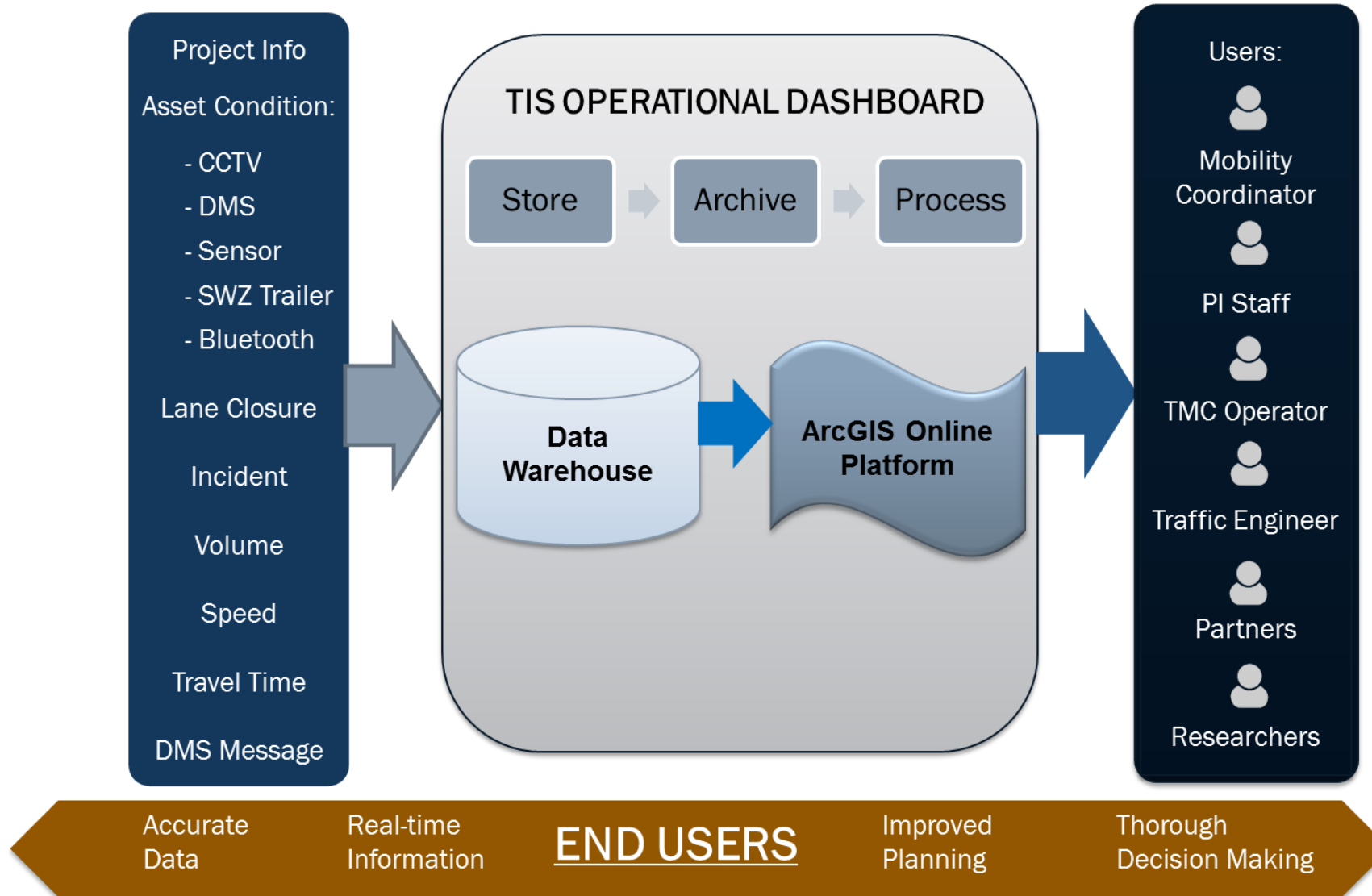


Automated Buses



Smart Cities Integration

Big Data

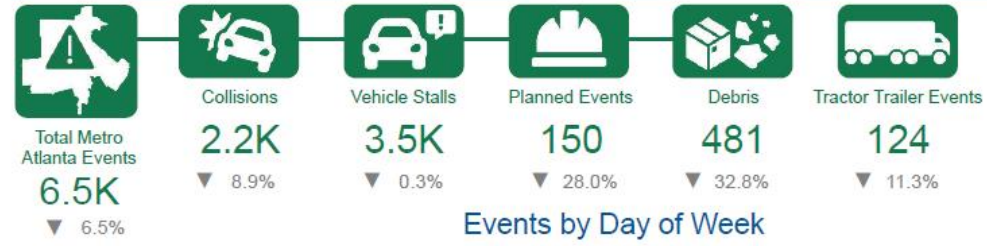


Performance Measures

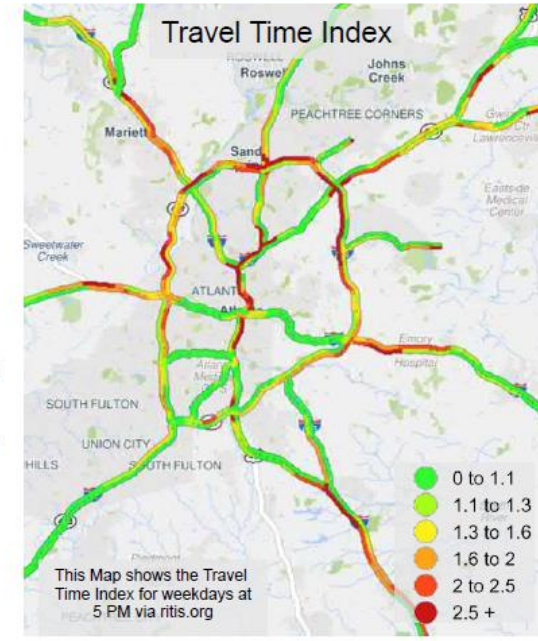
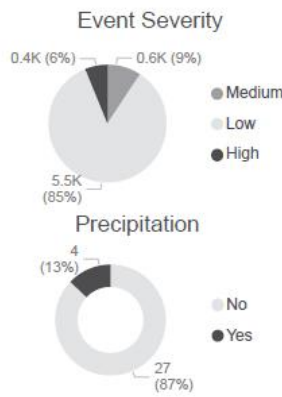
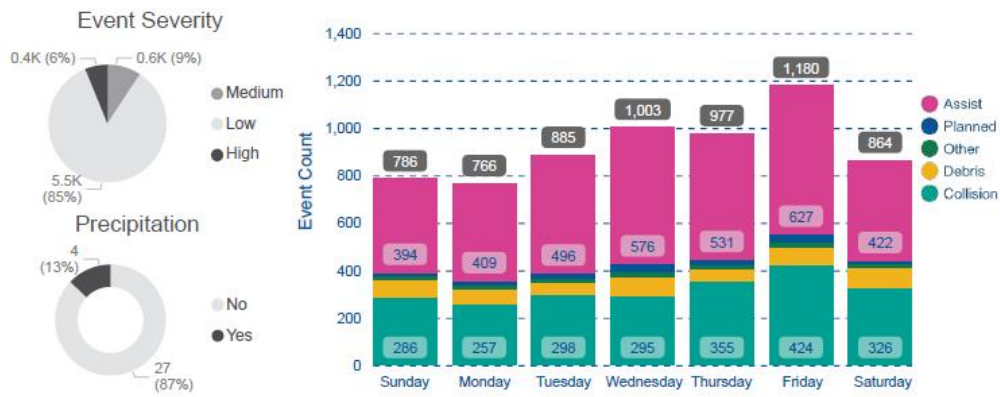
- Type of Events & Frequency
- Travel Time Reliability
- Asset Uptime Availability
- Emissions Savings
- Benefit-Cost Ratio

