Lanternn by Valerann™

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Redefining Roadway Operations

Our transportation systems are facing multiple challenges with higher fatalities, increasing greenhouse gas emissions, and limited deployment of lifesaving technologies.

Road traffic operators are challenged with identifying smart solutions that deliver on sustainability goals through CO_2 emission reduction and meet multiple road safety criteria by both increasing road safety and minimising accident casualty rates.

The answer to the above lies in improving road operations efficiency through enhanced roads monitoring, and proactive roads management, including preventive incident measures, traffic flow optimisation by influencing travel patterns. These quality improvements come from efficiently processing the exponentially growing volumes of real-time data drawn from a multitude of floating data sources (smartphones, social media, connected cars, etc.).

What is Lanternn by Valernn™?

Lanternn by Valerann™ is a data analytics engine for Advanced Traffic Management. It enables road and network Operators to leverage diverse mobility data to make better decisions.

It integrates a wide variety of real-time and historic data, which is stored, organised and fused to produce relevant and reliable insights about the road. These insights enable Operators to make better, data-driven decisions, in order to increase road safety, efficiency, sustainability and future readiness.

Through cutting-edge data fusion, AI and Machine Learning algorithms, Lanternn by Valerann™ is able to provide a holistic, integrated and real-time view of roads and networks including:

- Alerting of events and incidents

- Traffic flow status (speed, count and density)

- Current and forecast weather conditions

- Road context (topology, infrastructure locations)

- Live CCTV cameras

- Resource monitoring, such as patrol locations using GPS tracking

- Accident risk profiling and prediction

Lanternn by Valerann™ can be adopted as a data-only solution that can integrate with other ATMS or analytics platforms, or it can be used via one or more of our User Interface modules (see below).

What challenge does Lanternn by Valerann™ overcome?

Today, the majority of the world's roads are not actively managed, which has a significant negative impact on safety, congestion and the environment.

It is estimated that each year:

1.3M

PEOPLE ARE KILLED ON THE ROADS WORLDWIDE
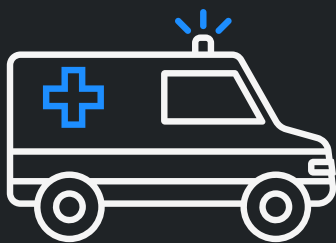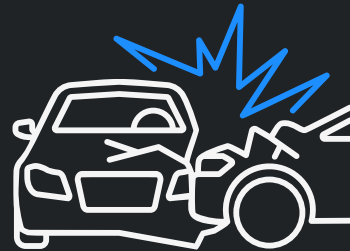
50M

PEOPLE ARE INJURED ON THE ROADS WORLDWIDE

That corresponds to 3,500 fatalities every day, including 500 children: an unacceptable human, economic and social cost for our societies.The cost of road traffic accidents in most countries is estimated at 3% of their GDP.[1]

1. FIA and WHO facts - https://www.fia.com/road-safety, https://www.who.int/news/item/28-06-2022-united-nations-to-act-for-global-road-safety

Road traffic injuries remain an important public health problem at global, regional, and national levels; hence, improving traffic safety by introducing Intelligent Transport Systems (ITS) is a real game changer worldwide.

Operators rarely have complete visibility of the road due to a lack of resources or insufficient camera, radar or other ITS coverage. This limits even their ability to make an impact.

There are a range of modern, innovative data sources and technologies that could address the cost, resource and coverage gaps, and which could make Traffic Management possible for many more roads and networks. But this is largely under-utilised due to a lack of trust. The size, complexity, opacity and disparity of the data that can be accessed for roads is so great that Operators continue to fall back on the existing, manual activities and tools in which they have certainty to make decisions.

Lanternn by Valerann™ overcomes this 'trust-gap'. It increases the certainty and actionability of the extensive and under-valued data related to roads, enabling data- driven Traffic Management possible, for a price that is accessible and that provides a return on investment.

