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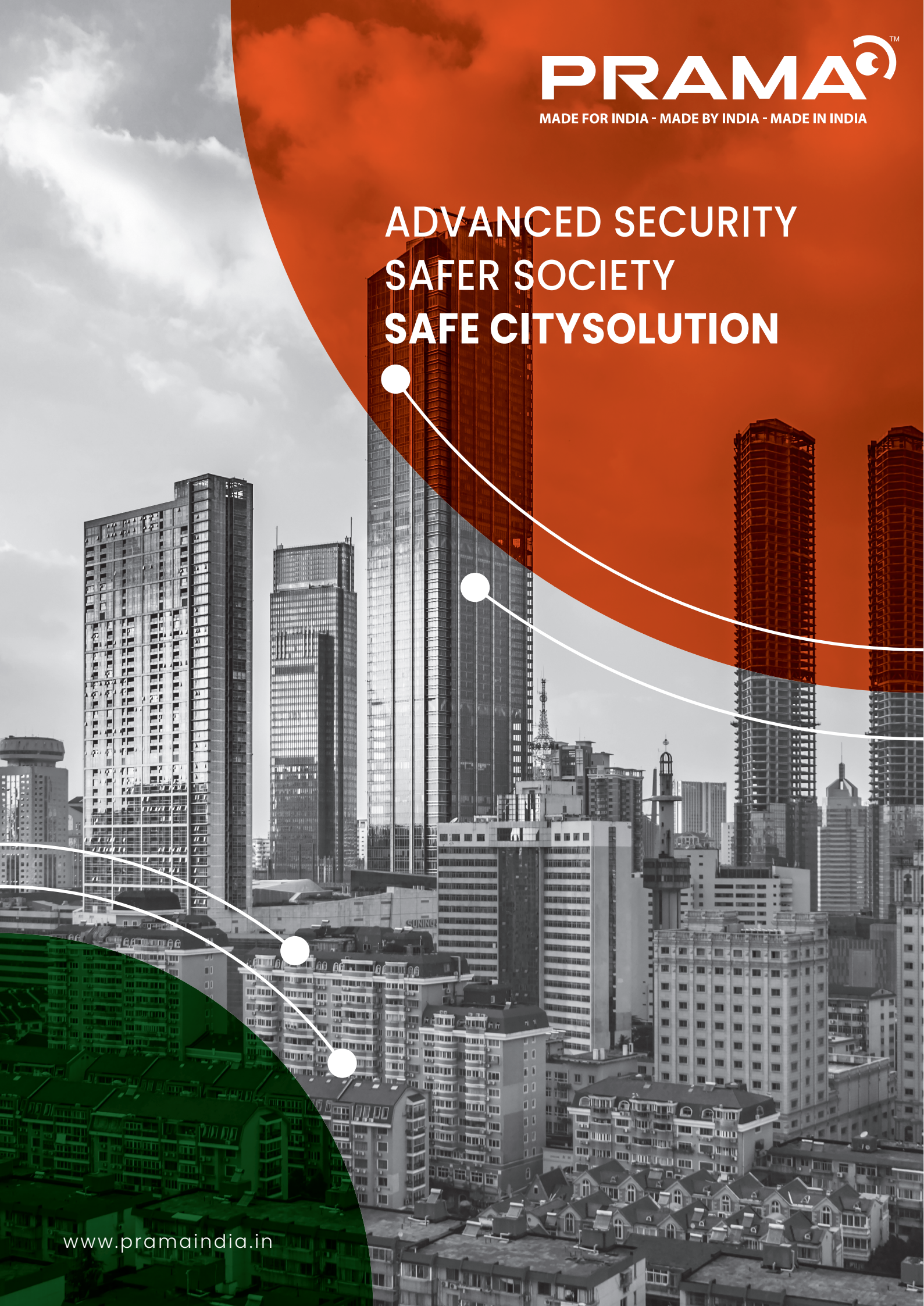
ADVANCED SECURITY
SAFER SOCIETY
SAFE CITYSOLUTION



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SAFE CITY SOLUTION

The Prama Safe City Solution provides sound, stable, and reliable municipal security. It features a series of advanced technologies and various security subsystems to safeguard industries, centralize operations, and integrate security platforms. These integrated technologies enable rapid and effective responses to security needs and events. All componentry, software, and services in the Safe City Solution reinforce public administration, improve people's lives, and boost substantial, long-term development.

PRAMA's Safe City Solution features:

- Data collection with front-end processing, entrance & exit control, ID verification, under-vehicle surveillance, alarm linkage, and smart linkage;
- Personnel protection, forensic investigation, vehicle surveillance, parallel analysis, video patrol, and information retrieval;
- Status analysis, comprehensive assessment, preventive measures, data relationship mining, centralized security footage, and valuable statistics.

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THREE DEVELOPMENT PHASES FOR A SAFE CITY

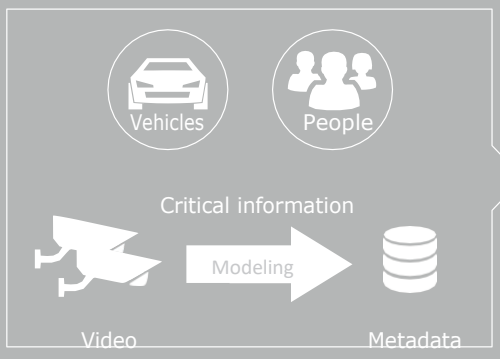
Phase 1 City Surveillance

Video Data Collection Devices → Control Center → Basic Application Scenarios

- Video Surveillance
- GIS Applications
- Alarm Controls
- Command & Dispatch

Phase 2 Intelligent Video Surveillance

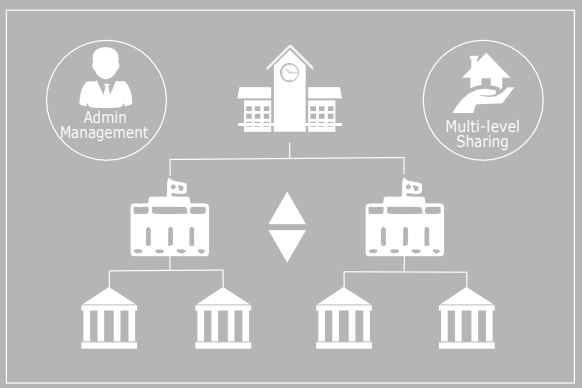
AI Devices, Intelligent Learning Servers, Existing Devices