Report Compiled By: **AECOM**

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Events by Day of Week



Number of Monitored Incidents	Number of Managed Incidents	Number of Signal Timing Changes	Average Incident Duration (Min.)	Benefit-to-Cost (B/C)	Net Benefit Value
76	35	30	111.3	3.97	\$223,699

Performance Measures

- Dashboard Portal
- Notifications & Alerts
- Pattern Identifications
- Predictive Analytics
- “What If” Simulations



Bottleneck Management

Active Arterial Management

Safety

System Availability

Work Zone Management

Data Collection

Asset Management

Multimodal Applications

GIS Layers

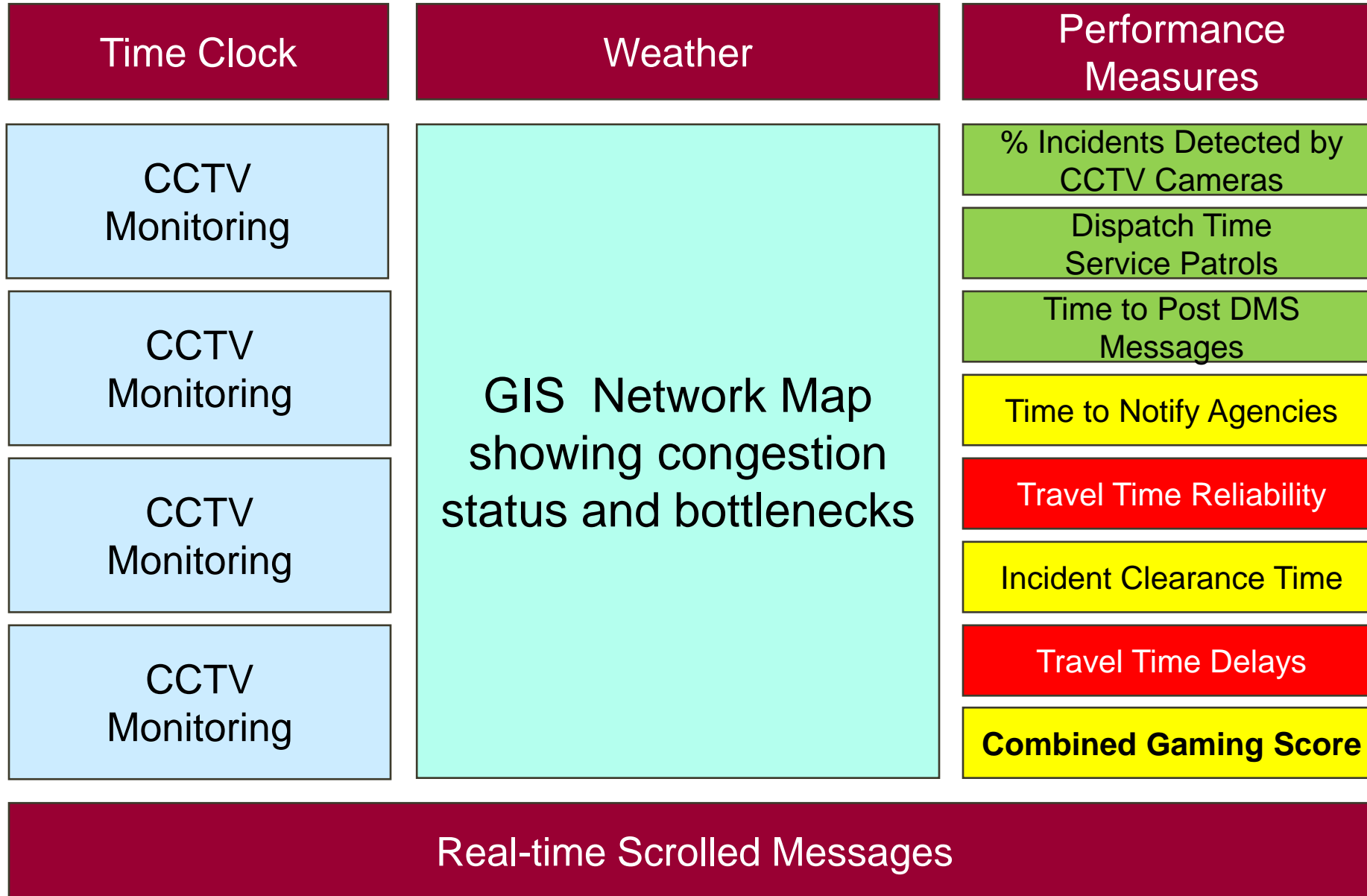
Performance Measures



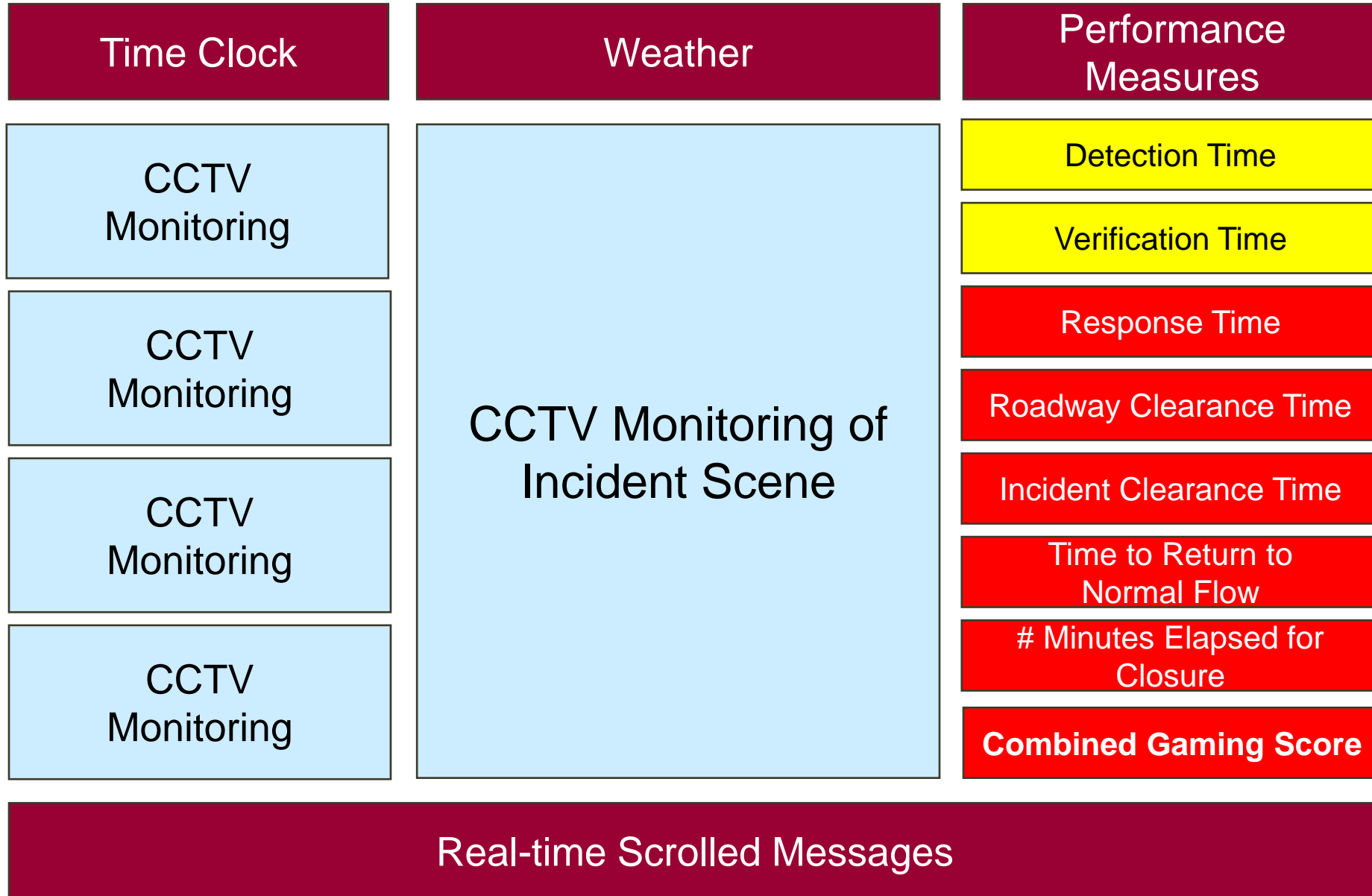
Gamification

Summary of Points for RTMC Operators								
