SMART
OPERATIONS

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SMART OPERATIONS

Advanced Mobility Analytics group's (AMAG) Safe Mobility Alert Real Time (SMART) Digital Platform, offered via Software as a Service (SaaS), is designed to provide analytics and insights for transportation management, operations, and planning. Using video analytics, AI, econometric models, and Deep Learning, the SMART platform benefits from more than a decade of research, refinement, testing, and validation with 23 city customers across 8 countries globally. Crashes are estimated to have been reduced between 20% and 60% as verified by AMAG predictive analytics. These learnings over the past 15 years are embedded in SMART, allowing the road safety community to proactively manage safety on their transport networks.

At the heart of SMART, Operations (OPS) is a product that supports transportation operations and safety. The Module helps support efficient operations and prevent crashes by alerting engineers, motorists, and traffic management facilities to optimize the network operation for 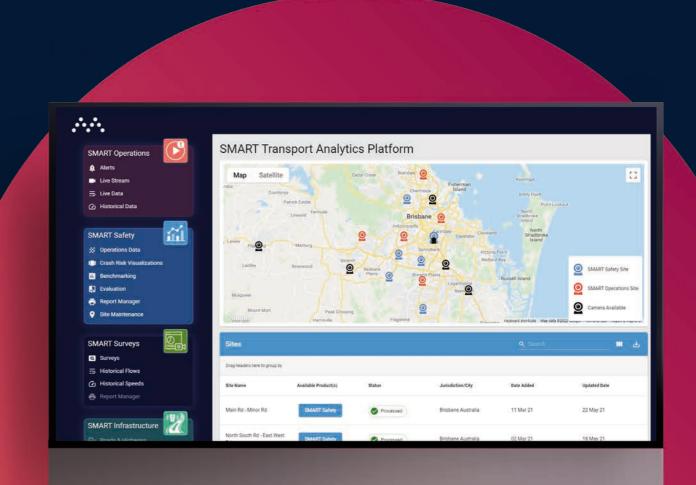improved safety. SMART Operations tracks trends and events involving different road user classes (e.g. pedestrians, bicyclists, passenger cars, commercial vehicles, buses, etc.) of interest to and configured by the network operator. Trends are tracked over 15-minute intervals, whereas events are tracked immediately, in real time. In addition, the operations module monitors and records road user flows by movement type, speeds, and violations in real-time by mode-share (Cars, Trucks, Motorbikes, Buses, Pedestrians, and more) and stores them for later access.

SMART Operations is useful for customers wishing to:

- Continuously monitor metrics including flows, speeds, violations, and critical conflicts
- Receive alerts when monitored metrics are 'unusual' compared to historic operations
- Provide additional AI support for Traffic Management Centre operations
- Deliver exception-based reporting and management of site performance
- Customise and automate alert management
- Observe live streaming of sites, speeds, and flows
- Record, log, and assess alerts across the network hourly, daily, weekly, monthly, etc
- Configure and alert individuals, teams, regarding event management through a variety of management actions
- Use AI to background monitor operations of a network

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Software as a Service (SaaS) architecture