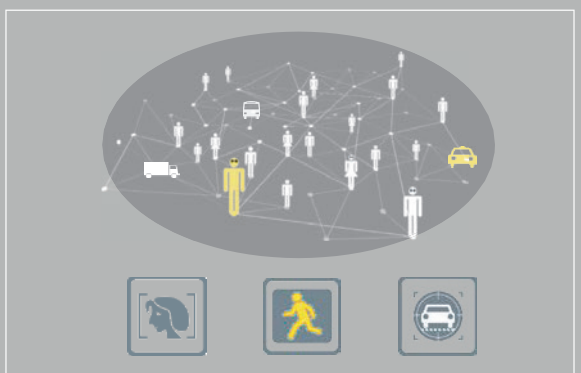
- Target Recognition
- Target Tracking
- Target Control
- Crowd Density Estimation
- Traffic Enforcement
- Incident Detection
- Traffic Flow Control
- Blacklist Alarm

Phase 3 Data Fusion & Hierarchical Management

Unified Hierarchical Management

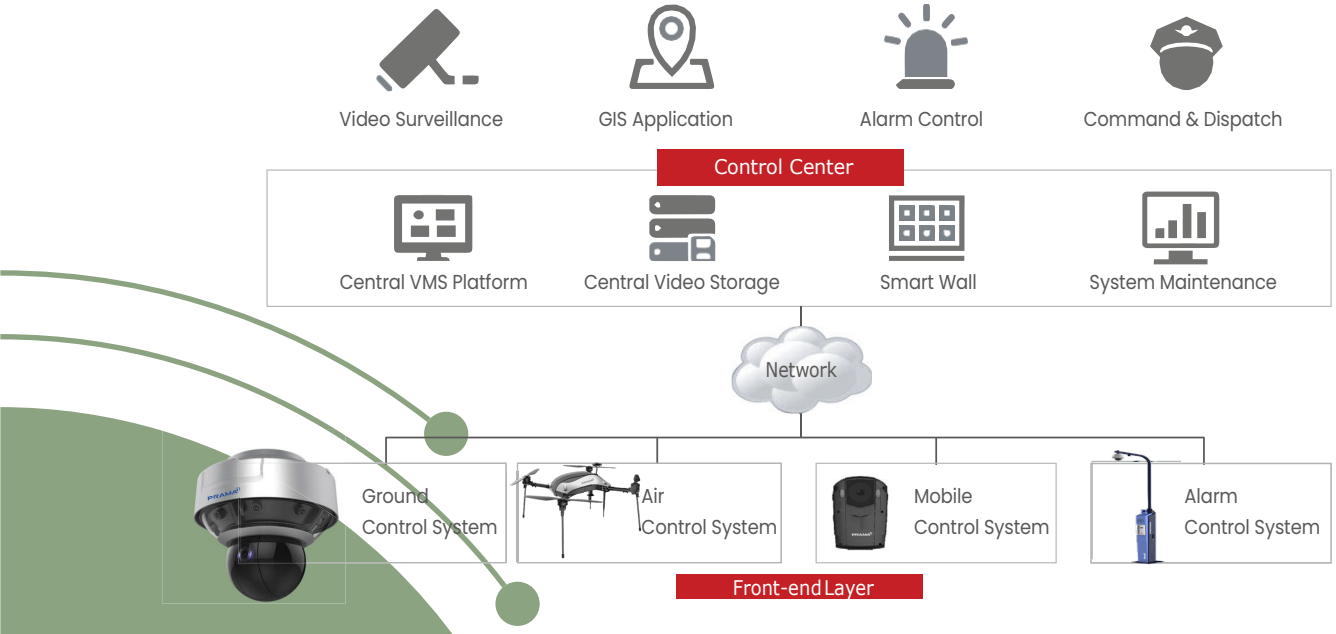


Multidimensional Data Fusion



CITY SURVEILLANCE

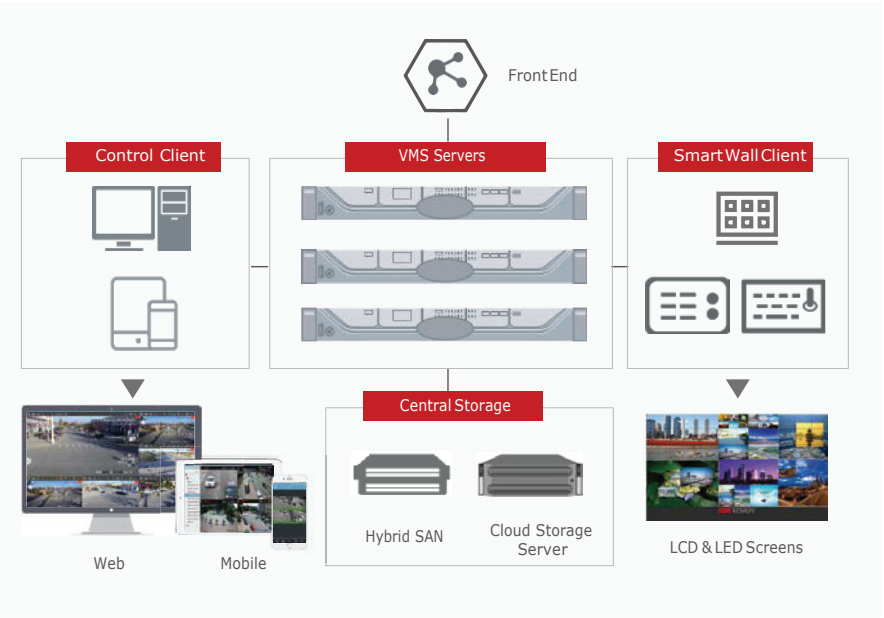
A well-crafted city surveillance system will deter vandals and prevent security threats, and the best installations go unnoticed by the public at large. Prama provides a series of front-end devices in various applications to provide strategic surveillance and prevent criminal activities. And when events do occur, this City Surveillance System significantly improves efficiency for post-event investigation.



