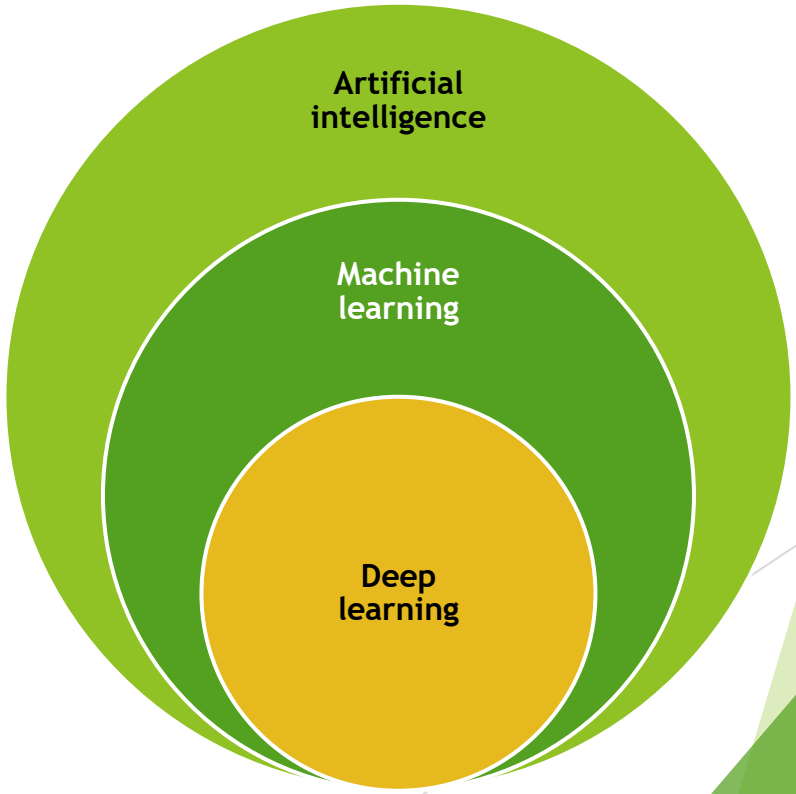
Artificial Intelligence

Best practices for leveraging AI video analytics.

Quote on AI

- “Artificial Intelligence, deep learning, machine learning…whatever you’re doing if you don’t understand it…learn it. Because otherwise, you’re going to be a dinosaur within 3 years.” – Mark Cuban