Performance Measure	Max Points	RTMC Operator 1		RTMC Operator 2		RTMC Operator 3		
		Individual Points	Team Points	Individual Points	Team Points	Individual Points	Team Points	
Output Metrics	Dispatch Time: Service Patrols	15	10	--	15	--	10	--
	Time to Confirm an Event	15	10	--	15	--	10	--
	Time to Post DMS Messages	15	10	--	15	--	10	--
	Time to Notify Other Agencies	15	15	--	10	--	10	--
Outcome Metrics	Travel Time Reliability	5	--	5	--	5	--	5
	Incident Clearance Time	10	--	10	--	10	--	10
	Arterial Travel Time & Delay	10	--	5	--	5	--	5
	Express Lanes Reliability	10	--	8	--	8	--	8
	ITS System Availability	5	--	5	--	5	--	5
Subtotal		100	78		88		73	

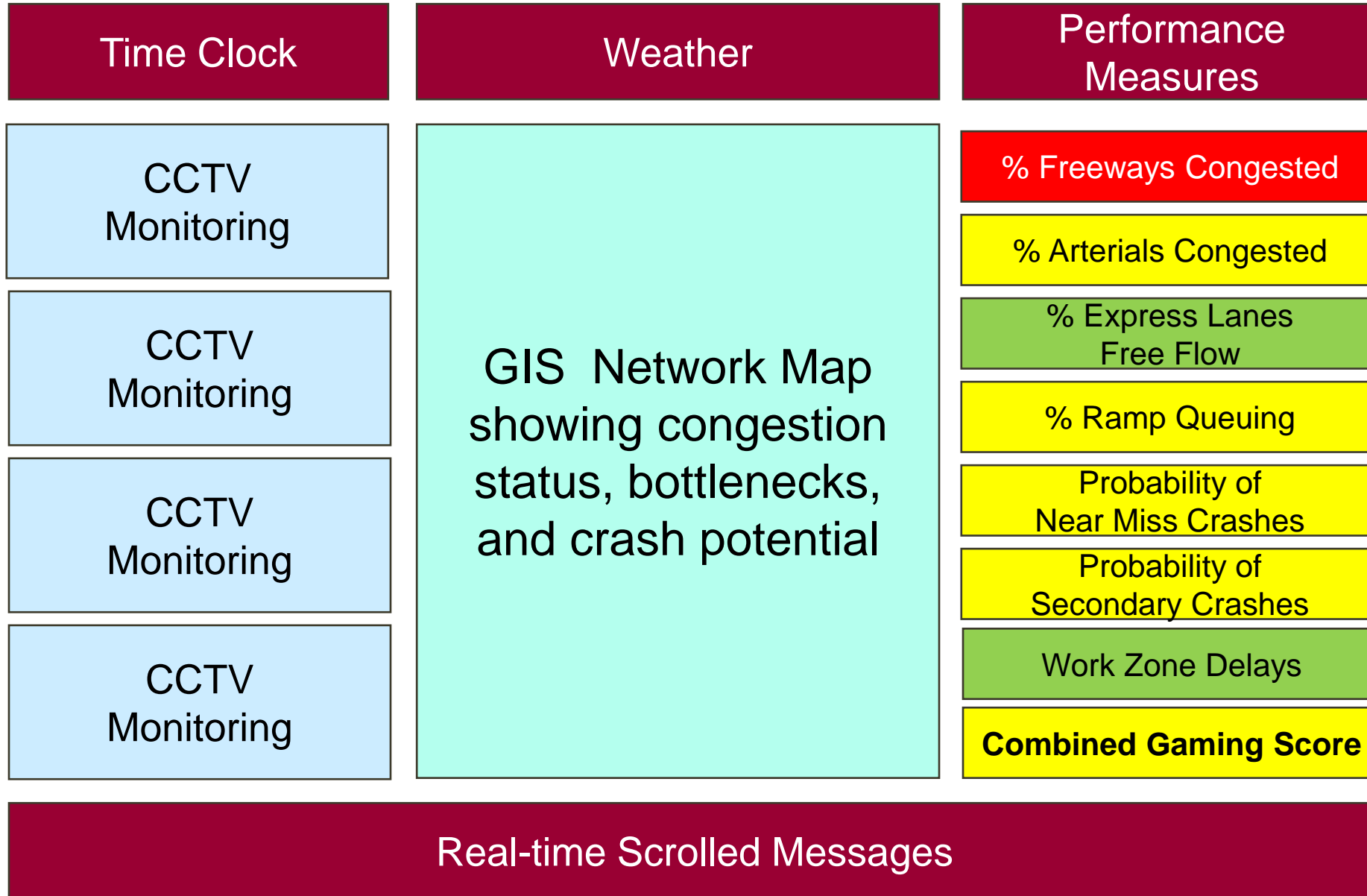
Video Wall Management: Normal Operations