CONTROL CENTER

The Control Center creates the utmost reliability and management ability for video footage protection and daily operations.

- Provides management, video playback, and control for all daily operations among all devices in a centralized VMS platform
- Extends data into cloud storage when storage device capacity is overloaded
- Generates multiple viewing modes, from standalone monitors to large smart walls
- Centralizes display of general system health on the dashboard for up-to-the-minute status report



DEDICATED VIDEO STORAGE WITH FAIL-SAFE PERFORMANCE:

- Full lifespan management of security data
- 24/7 uninterrupted storage
- Decoupling of VMS applications and storage architecture
- Multi-thread high-speed downloading
- High-speed data recovery
- Multiple streaming protocols
- Third-party storage device compatibility

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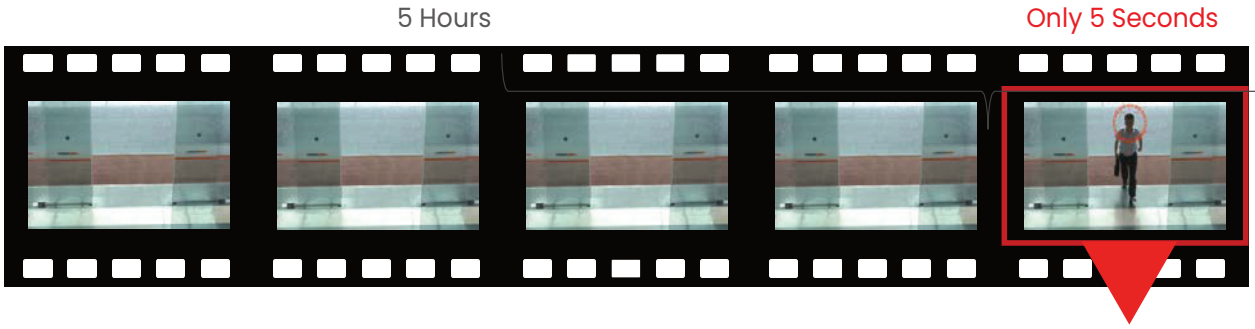
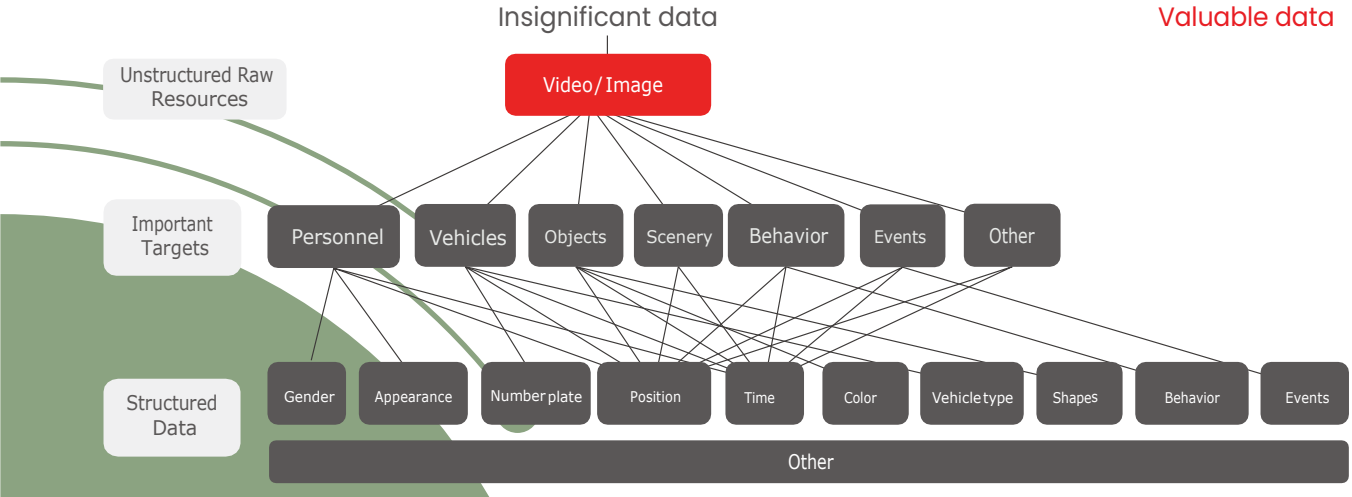
INTELLIGENT VIDEO SURVEILLANCE