A New Era of Analytics

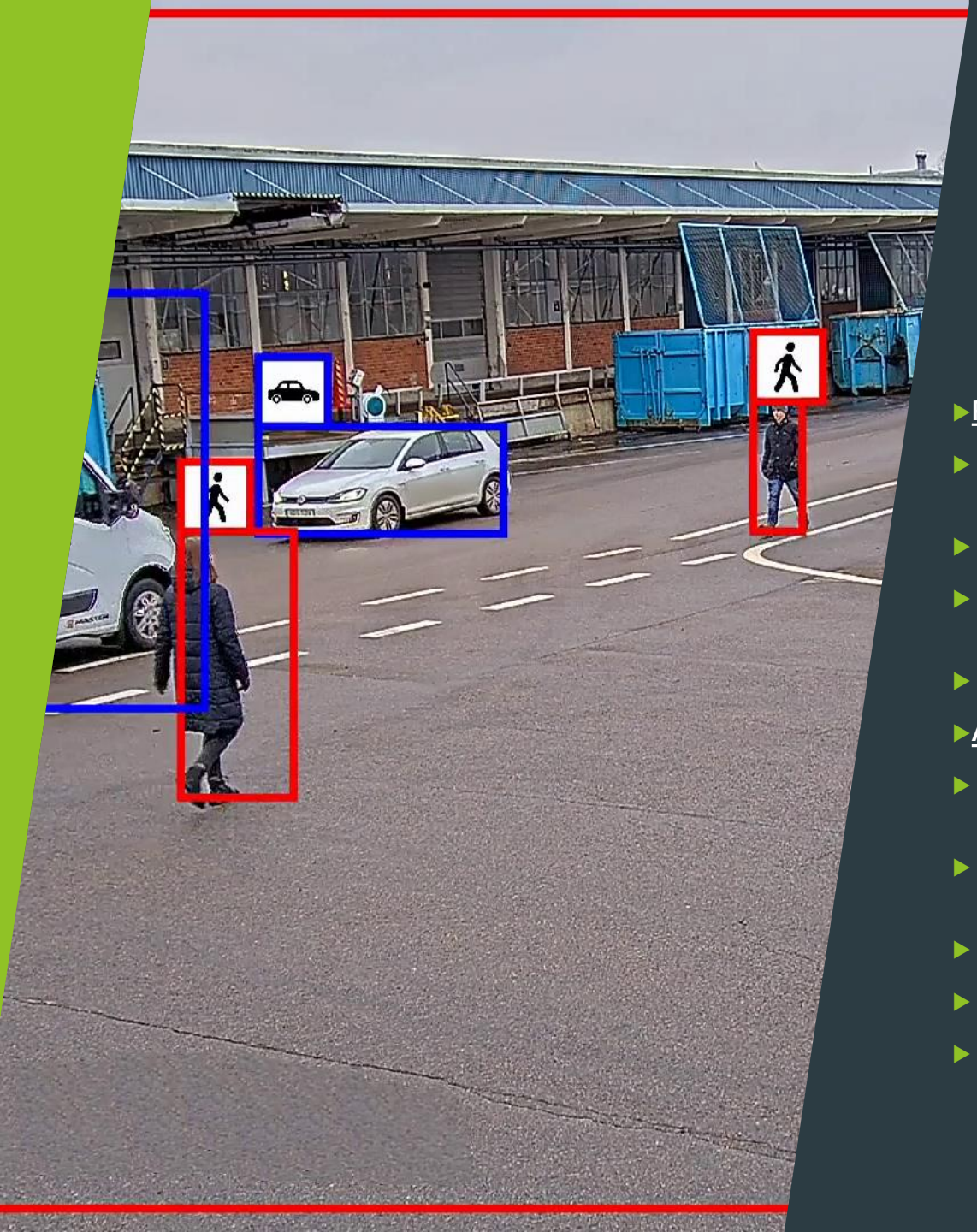
Advances in processing enable true edge-based AI

Greater potential to make complex analytics easy to use

Modern programming enables efficient interaction between edge, on premise and cloud

There are over a billion surveillance cameras in the world

How can we make use of all this data?



Journey of Analytics

- **Pixel Based / Motion Detection**
  - Analyzes change in pixels between consecutive frames.
  - Predefined thresholds for motion detection.
  - No complex algorithms or machine learning techniques
  - Prone to false alarms animals, wind, etc.
- **AI Based / Machine Learning / Deep Learning**
  - Utilize advanced machine learning algorithms and artificial intelligence techniques.
  - Can classify different object types. (people, vehicles, etc.)
  - Algorithms trained on large datasets.
  - Reduce false alarms.
  - Requires more computational power.

Customer Needs – Driving the Evolution of Analytics

Alarm accuracy – enabling fast action and event-based recordings

Efficient **search in live and recorded video**

Automated alerts enabling proactive action

Operational efficiency with intelligent statistics

Flexible integration of **systems** for overall awareness

Technology Trends

- **Artificial intelligence** – a dominating technology driver
- **Increased processing power** on edge devices
- Hybrid **architectures** supporting edge, on premise and cloud
- Open **metadata** interfaces for smoother system integration

What is Metadata?