What benefits does Lanternn by Valerann™ provide Operators?

By increasing access to and the actionability of data, Lanternn by Valerann™ empowers road and network Operators to make better decisions related to traffic management, both in real-time and for strategic planning. This provides a range of operational benefits, such as:

- Improved situational awareness
- Reduced time to incident detection and clearance
- Better proactive action plans and rapid response
- Reduced congestion and journey times
- Ability to reduce OPEX and CAPEX
- Increased road user satisfaction
- Increased market share and revenue opportunity
- Streamlined internal operational processes
- Reduced human error and 'blind' decision-making
- More intelligent use of resources and investment
- Better internal collaboration and external stakeholder communication
- Reduced environmental impact

What are the modules of Lanternn by Valerann™?

The main module of Lanternn by Valerann™ is our proprietary, real-time Fusion Engine. This is the analytics engine that generates data insights, following an integration of available data sources. The Fusion Engine can be adopted as a stand-alone, data-only solution, where the insights are accessible via our APIs. Any external integrator (ATMS) or data analytics platform can utilise these APIs to ingest, action, query, report upon or analyse the Fusion Engine's insights.

In addition, Lanternn by Valerann™ offers advanced modules that can be paired with the Fusion Engine. These modules offer User Interfaces that are specifically designed to maximise the usability and actionability of the Fusion Engine's insights, without any additional effort or external platforms. They optimise how Operators interact with Fusion Engine insights and provide additional tools and features to achieve improved operational efficiency.

Monitor

Fusion Engine
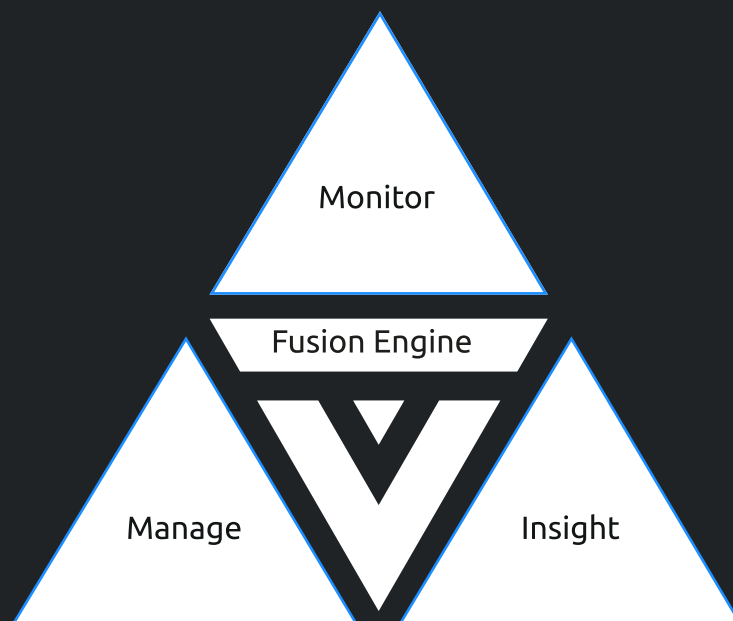
Manage   Insight

Fusion Engine

The Fusion Engine is the data analytics brain of Lanternn by Valerann™, which produces Advanced Traffic Management insights. It works by:

- Ingesting data from any integratable data source, including CCTV cameras, sensors, radar loops, GPS assets, ITS assets (e.g. VMS), floating car data, weather data (Accuweather, Tomorrow.io), navigation apps (Waze, Google, Mapbox), Social Media, websites, local data centres, etc.

- Organising the ingested data into a data lake, with a common structure for time and location attributes, enabling all data points to be related through space and time.

- Processing, analysing and fusing the ingested data using Machine Learning, AI and Computer Vision algorithms - taking into account business rules, thresholds and processes defined by each specific client.

- Outputting real-time insights related to traffic management, to power operational and strategic decision-making and workflows. These are then stored to enable retrospective analysis and reporting.