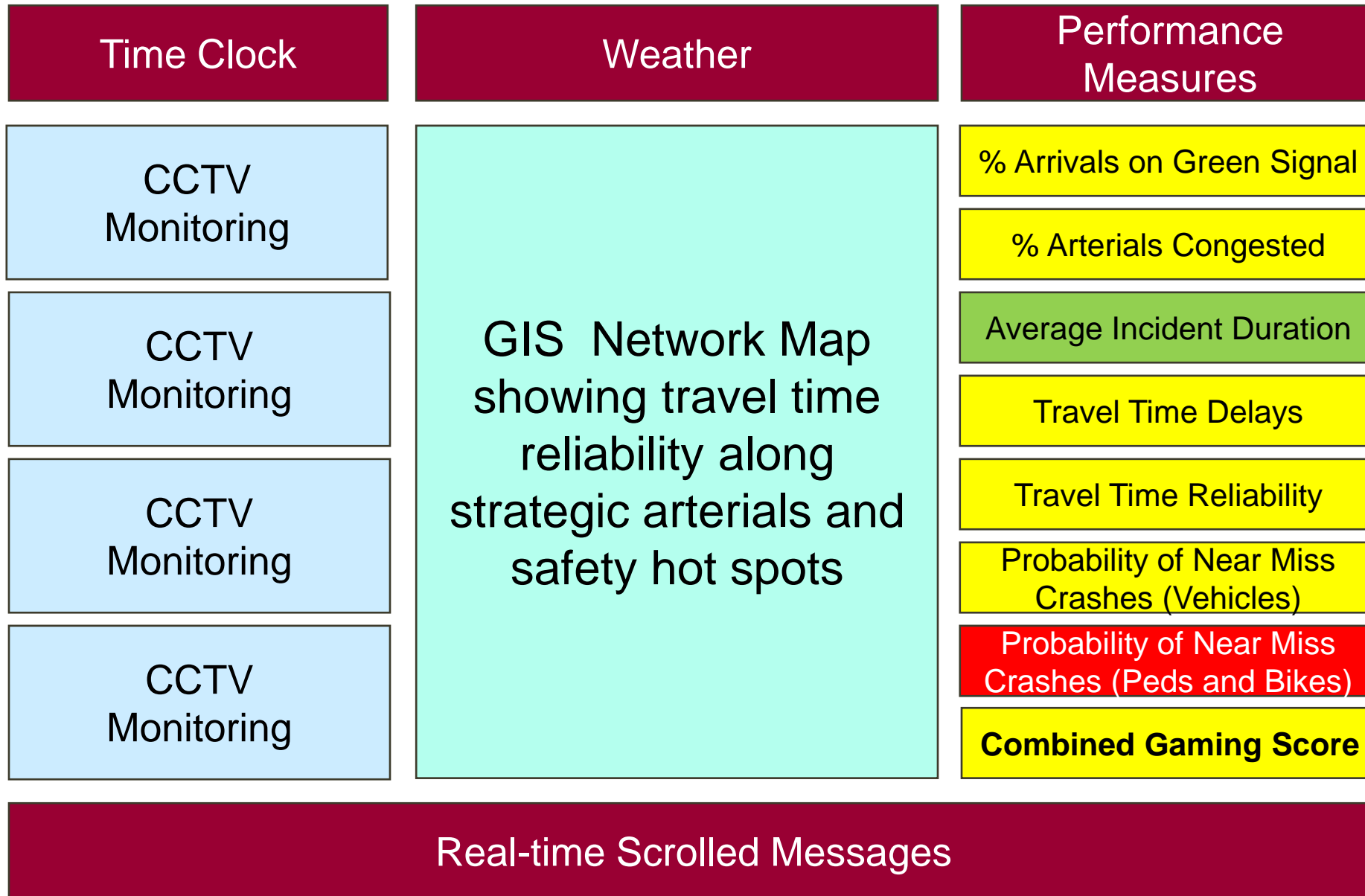
Video Wall Management: Incident Management