Object: Person

Color top: Grey

Speed: 2 m/s

Direction: West

Metadata describes the content and characteristics of the scene:

- **Unclassified motion:** based on pixel changes
- **Classified objects:** such as humans, vehicles
- **Events:** rule-based alerts sent e.g., when an object has crossed a line

Object: Vehicle

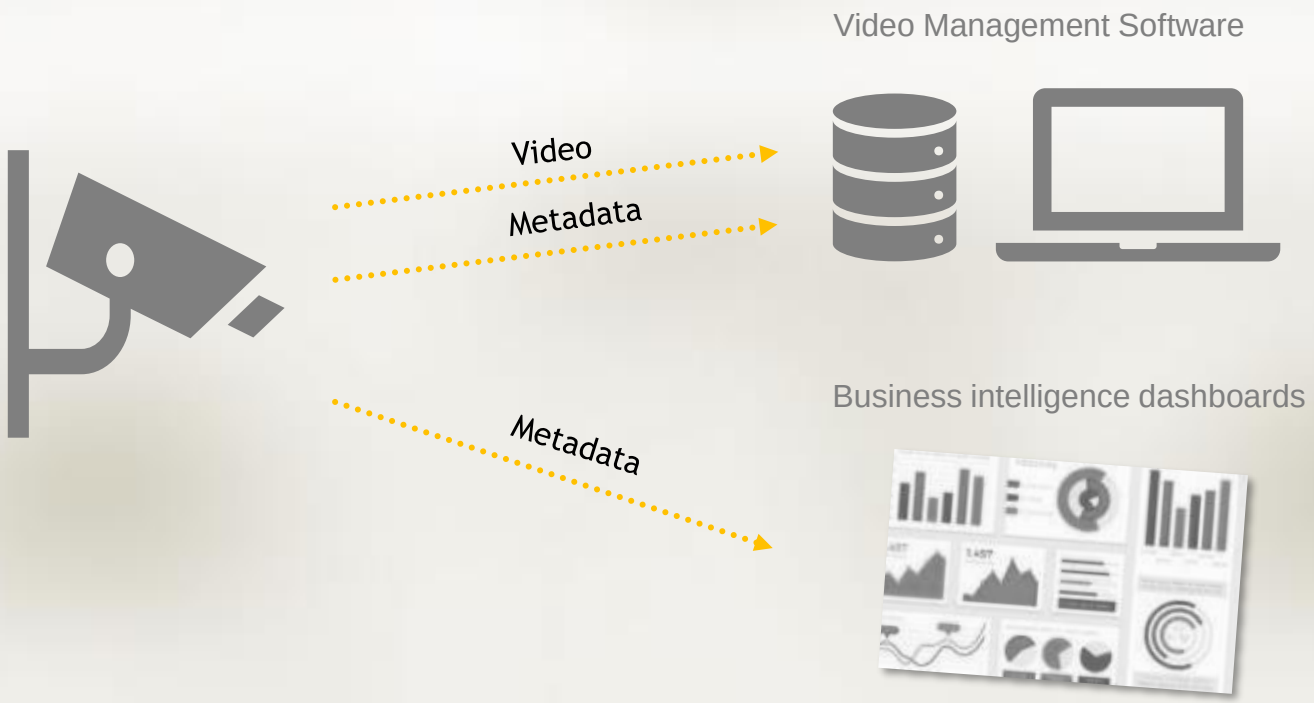
Object class: Car

Color: Yellow

Direction: East

License plate: ABC123

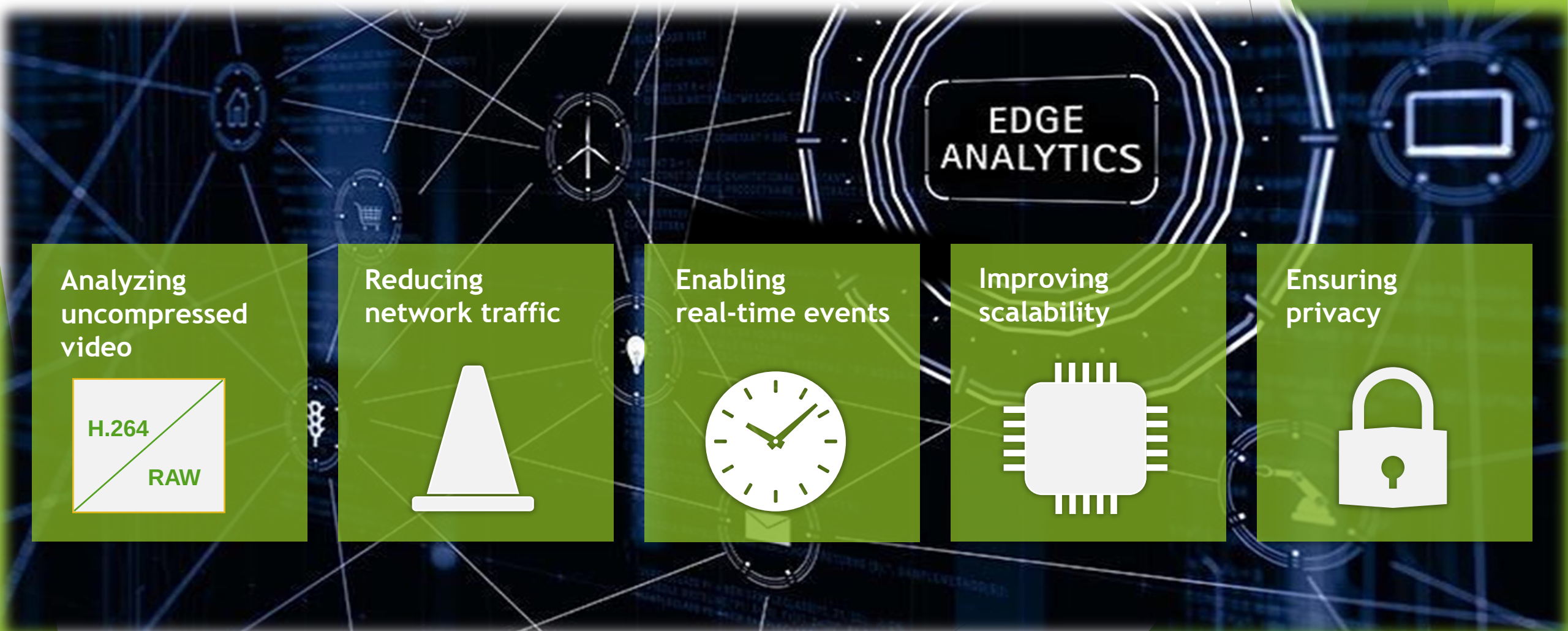
How is Metadata used?



Metadata

- Enables automated responses to alerts
- Enables rapid forensic and real-time search
- Can be collected and visualized in dashboards to create statistics and deeper insight

Analytics Processing on the Edge



Checklist for Quality Analytics

- Quality image processing
- Quality designed hardware
- Advanced edge processing
- Relevant training data
- Responsible handling of data
- Leveraging the power of metadata

Quality Image Processing

Wide Dynamic Range (WDR)

Visibility even in the darkest and brightest areas

Without

With

Contrast and color

The latest in image processing techniques

Without

With

IMAGE USABILITY is essential to succeed with analytics

Electronic Image Stabilization (EIS)

Minimizing the effects from vibration and shaking

Without

With

Noise filtering

High-resolution, full color video even in near darkness

Without

With

Challenges in the Surveillance Industry

- 24 / 7 / 365
- Vibrations and insects
- Varying light conditions
- Weather and seasonal changes
- Every installation is unique!