The insights produced by the Fusion Engine, dependent on the specific road/network, available data sources and use case requirements, include:

Road/Network status and conditions
- Traffic flow (speed, count and density)
- Journey times

- Closed roads, lanes or entry/exit points
- Infrastructure status and health
- Active work zones/roadworks
- Patrol/on-road resource locations and status

Events

- Accidents
- Hazards (e.g. Stopped Vehicles, Pedestrians, Cyclists and
- Animals)
- Wrong-way driving
- Traffic anomalies
- Current/forecast adverse weather conditions (e.g. rain,fog, snow, ice, storms)
- Areas of reduced visibility
- Air quality alerts
- Anomalous journey times
- Queues and congestion

Risk Profiling
- Historical accident zone modeling
- Near-miss and harsh-breaking hotspots
- Elevated accident risk zones (in real-time)

Traffic Management actions
- Auto-identification of nearby resources
- Automatic CCTV controls
- Pre-defined incident response workflows

The Fusion Engine can provide 100% data coverage of the road, with advanced visibility in areas with CCTV, radar, or other sensor installations. The granularity of the insights provided improves with more data source integrations.

Module 1: Monitor

The Monitor module of Lanternn is the UI gateway to the insights produced by the Fusion Engine. It organises, prioritises, visualises and alerts of insights to provide a holistic view of the road or network area, to enable Traffic Management.

Features include:

Live Map - Add or remove static and dynamic, real-time data layers in order to understand traffic flow, risk and weather conditions relative to each point on the road, as well as the location and status of installed ITS and patrol resources.

Automatic Event Detection - Operators are alerted of important traffic, weather, risk and other events detected within the road or network, or predicted to occur. Events are scored based on severity, likelihood and confidence. They can be filtered and organised based on their attributes.

Automatic Event Validation - Instant access per event to video replays from nearby cameras or dashcam images and other analytics to enable the nature and impact of the event to rapidly be assessed.

Live Cameras - Access directly all real-time CCTV cameras. Search for video replays from a specific point in time for any camera. Cross reference their location with the road context and traffic/weather conditions.

Weather Conditions - Observe average and localised weather conditions, both current and forecast, including temperature, precipitation, humidity, wind speed, visibility, etc.

Module 2: Manage

As an extension of Monitor, the Manage Module 'closes the loop' by empowering Operators to take a response to automatically detected events and the road/network status. It provides insights and tools to streamline and automate operational processes and enable effective communication with internal and external stakeholders, including drivers.

Features include:

Back-office Event Management - Through a hybrid of automatic and manual data capture, rapidly log key information about an event and the steps taken to respond. Create a full audit trail, with time, date and user tracking. Upload images, video and other files. Generate PDF and Excel reports. Assign a User as the responsible Operator.

Information Sharing- Distribute the details of an event or disruption to stakeholders and drivers using one-click integrations with MS Teams, Slack, Whatsapp and email clients. Inform road-users using social channels, such as Twitter and Waze, or by updating integrated VMS.

Automated Resource Profiling - Identify in real- time the most appropriate resources to leverage in incident response: confirm the nearest available patrol; identify upstream VMS to alert drivers approaching the affected area; pin CCTV streams with visibility of ongoing disruptions.

Automated Workflows - Trigger pre-defined automated workflows and action plans in response to real-time conditions and events: alert emergency services; control ITS resources, such as VMS and CCTV; dispatch patrol vehicles;

Module 3: Insight

Alongside Lanternn by Valerann™'s more real-time interfaces (Monitor and Manage), the Intelligence module provides an Business Intelligence interface through which the accrued insights generated by the Fusion Engine, as well as all back-office Event Management data, can be analysed and reported upon.

Features include:

Traffic Analysis and Forecasting - Compare historical averages, actual and predicted traffic metrics, including speed, count, journey times and density. Cross-reference traffic behaviour with archived and predicted events, as well as actual and forecast weather conditions.