AMAG's digital platform is built for the cloud with mobile-first design in mind and uses cutting-edge technologies ready hosted and available on the cloud for customers just a few clicks away. AMAG's SaaS application does not require the deployment of large computing infrastructure at a client's location, rather it is designed to work with a variety of platforms anytime and anywhere. AMAG's SaaS solution also provides a highly scalable application with exemplary computi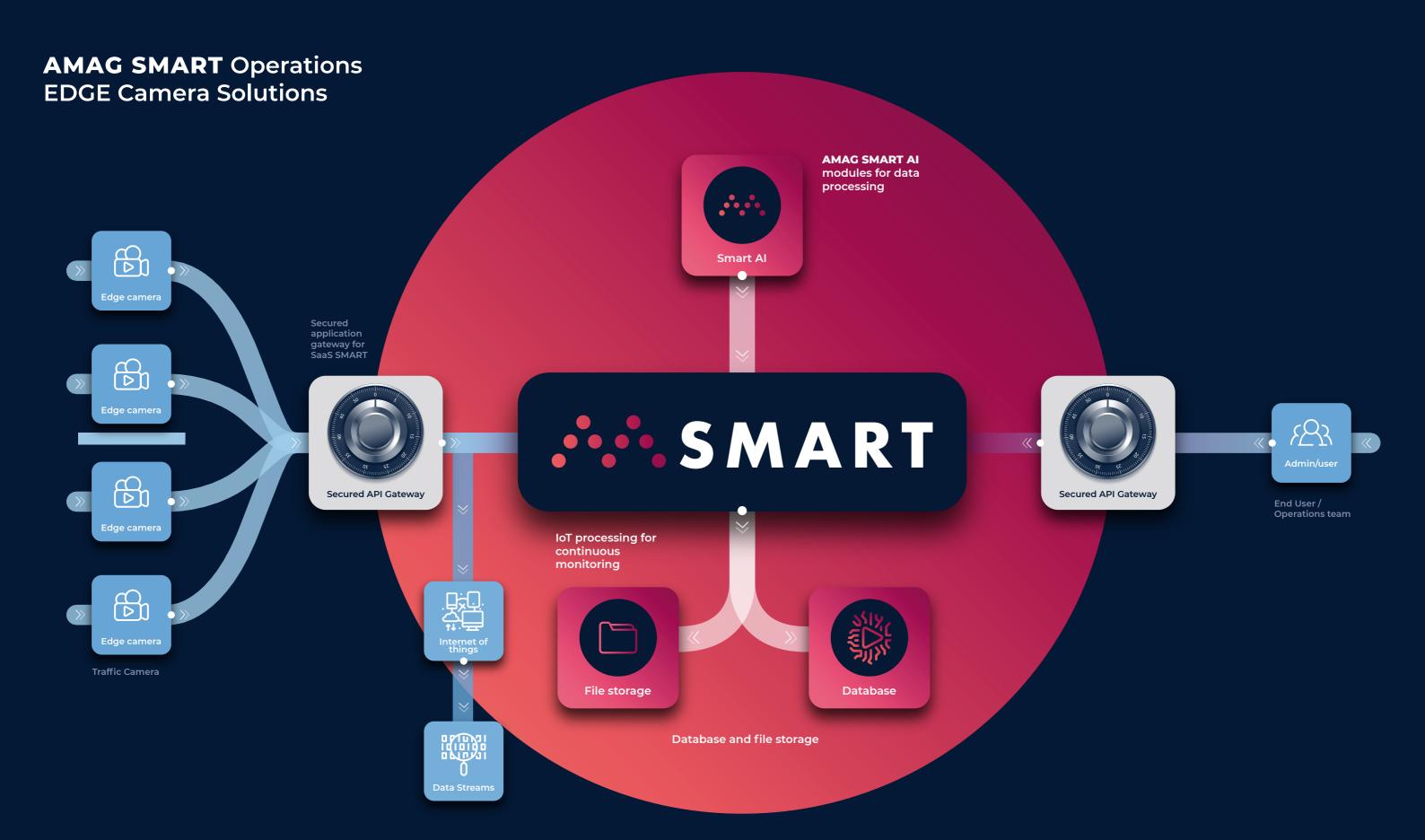ng performance. It is constantly available and able to process data of any size and supports excellent rendering, data querying, and various transactions. The platform is designed with security in mind, as it ensures data security and integrity in every layer of the software. The AMAG Software as a Service enables you to:

AMAG's digital platform is capable of hosting on any cloud platform. It is developed using ASP.Net Core and Python for RESTful APIs and microservices. Front-end frameworks such as REACT, Bootstrap, and jQuery are primarily used for user interface (UI) development. Its data layer is capable of using any relational database such as SQL, Oracle and Postgres. For Artificial Intelligence (AI) and Machine Learning (ML) microservices Python is being used. The solution is broken down into multiple web apps and microservices so that can be hosted into multiple cloud platforms. The AMAG SMART PLATFORM is combined with the following key components. Security components include: identity management (for authentication and login using standard, Single Sign On (SSO) and OAuth (Open authorization)), supports both cookie and Jason Web tokens (JWT), access management (Role and Claim based), and security logging for insights and threat detection. Video analytics and trajectory data components are designed to feed video streaming data to cloud storage and contain a microservice to process streamed video for trajectory data extracts. The enterprise applications component is a logical placeholder for a range of web applications such as SMART Safety, Operations, Survey, Infrastructure, and Pavements. AI and ML microservices operate in this layer that runs independently as a background process also manageable through AI web application interface.