Qualitative and Representative Data Required

Key factors in training analytics

Data quality

- Image usability
- Reliable labelling

Relevance of data

- Good representation of scene conditions
- Object variation in types, attributes and poses
- Awareness of bias issues

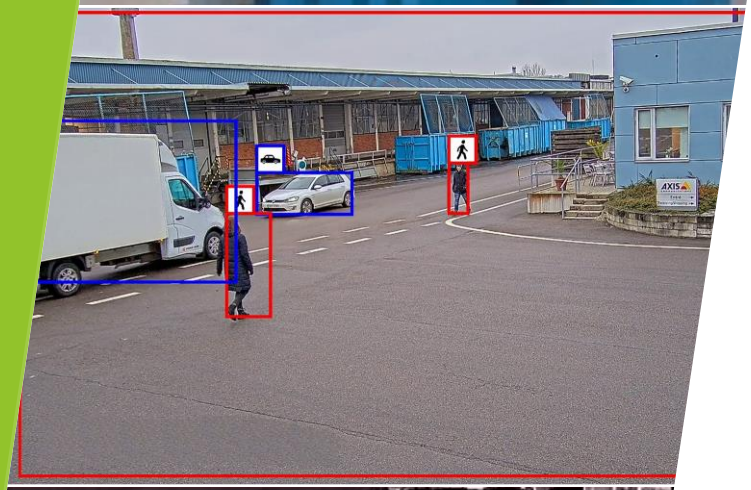
Legal and Ethical Considerations

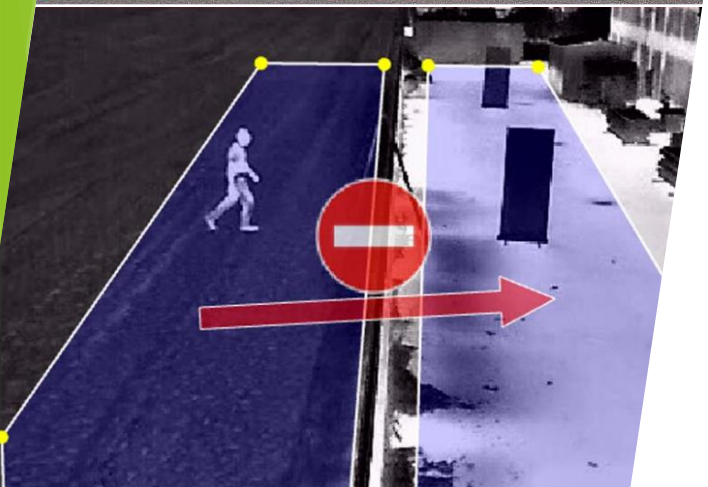
Responsible handling of data

Legal compliance (e.g., GDPR)
Cybersecurity and privacy concerns
Minimizing biases with diverse data