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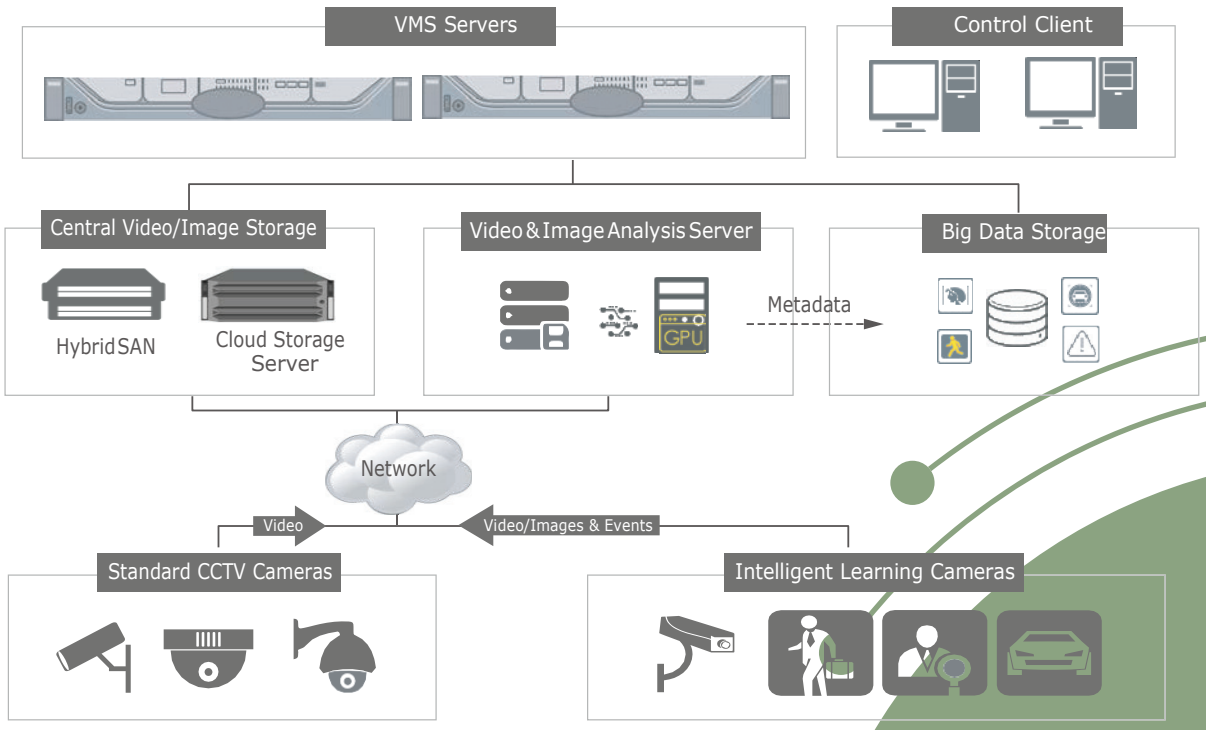
SYSTEM TOPOLOGY



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VEHICLE MANAGEMENT

One of the key features of PRAMA's Safe City Solution is its ability to help authorities manage traffic and monitor vehicles.

TRAFFIC ENFORCEMENT APPLICATIONS

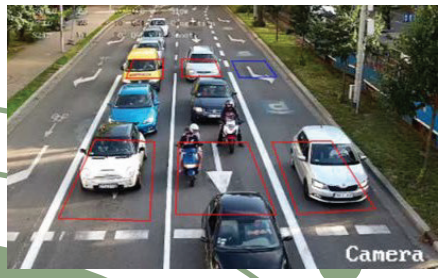
Ensuring road safety and smooth travel, the system can detect violations & behavior for further analysis.

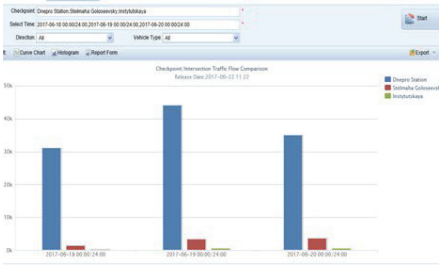
- Red light violation
- Wrong-way driving
- Illegal lane change
- Illegal parking
- Speeding violation
- Unfastened seatbelt

TRAFFIC FLOW MANAGEMENT

Traffic big data analysis predicts traffic in advance to prevent traffic jams, as well as conducts effective signal control and guidance.

- Traffic guidance
- Traffic signal control
- Traffic event detection





Vehicle Counting System

Based on video streaming analysis technology, the operator can predict or take precaution to prevent accidents from happening.

Traffic Event Detection

The traffic control system is able to report traffic flow and display congestion status to the public inreal-time, effectively guiding vehicles to avoid jammed areas.

Traffic Flow Report

The system is able to generate traffic flow reports and to display relevant data in different charts and diagrams.

- Real-time traffic flow
- Traffic flow comparison
- Report on vehicle violation

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VEHICLE APPLICATIONS FOR PUBLIC SECURITY

Combining ANPR cameras with back-end analysis servers allows the PRAMA traffic system to recognize not only generic features such as license plates or vehicle color, but also to identify characteristics specific to one vehicle - such as the number of stickers on the wind shield - through data modeling.

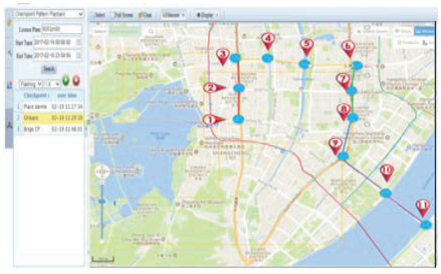
Similarity tests among vehicle types helps law enforcement to identify a suspected vehicle. This is a useful addition to the conventional method of identification using structured data such as license plate numbers, for example.