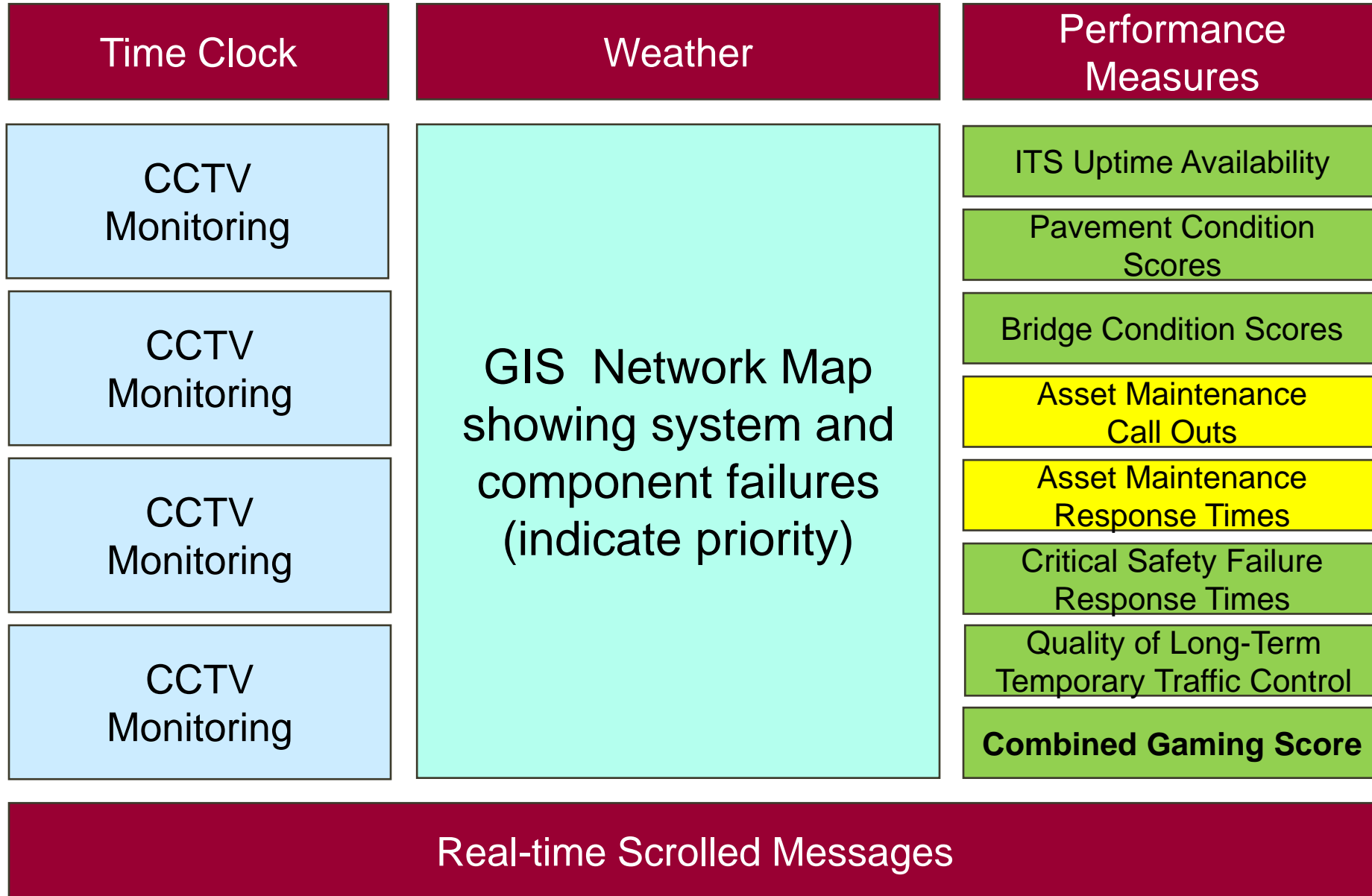
Video Wall Management: Traffic Analysis



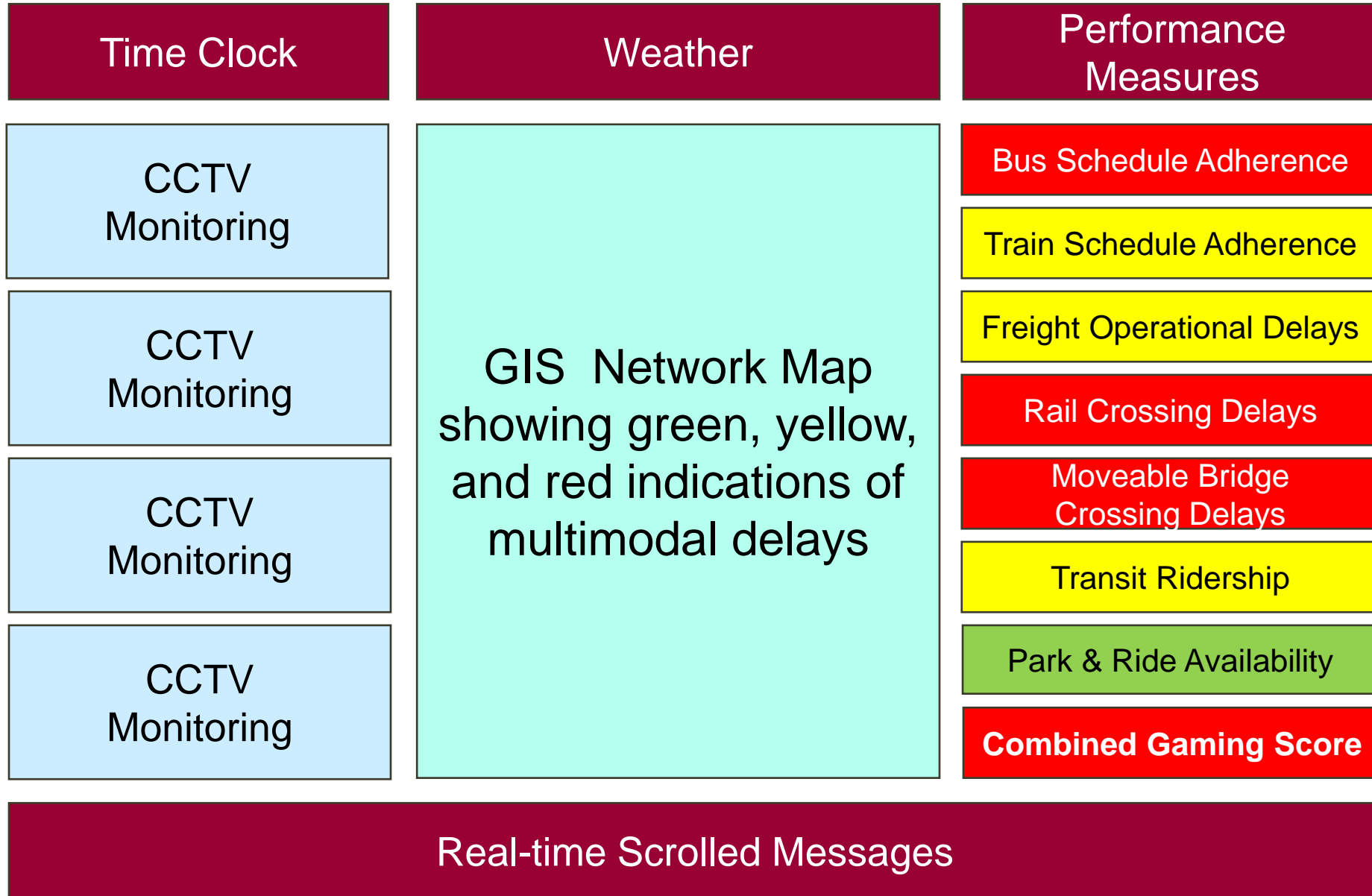
Video Wall Management: Active Arterial Management