Evaluating the use cases

Considering legal and ethical aspects
Not banning technology in itself

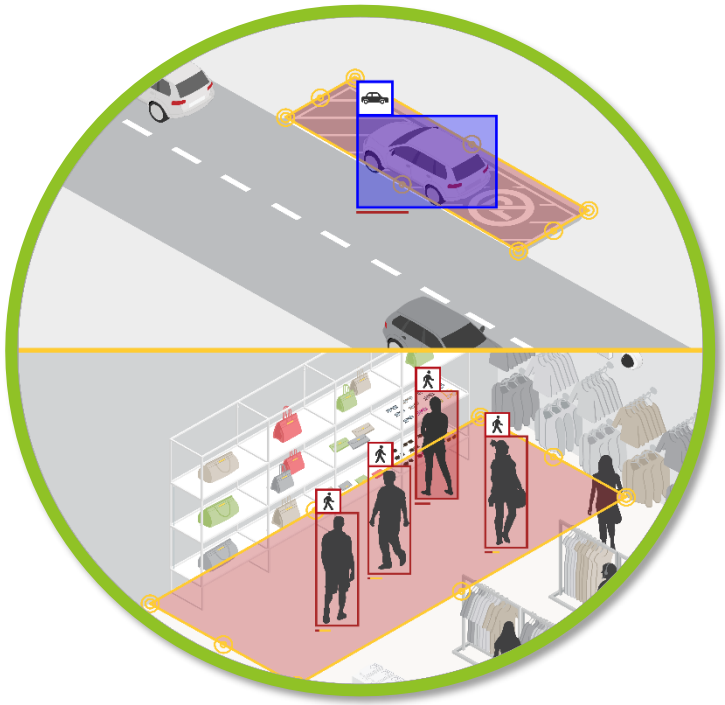




Applications

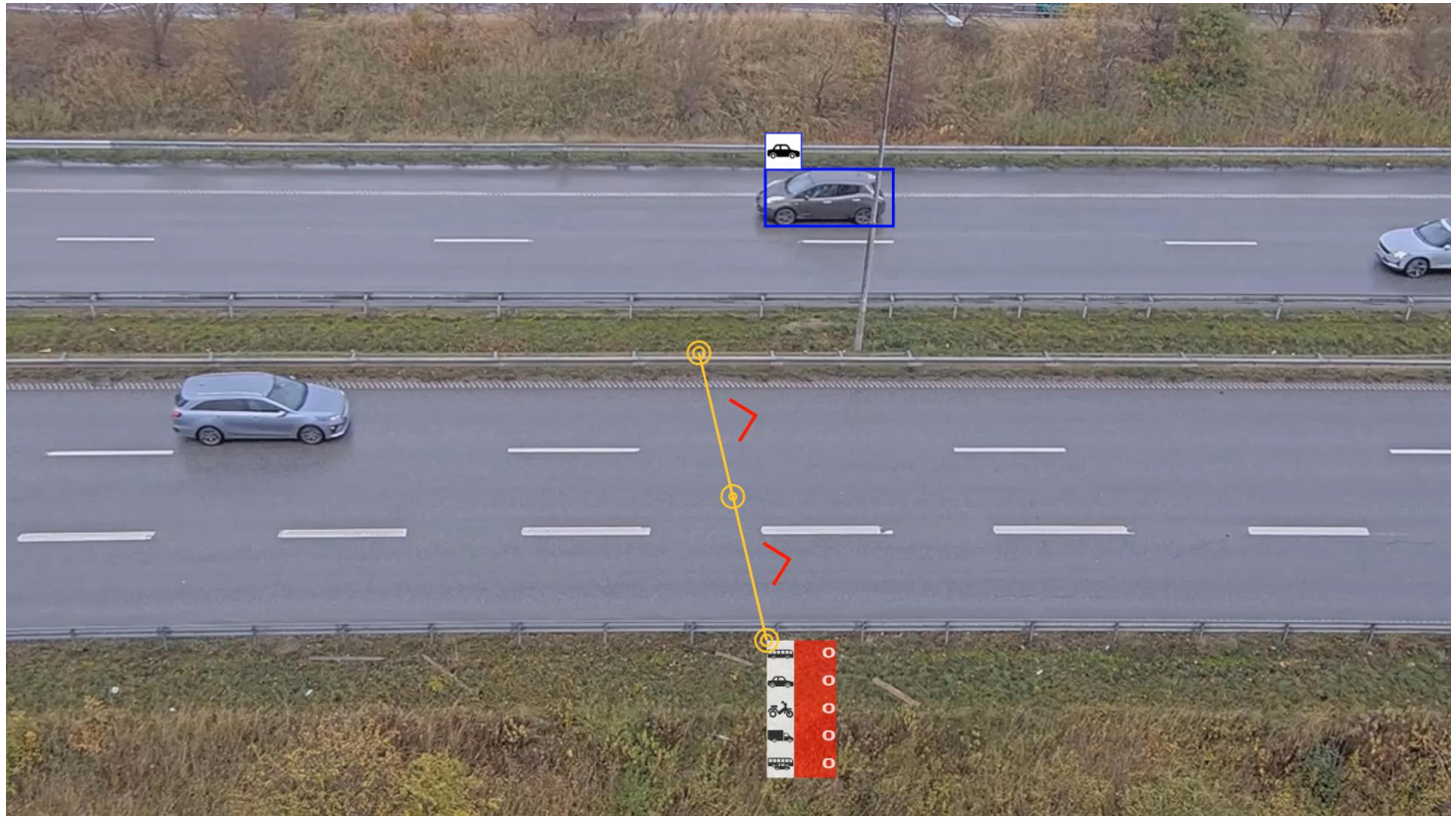
- Face detection
- Intrusion detection
- License plate recognition
- Privacy masking
- Loitering detection
- Motion detection
- Object detection and classification
- Object counting
- Perimeter protection
- Speed monitoring
- Image Health