Vehicle image analysis server

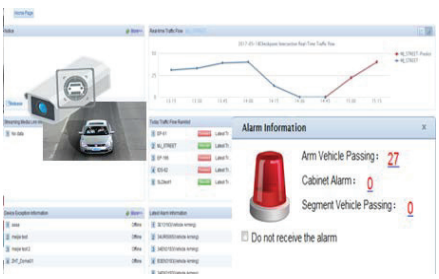
- High-density GPU chipsets
- Intelligent learning technology
- Detection for more vehicle

- Basic route info
- Vehicle color
- Vehicle type
- Vehicle brand
- Driver using phone
- Seatbelt
- Modeling for other characteristics

ANPR and the vehicle characteristics analysis algorithm together provide law enforcement officials a more efficient way to investigate incidents.



Driving Pattern Analysis



Vehicle Blacklist Alarm

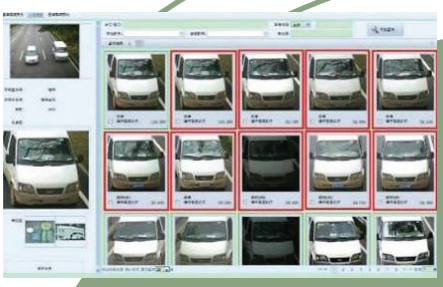
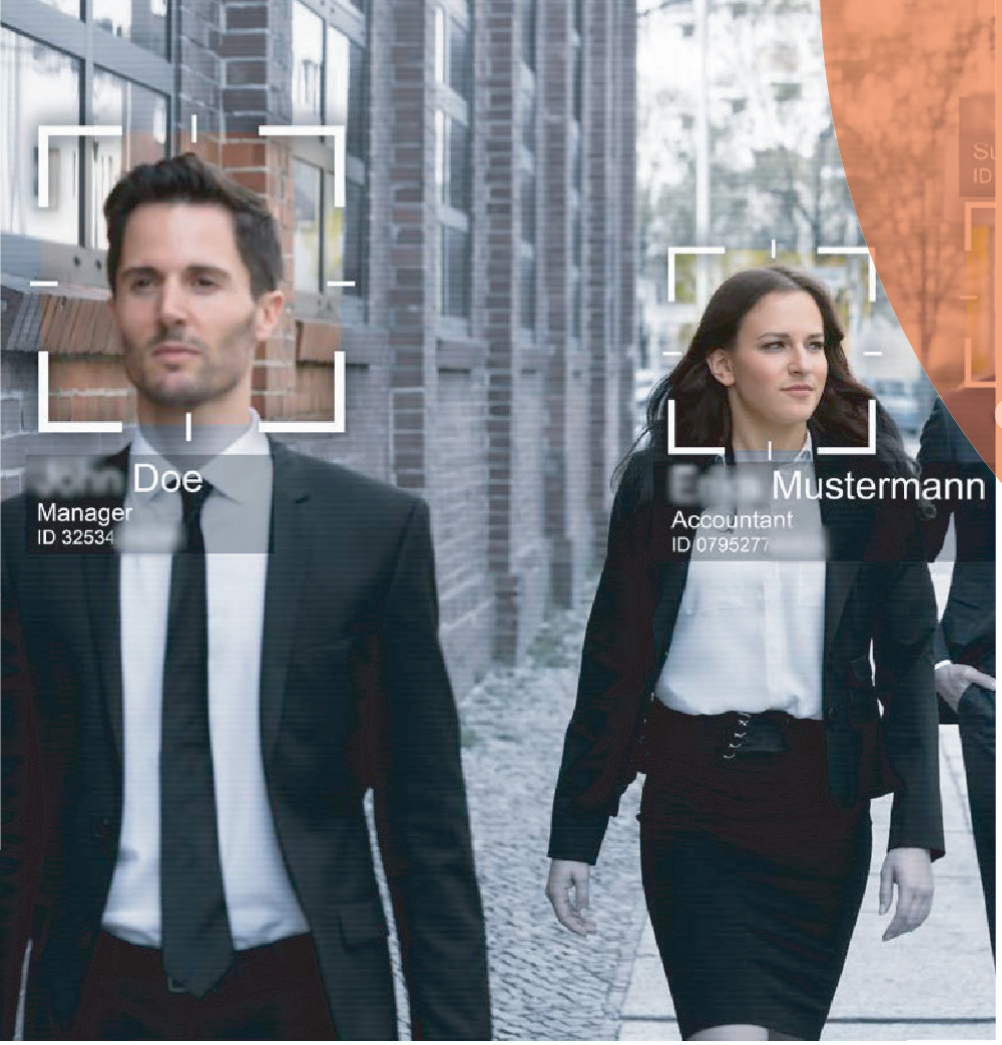


Image Comparison and Matching

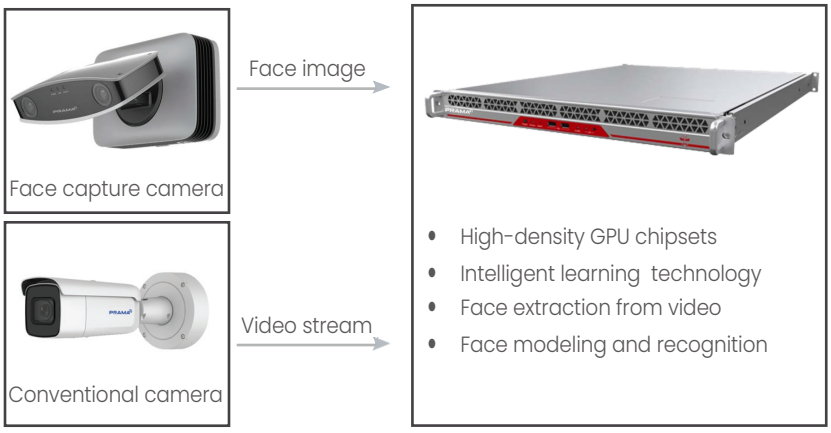


PEOPLE MANAGEMENT

FACIAL RECOGNITION

The system provides accurate facial recognition results thanks to the PRAMA face capture cameras and powerful servers.