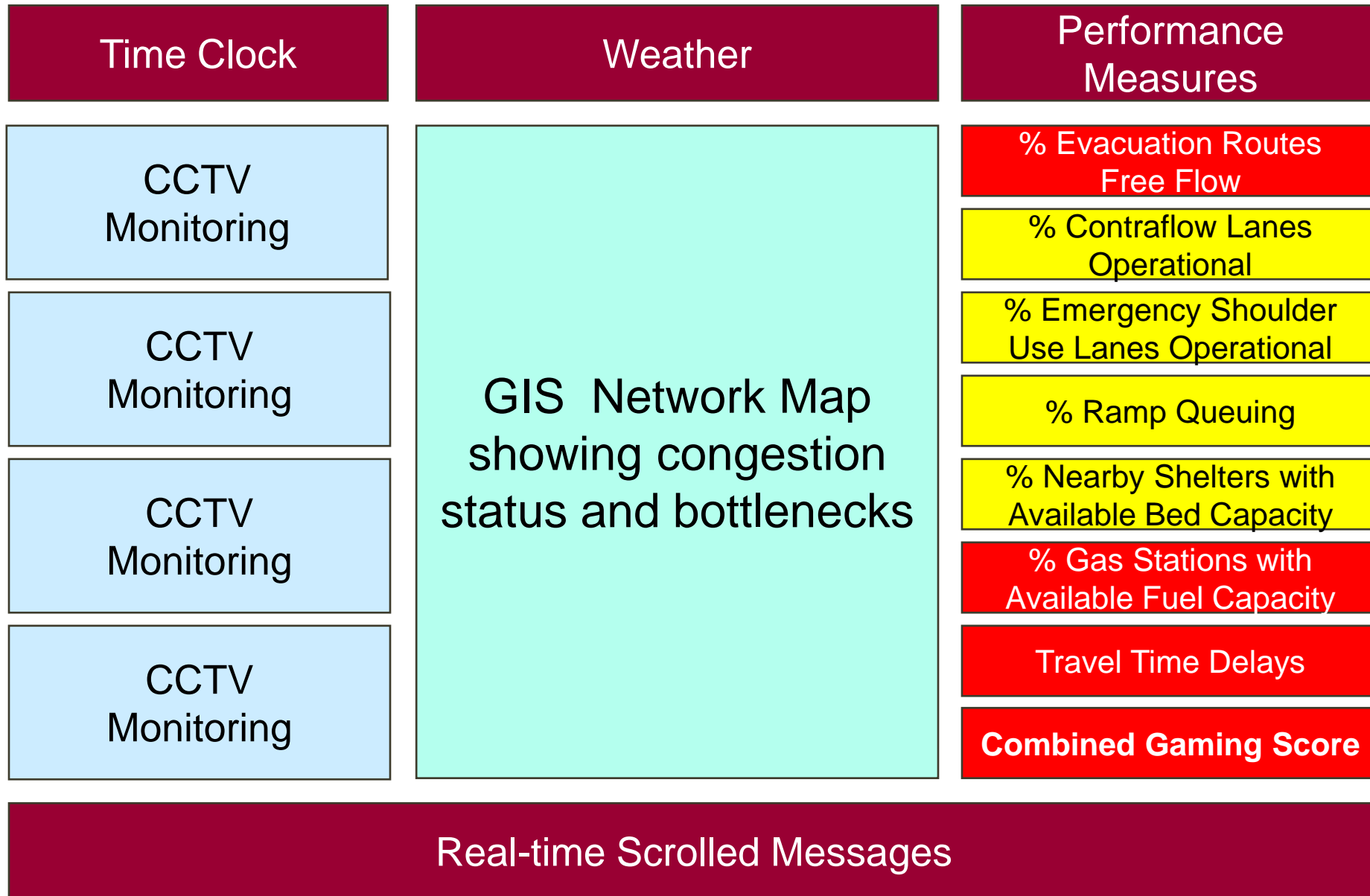
Video Wall Management: Asset Management



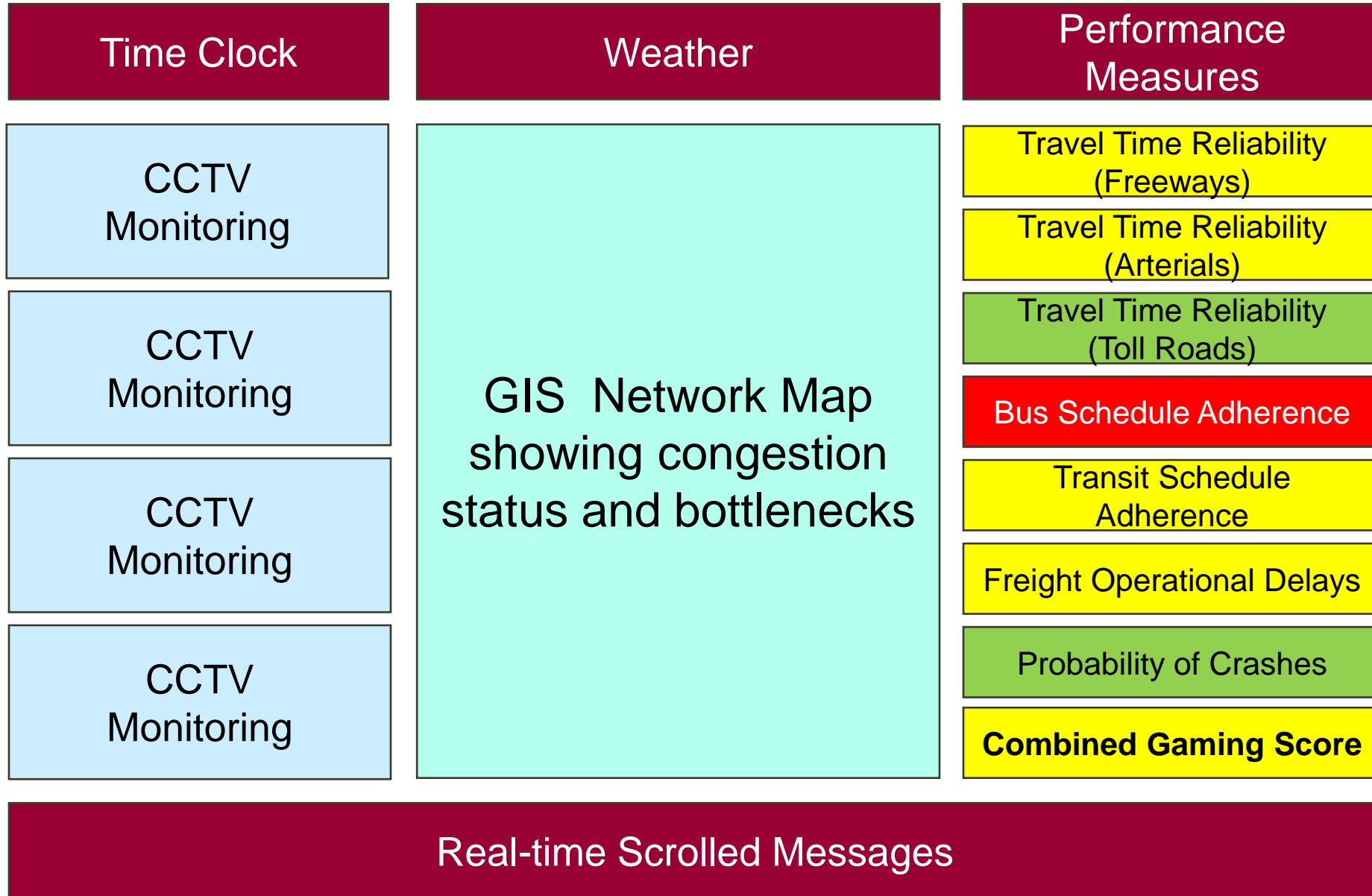
Video Wall Management: Multimodal Operations