AMAG SMART Operations
EDGE Camera Solutions

AMAG SMART AI
modules for data
processing

Smart AI

Edge camera

Edge camera

Edge camera

Edge camera

Traffic Camera

Secured
application
gateway for
SaaS SMART

Secured API Gateway

SMART

IoT processing for
continuous
monitoring

Internet of
things

Data Streams

File storage

Database

Database and file storage

Secured API Gateway

Admin/user

End User /
Operations team

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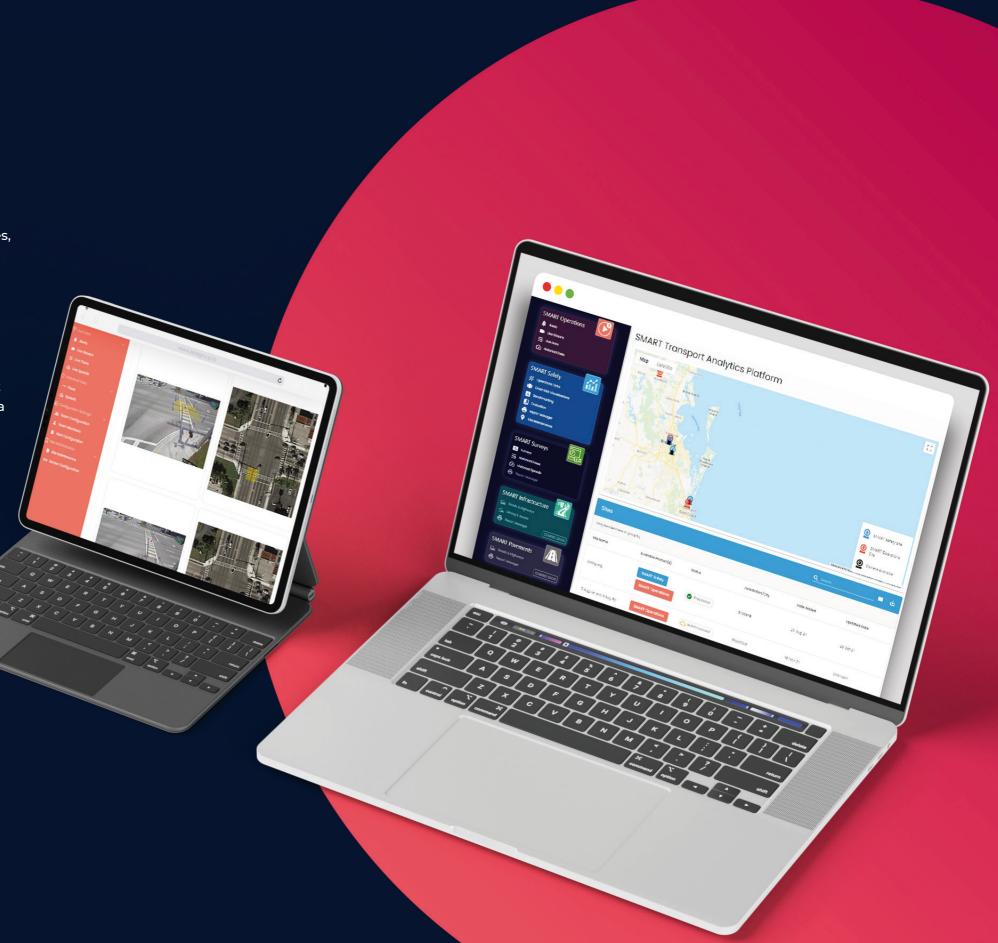# License Configuration & Site-Level Data Input

OPS incorporates nearly two decades of research and development and uses advanced video analytics with AI, Deep Learning, and Advanced Econometrics techniques to measure and detect a variety of interactions among road users (e.g. vehicles, pedestrians, bicyclists, etc.) as well as operational aspects of a site, so that site operations can be improved., continuously, and in real-time.

OPS makes use of edge processing and cloud to deliver low-cost, low latency analytics to SMART, which is hosted in the AWS Cloud.