PRAMA optimizes facial recognition algorithms for different countries and regions to achieve higher accuracy rate.



- High-density GPU chipsets
- Intelligent learning technology
- Face extraction from video
- Face modeling and recognition

- Face image comparison
- Search from all captured images
- Facial image retrieval – 1:N comparison
- 1V1 image comparison
- Face searching app
- Real-time facial image capture and blacklist alarm

Image comparisonvia mobile app

Real-time facial image capture and Black list alarm

Image comparison and matching

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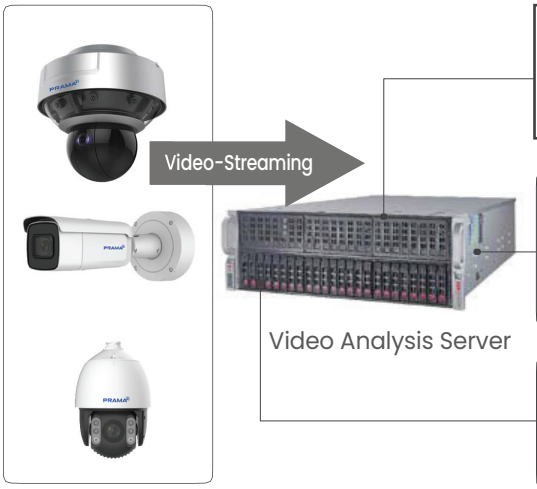
BODY CHARACTERISTICS AND ABNORMAL BEHAVIOR

The real-time video analysis algorithm can model an individual's body characteristics using video streams from existing cameras. The back-end analysis server is also equipped with algorithms that can detect abnormal behavior,Such as sudden running, wandering, or intrusion, via video streams.

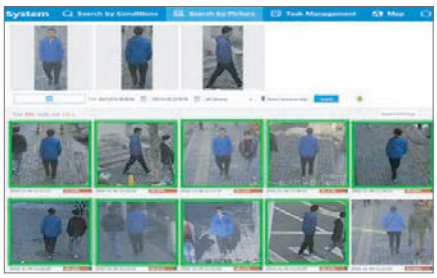


Abnormal Behavior detection
- Sudden running
- Wandering

Body Characteristics Analysis
- Gender
- Hair
- Clothing
- Glasses
- Hat
- Backpack

- High-density GPU chipsets
- Intelligent learning technology
- High-performance server

- Supports real-time standard video-streaming analysis
- Supports analysis from video footage
- Generates direction of travel movement on the GIS map
- Search using one image with body characteristics
- Search using multiple image with body characteristics
- Search by other features such as clothing color, figure, gender, etc.
- Supports locating specific person on the map
- Supports perimeter detection such as intrusion, line crossing



Search using multiple images with body characteristics

Direction of travel movement

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CROWD DENSITY PREDICTION

The crowd density analysis system is designed for large open areas such as public squares, stations, and airports.

Through high-definition video stream analysis, the system is able to calculate the population density within a designated area. If the density exceeds the preset threshold, alarm notification will be shown.

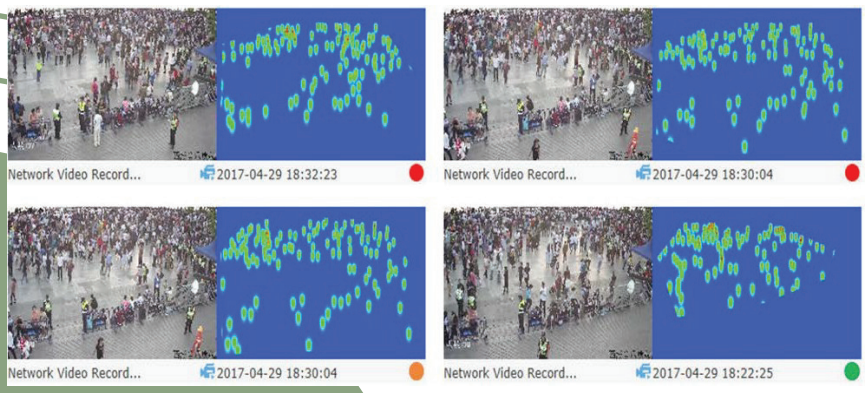
Traditional Camera

Video stream

- High-density GPU chipsets
- Intelligent learning technology
- Crowd density algorithm
- Video streaming analysis

Features and applications

- Supports 4CIF to 3 MP streaming analysis
- Supports customization of alarm threshold for crowd density
- Alarm notification on VMS client after triggered
- Intuitive display of alarm level by using different colors
- Various data display mode



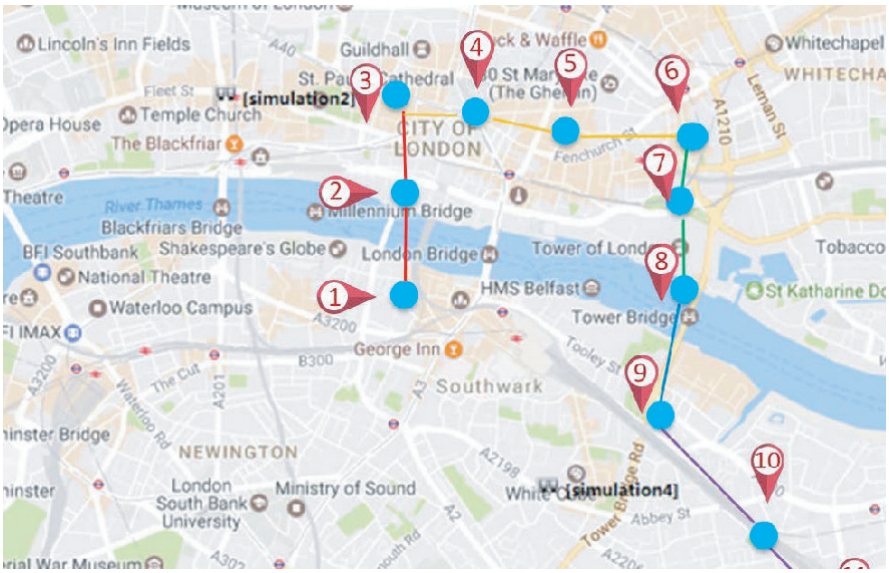
Using different colors to represent alarm level