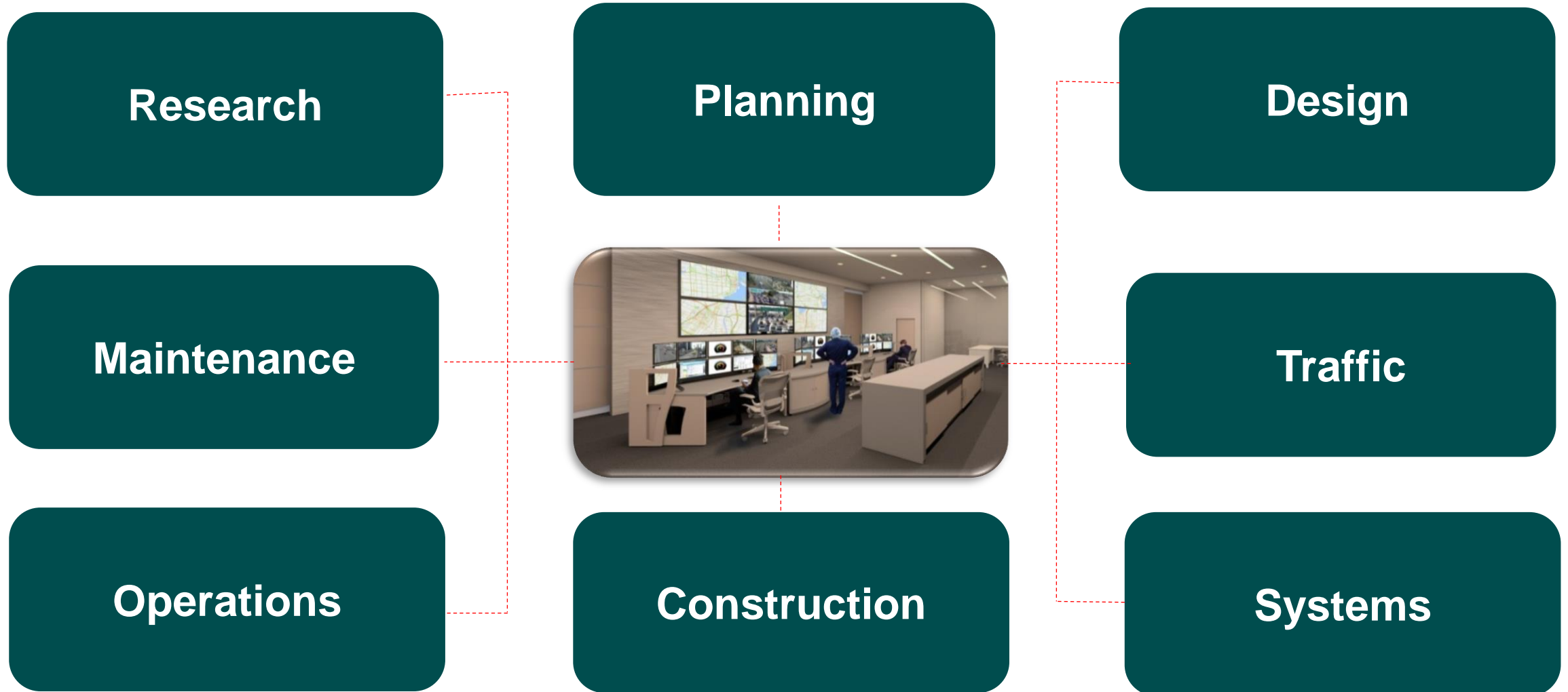
Video Wall Management: Emergency Management



Video Wall Management: High Profile Visitors

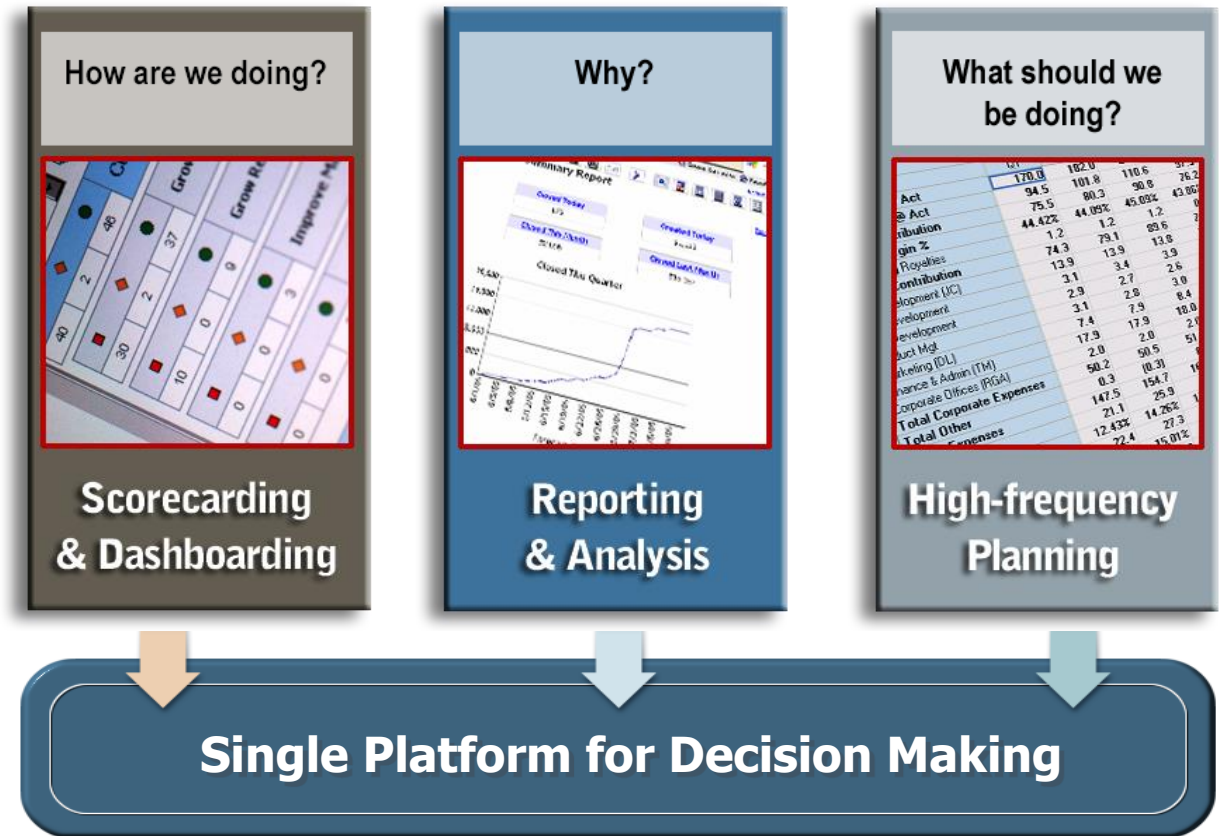


Remote Workstations



AI / Machine Learning

- Predictive Analytics
- Performance Targets
- Automated SOPs
- Apply Best Practices
- Digital Twinning