Event Detection Reports - Monitor the trends associated with the type, time and location of events, relative to traffic and weather conditions. Identify Event hot-spots and conduct root cause analysis to identify factors leading to Event peaks.

KPI Reports & Dashboards - Instant access per event to video replays from nearby cameras or dashcam images and other analytics to enable the nature and impact of the event to rapidly be assessed.

Report Builder - Tailored to specific client needs, use cases, challenges or areas for investigation, develop reports and analytics tools for monitoring, business analysis and planning, leveraging the full insights of Lanternn by Valerann™'s data lake.

Which Use Cases can Lanternn by Valerann™ be used for?

Lanternn by Valerann™'s Insights can be used to power a range of Traffic Management related use cases. The following is a non-exhaustive sample:

Safety Management - Increase visibility and reduce detection time for events occurring on the road, to minimise disruption, improve response and increase safety. Leverage risk profiling to mitigate the probability of an accident or incident occurring.

Market Share Optimisation - Understand the relationship between traffic conditions and driver behaviour/road usage, including comparisons with competing route, in order to optimise market share opportunity.

Resource Optimisation - Manage Traffic Management resources, such as patrol vehicles and ITS (VMS, CCTV) versus risk profiles and real- time events, traffic flow and weather conditions to increase their effectiveness.

Congestion and Emission Analysis - Analyse and monitor traffic flow behaviour and the environmental impact, versus air quality KPI's, to develop mitigations strategies.

Operational Automation - Transform Traffic Management procedures using insight-powered decision making, automation and advanced tools, to reduce error, increase scalability and increase

Lanternn by Valerann™

Delivers best in class data fusion with precise events cross-validation, events prioritisation thus providing certainty for road operators, helping them to maximise road operations efficiency, increase road safety and achieve their KPI's.

How can Lanternn by Valerann™ add value to an existing ATMS?

Whilst Lanternn by Valerann™'s advanced modules are designed to be used as a stand-alone Advance Traffic Management solution, our data-only Fusion Engine can also be integrated with any other ATMS or analytics platform.

Whilst other ATMS may be able to integrate data sources and/or allow Operators to manage their ITS resources, Lanternn by Valerann™ can offer additional value and capabilities:

Data Fusion - Rather than providing individual integrated data streams, Lanternn by Valerann™ cross- references, analyses and processes a multitude of data sources to output a 'single source of truth'. This single source offers a greater degree of certainty, avoids noise or duplication and alights new insights that would otherwise be hidden.

Hardware agnostic- Any ITS hardware, such as CCTV, radar loops, VMS and others, regardless of make, model or data hosting can be integrated and will benefit from our AI, Machine Learning and ComputerVision algorithms.