MULTI-DIMENSIONAL DATA FUSION & ASSOCIATION

As more multi-dimensional data is collected, the utilization of only one single data category (i.e., vehicle data, facial data, etc.) no longer fulfills the increasingly complicated security needs. Therefore, breaking down data silos and merging various data types together becomes crucial for safe city construction.

Human bodies and faces are associated using big data for data fusion analysis.

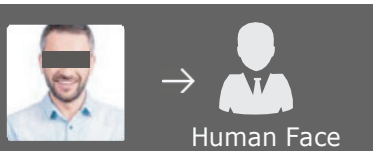
A driver can be identified by face recognition and then associated with related vehicle information (i.e., license plate information) based on unified big data.



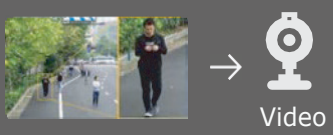
TRAIL TRACKING BASED ON DATA FUSION

This application is based on big data fusion from multiple resources, like vehicle data, human face data, and body characteristics data.

When a suspect flees from a crime scene by car, the system can generate a trail based on license plate photos captured by checkpoints.



Even if the suspect leaves the car and walks, the trail continues with facial recognition at checkpoints which can associate vehicle information with specific face images.



Once the suspect is out of the facial recognition area, the system can still detect the suspect by specific body characteristics through video analytics.

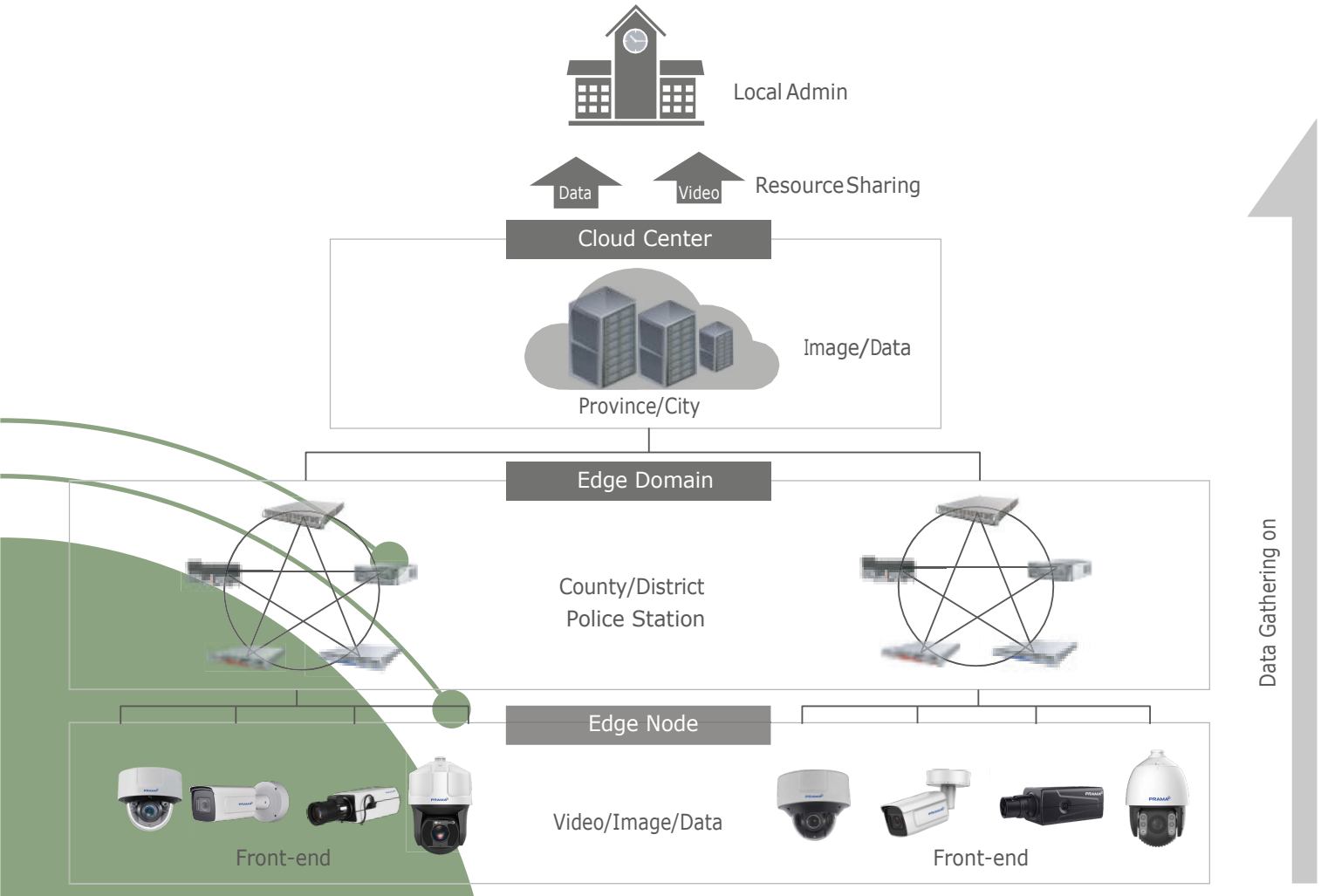
HIERARCHICAL MANAGEMENT

In addition to establishing a safe city, local administrators prioritize and manage all resources from various cities. Here's how it happens:

The Cloud Center focuses on multidimensional data fusion and big data analysis.
- Application: Prediction & warning, multidimensional analyses - Responds on demand

The Edge Domain focuses on data storage, intelligent processing, association analyses, and rapid response.
- Application: Trail tracking, command scheduling, and more - Timely response

The Edge Node focuses on multidimensional data collection and front-end intelligence processing.
- Application: Facial attendance, person / vehicle barrier control, and more - Real-time response



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WHY DO WE NEED THE EDGE NODE AND DOMAIN?