AI / Machine Learning



AI / Machine Learning: Traffic Safety

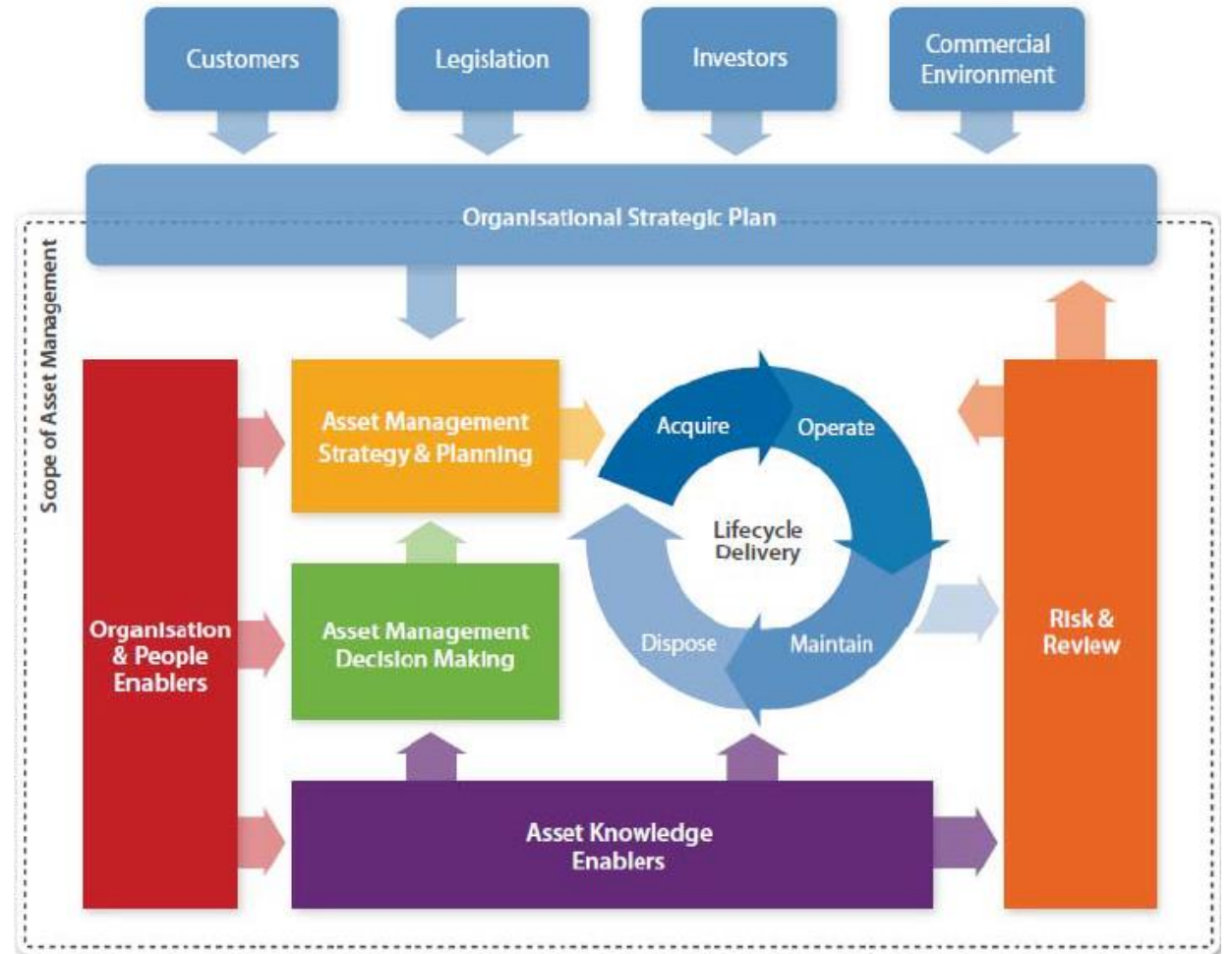
- Near Miss Algorithms
- Predict High Crash Sites
- Dynamic Heat Maps
- Identify Root Causes
- Low-Cost Solutions



DOTs typically analyze historic crash data over the most recent 3-5 years to analyze high crash locations and develop safety recommendations.

AI / Machine Learning: Asset Management

- Data Collection
- Detect Deficiencies
- Prioritize Repairs
- Replacement Programs
- Optimize O&M Budgets



AI/Machine Learning can leverage nanotechnology to collect, analyze and predict pavement and structural cracking.

AI / Machine Learning: Freight Logistics

- Optimize Routes
- Optimize Schedules
- Drayage Operations
- Bundling Pods
- Automation



Ai/Machine Learning has significant potential applications in optimizing freight operations.

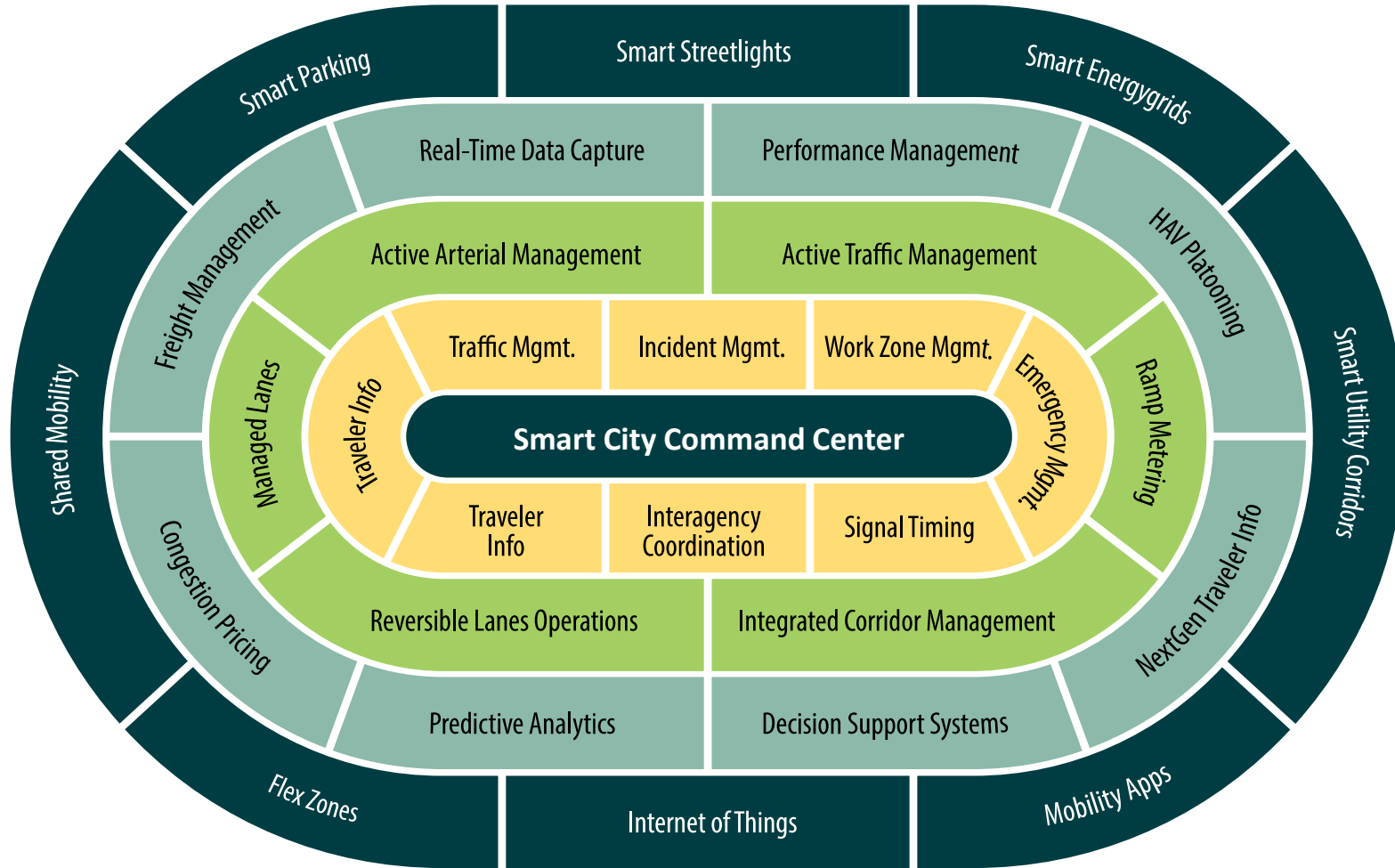
AI / Machine Learning: Congestion Pricing

- Supply & Demand
- Generate Revenue
- Multimodal Strategy
- Infrastructure Lite
- System Optimization



While congestion pricing has been in operations in Singapore, London, and Stockholm for many years, it is beginning to gain traction in certain US cities.

Summary



- TMC of the Present
- TMC of the Future
- CAV Applications
- Smart City Command Center

Thank you.