Time in Area

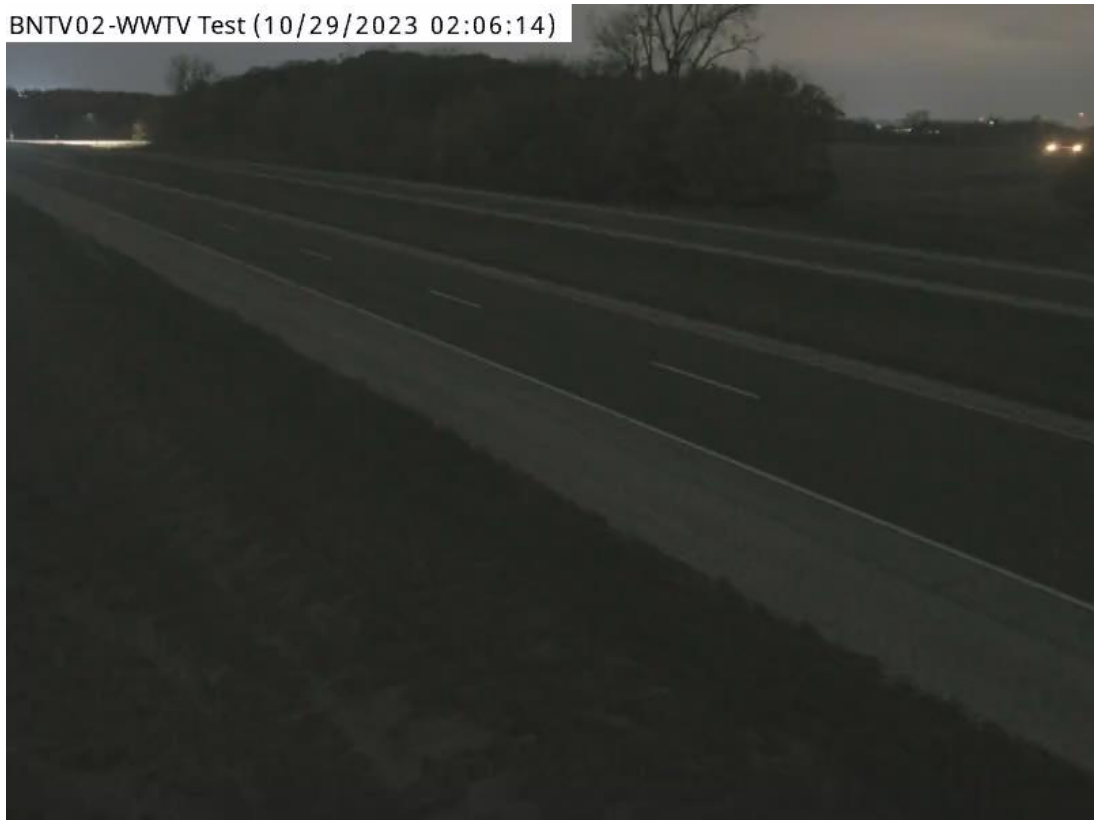


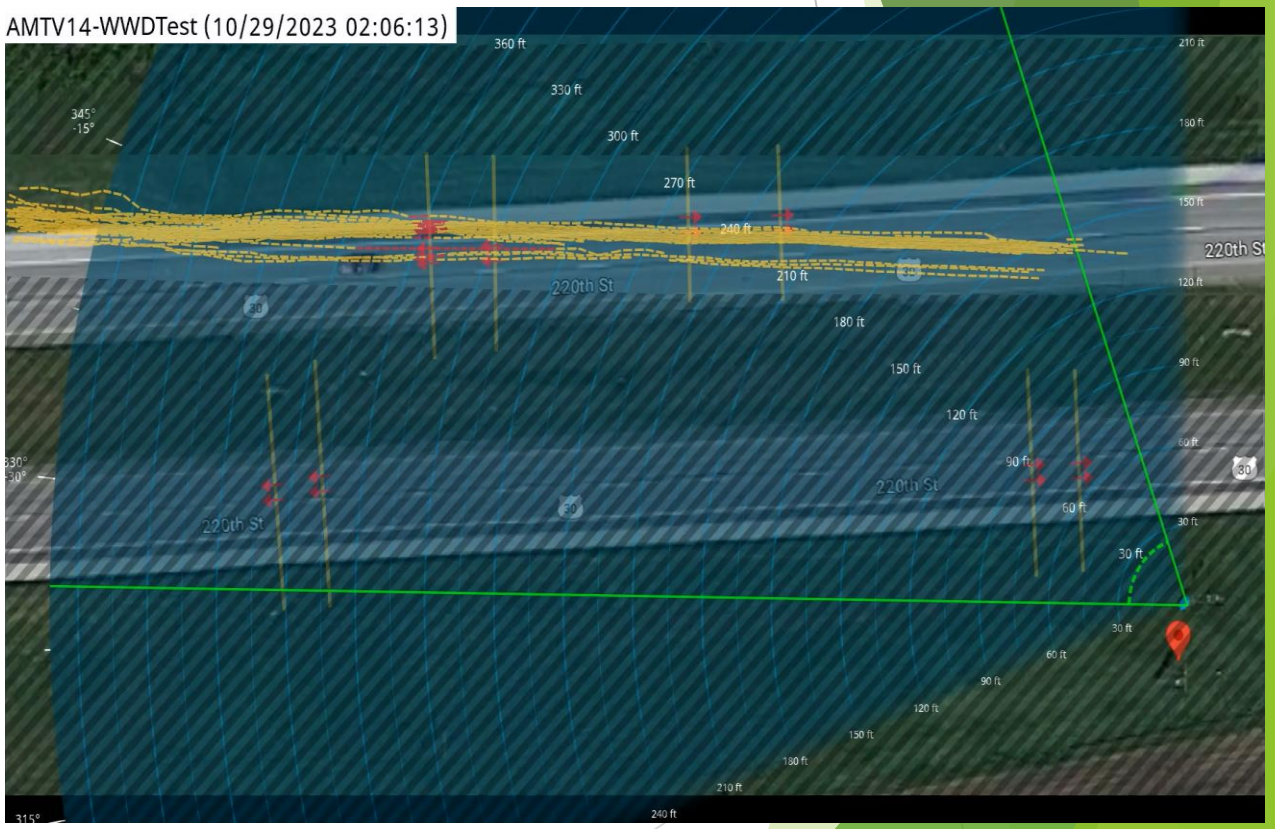
- Track dwell time
- Detect loitering
- Improve operational efficiency
- Detect unauthorized parking

Crossline Counting



Wrong Way Vehicle Detection





LPR Search

Actionable Insights – Closer than You Think

- Evolving technologies
- Data at the edge
- Processing power for AI
- Easily accessed insights

Thank You

Justin Jablonski, RSM

justin.jablonski@axis.com

414-520-2871

Axis Communications

www.axis.com