OPS `SMART Operations is delivered as a SaaS platform—minimizing IT overhead and

ensuring that customers receive regular, high value feature updates, security and bug fixes, and can provide feedback.

Locations are added for SMART Operations (and Safety) through a customised interface for a particular site. General site-level information is required to support the analysis and is input through a user-friendly interface.

Camera Calibration at a site is managed through Site Maintenance, to enable alignment of camera data with site characteristics referred to as homography.

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Alerts

Alerts are the cornerstone of OPS, which enables transport network operators to continuously monitor the network with instant notifications as they occur in real-time. Historical alerts are filterable under time and days - configured to user preference. Safety-related alerts enable improved network safety and operations management. All alerts are configurable within OPS and can be directed to a dashboard in Traffic Management Centres (TMC) via email and or call to staff within the organisation to engage in remedies. Meetings can also be coordinated into response to alerts, as well as requesting a site undergo a Safety Evaluation, providing a variety of alert management options.

Pre-crafted messages to Variable Message Signs (VMS) via the system or system operator managing these signs and to connected vehicles via the ground operators communicating

with connected vehicles. The SMART Operation alerts are fundamental in supporting network operations.

Alerts are provided via a couple of different dashboards within the SMART Operations module - a map-based interface and a list-based interface to suit. The map-based interface (see map figure) shows all of the monitored sites within a region and displays a list of sites with safety or operations parameters operating outside of user-defined parameters. Additionally, for prompt responses an ALERT shortcut is included to provide
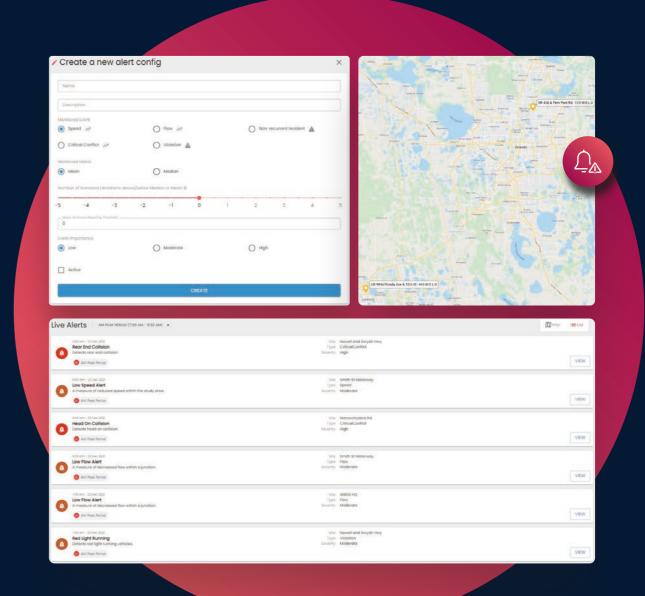
The intent of safety-related alerts is to provide system operators rapid feedback on abnormal operations and safety of monitored sites within a network. Ideal candidates for SMART Operations monitoring, therefore, are sites with complex operational conditions, which includes but is not limited to:

- High-volume signalised

intersections with a large number of active road users

- Complex mid-block locations with high road user conflicts or ingress/egress issues

- Signalised intersections with unusual design constraints, such as skew angles, 5+ approaches, etc.