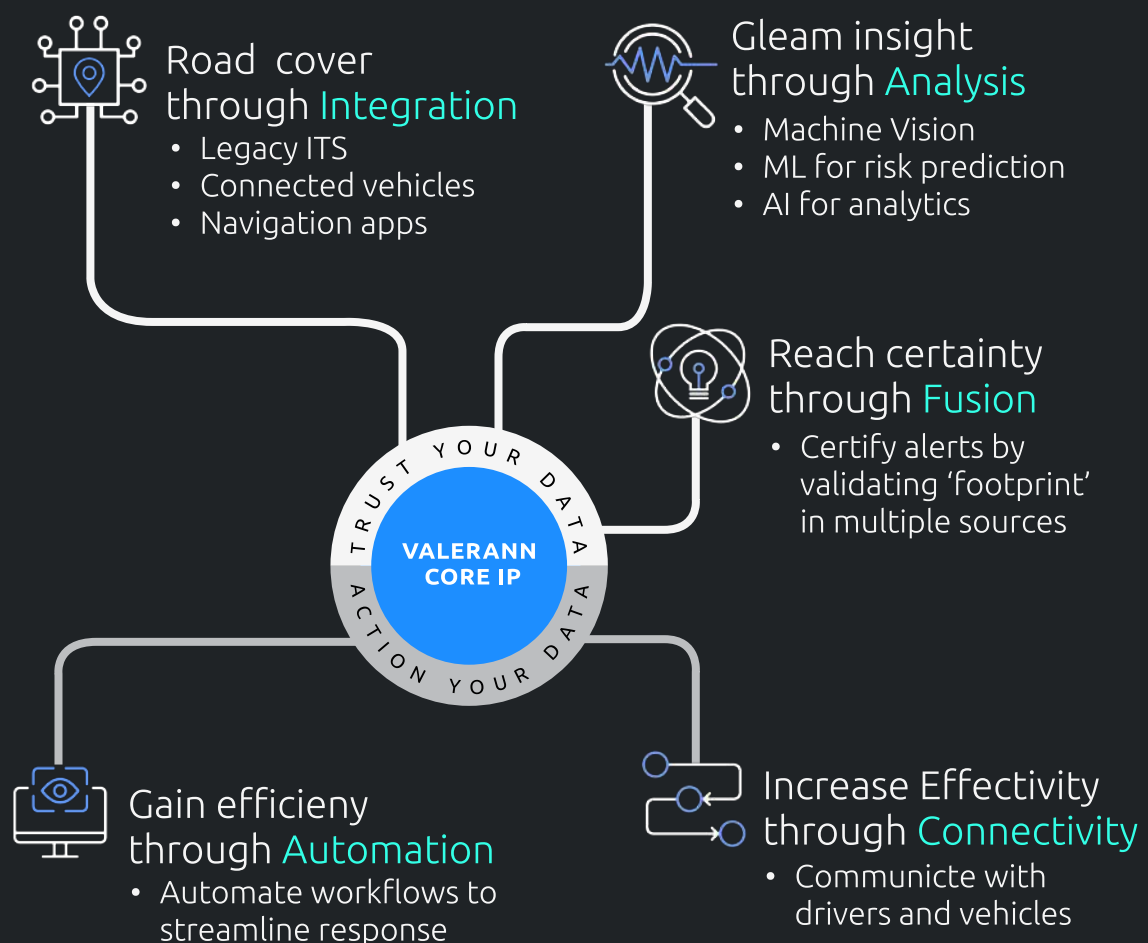Consistent data structure - We organise the raw data ingested by Lanternn by Valerann™ consistently in terms of space and time, making it simple to analyse and process data that is usually disparate. This even includes CCTV video and images, which Lanternn by ValerannTM is able to convert to a GIS definition, in order to plot each pixel to a specific point on a map.

New Data Sources - With existing partnerships and integrations with a range of modern data providers, including Floating Car and Connected Vehicle Sources, Lanternn by Valerann™ increases road coverage to 100%, complimenting pre-installed infrastructure and hardware solutions.

Business Rules - Alongside Lanternn by ValerannTM's Machine Learning algorithms, the insights output by the Fusion Engine can be tailored to each clients specific needs, thresholds, KPI's and use cases, ensuring focus and relevance.

Predictive Alerting - Lanternn by Valerann™ combines historic and real-time data to not only provide the current traffic, weather and road conditions, but also to forecast important upcoming events and state, including risk profiles.

Road cover through Integration
- Legacy ITS
- Connected vehicles
- Navigation apps

Gleam insight through Analysis
- Machine Vision
- ML for risk prediction
- AI for analytics

Reach certainty through Fusion
- Certify alerts by validating 'footprint' in multiple sources

TRUST YOUR DATA
ACTION YOUR DATA
VALERANN CORE IP

Gain efficieny through Automation
- Automate workflows to streamline response

Increase Effectivity through Connectivity
- Communicte with drivers and vehicles

VALERANN

POWERED BY DATA. DRIVEN BY INSIGHT.