Edge Node

- Raw video analysis
- Self-adapting image adjustment
- Front-end image quality benchmark

Image

Edge Domain

- Complex function: feature & modeling
- High-density computing
- Cluster analysis

- Elasticity Architecture
- Low TCO(Total Cost of Ownership)

CORE VALUES OF HIERARCHICAL CONSTRUCTION

More Efficient Perception and Cognition

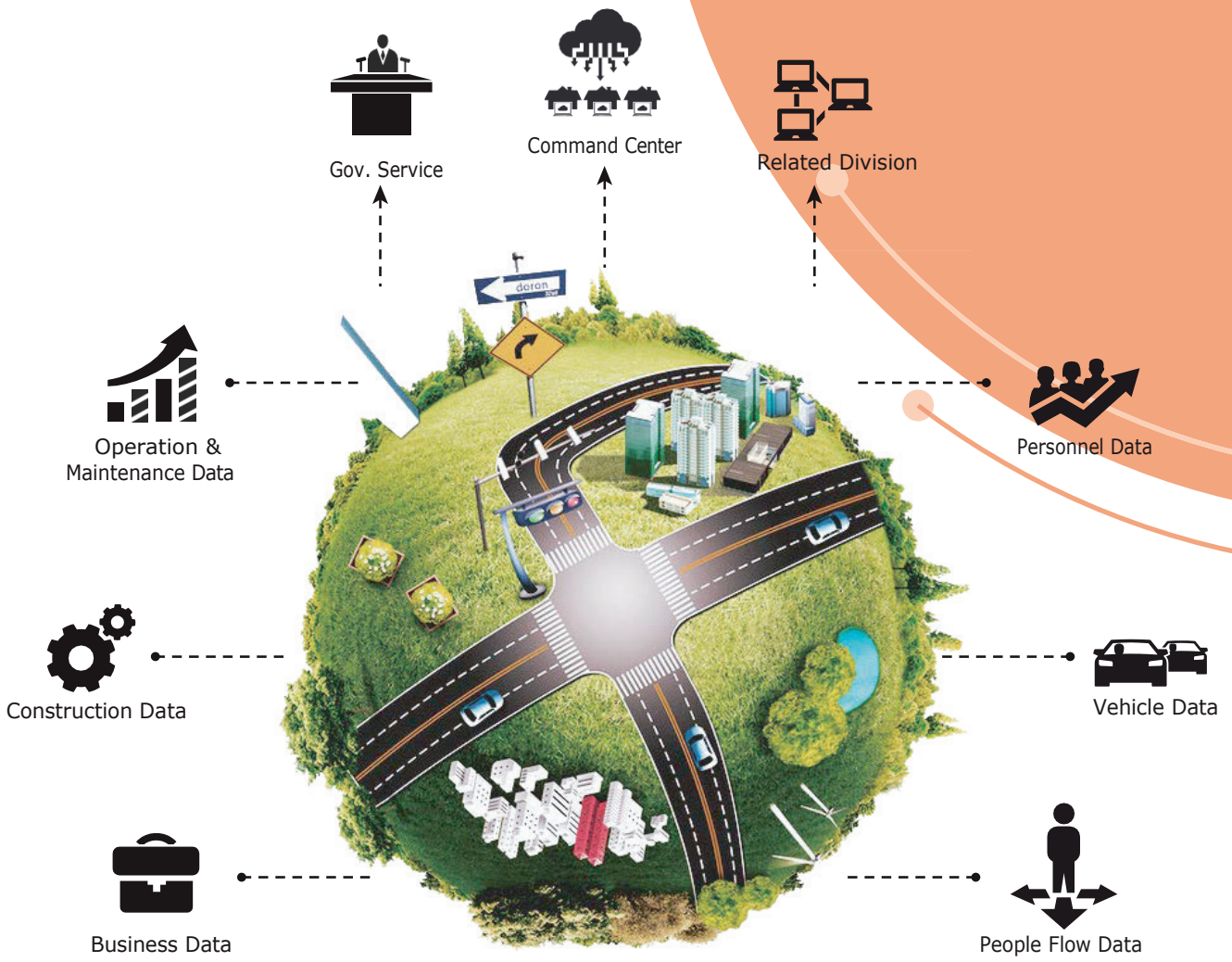
Optimizing Network Usage

More Precise Perception and Cognition

Better Agility in Business Response

More Efficient Transmission of Target Information

More Flexible on Data Classification and Application



STATISTICS & ANALYSES

OPEN ECOSYSTEM FORS MART CITIES

Prama provides a scalable Safe City Solution to fulfill the various development phases for any scenarios. Meanwhile, Prama also creates opportunities to build an ecosystem with our partners, making cities smarter and safer.

- Open Infrastructure (for third-party hardware or system)
- Open Application Interface
- Open Data Resources
- Open Platform Services
- Open Video Resources
- Open Third-party Algorithm Integration