- Roundabouts with a large number of active road users

- Intersections of roads and shared-use paths

- Railroad crossings with a large number of active road users

- Complex merge and weaving areas

- Other complex, highly saturated interaction sites

SMART Operations continuously monitors speeds, flows, violations, and crash risk and sends alerts when any of these operational or risk indicators are operating out of 'normal' ranges. Whilst the
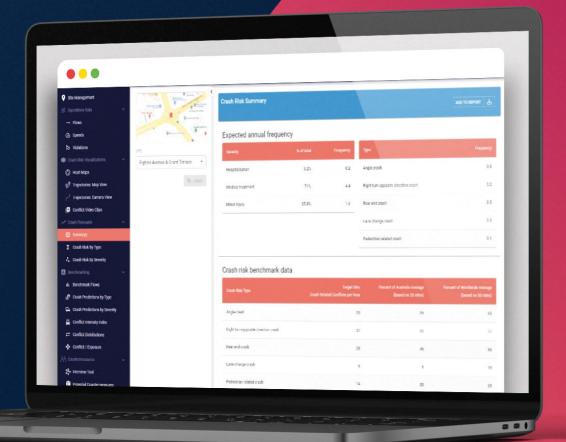
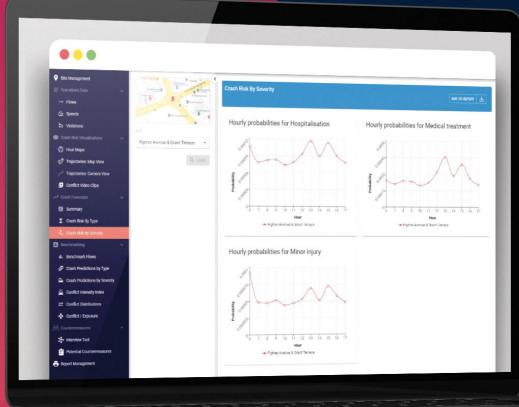alert dashboard provides summaries of these alerts, supporting dashboards are used to provide more detailed information at the site level. Users can toggle between MAP and LIST view of intersections with active alerts, based on the selected comparison period.

For all alert generations under the speed and flow events, the most recent

'similar' period is used. The SMART Operations module will compare the current 15 minute ending period to all historical comparable time intervals. For example, 9:00 to 9:15 am on Tuesday would be compared to the average of all 9:00 to 9:15 periods from previous Tuesdays. Other monitored events are generated independently upon occurrence.

The SMART Operation Alerts List View generates a list of sites with current and recent ALERTS. It describes the type of risk and also shows a history of prior alerts. From this LIST view (or from the MAP) view, site details can be accessed by clicking on the site (or map icon in MAP view).

SMART OPERATIONS
as Gateway to SMART Safety

When operations of a site are chronically challenged, as evidenced by repeated Alerts, it may be prudent to conduct a deeper, more insightful analysis. As the SMART OPS is focused on operations actions (via alerts of various types) and to support signal timing optimization (an AMAG product offering or stand-alone optimized signal timing plans), SMART Safety is focused to support longer-term safety investments such as site configuration changes, striping, median designs, pavement condition improvements, signing, and striping, as examples. The safety insights provided by SMART Safety are focused on safety management and planning investments, while the SMART OPS is focused on operational performance, and is a useful screening tool for triggering the need for SMART Safety analysis. As a control measure, SMART OPS include a recommended Safety analysis, particularly when crash risk or operational issues are sustained. Thus, the SMART OPS serves as an ideal gateway to SMART Safety.

SMART Video Analytics Products Use-Cases

Use Cases for across the Transport Enterprise	SAF	OPS	SUR
Accurate ID and tracking of multiple road users	O	O	O
Flow and turning movement by road user class	O	O	O
Treatment evaluations (before/after & with/without)	O		
Alert-based operations and risk reporting		O	
Continuous, real-time operations and risk monitoring		O	
Travel demand screen-line calibration support			O
Intersection and corridor modelling support			O
Blackspot evaluation and management	O		
Complex site operational and risk assessments	O	O	
Speed studies and assessments		O	O
Incident detection and management		O	
Risk and operational diagnosis and countermeasure ID	O		
Asset inventory and condition assessment			
Pavement condition typology and assessment			

To book a demonstration of the Enterprise SMART SaaS Platform please go to our website **www.amagroup.io**

Advanced Mobility Analytics Group Pty Ltd (AMAG) aims to be the world leading provider for proactive Transport analytics and management, applying more than 70+ years of cumulative road safety knowledge to develop the only complete Transport management suite of modules from Safety, Operations through to Infra-structure. Using Video Analytics, Artificial Intelligence (AI), Deep Learning, and Advanced Econometrics, AMAG has solved the challenge of predictive analytics for road safety, and during the past decade the founders have proven the methodology and technology through research, refinement, testing, and validation with 23 cities across 8 countries.

AMAG is focused on what we do best, road operational and safety insights through the best analytics solu-tions, developed by the best people. To de-liver the best end-to-end SaaS Solution to road safety practitioners, we are partnering with the absolute best technology providers and engineering consultancy service providers across the globe.

Find out more https://amagroup.io

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