

# Dace IT<sup>SM</sup> d/b/a Sense Traffic Pulse<sup>TM</sup> Video Analytics and

Google Cloud Marketplace  
Google Video Intelligence  
Google AutoML  
Google Vision

September 2019



# Analyzing video content is a dynamic challenge

## The Human Component

*Tedious, error prone and causes fatigue*

Human error increases drastically after only 22 minutes of monitoring two screens



## The Technology Component

*Lack of comprehensive, flexible video platform with leading ML capabilities*

- Scenario and object identification is not one size fits all – businesses have unique needs.
- Tedious, expensive custom model creation and training
- Mediocre real-time analytics performance

## Opportunity Highlights

71% software

66% is on-prem

72% is in NA & Europe

APAC is fastest growing GEO

Top 3 industries are

- Public Safety
- Critical Infrastructure
- T&T

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## Video Analytics \$8.5B Opportunity\*



VIDEO ANALYTICS MARKET BY VERTICAL (\$M)			
	2018	2023	CAGR (2018-2023)
BFSI	171.6	415.6	19.4%
City Surveillance	475.8	1339.8	23.0%
Critical Infra	527	1412.7	21.8%
Education	87.5	181.4	15.7%
Hospitality & Entertainment	252.8	629.6	20.0%
Manufacturing	114.5	225	14.5%
Defense & Border Security	343.2	921.2	21.8%
Retail	252.4	654.9	21.0%
Traffic Management	364.1	1013.5	22.7%
Transportation	425.1	1259.2	24.3%
Other	212.1	500.3	18.7%
	<b>3226.1</b>	<b>8553.2</b>	<b>21.5%</b>

\* Video Analytics Market - Global Forecast to 2023. MarketsANDMarkets 2018

For Dace IT<sup>SM</sup> d/b/a Sense Traffic Pulse<sup>TM</sup> and Business Partner Use Only

# Cameras capture the image...Video Analytics captures the value

Dace IT<sup>SM</sup> d/b/a Sense Traffic Pulse<sup>TM</sup> Video Analytics with Google Video Intelligence empowers our clients to rapidly analyze and identify established and emerging scenarios or objects in video content – without the need for ML experts or developers.

Identify Anomalies	Mitigate Risks	Maximize Operational Efficiencies	Reduce Overhead Cost





Video Analytics with **Google Vision Vision (AutoML)** empowers organizations across all industries to **rapidly analyze and identify established and emerging scenarios and objects in video content** – without the need for **AI experts or developers** – to dramatically lower operational costs and risks.



DELETE

# Drive decisions faster with Video Analytics and AutoML



## Video analytics solution with custom deep learning models

Easy-to-create training models, deployed via Dace IT<sup>SM</sup> d/b/a Sense Traffic Pulse<sup>TM</sup> Video Analytics, provide a configurable, comprehensive and ML-infused video analytics platform that drives rapid value at scale.



## Real-time analytics

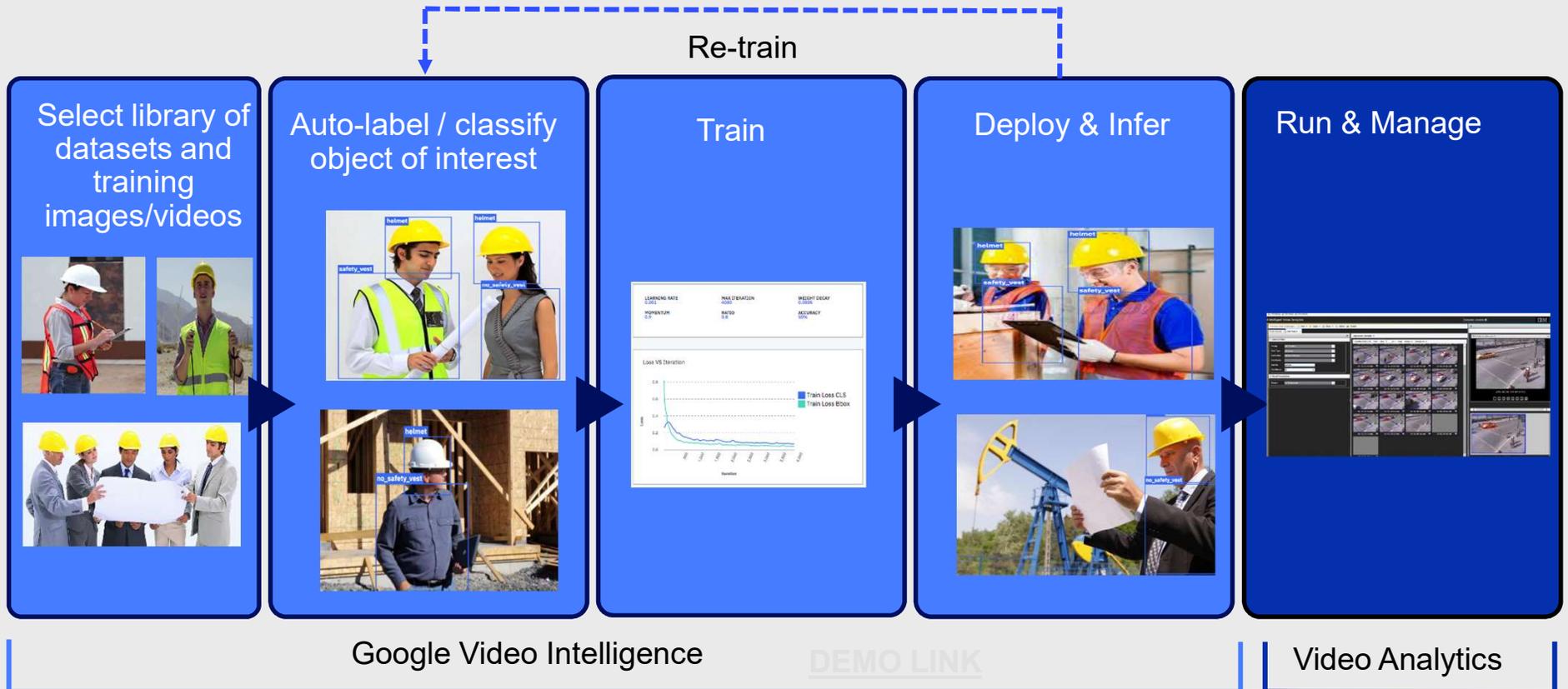
Power hardware with GPUs takes real-time analytics to the next level by enabling dramatic performance increase for workloads such as real-time deep learning and large scale video indexing.



## Ease of use

Intuitive drag-and-drop interface in AutoML allows domain experts to easily create new visual recognition models without development or AI skills. Once deployed into Dace IT<sup>SM</sup> d/b/a Sense Traffic Pulse<sup>TM</sup> Video Analytics, the solution's UI can be used to quickly identify, track, search, filter and alert on objects and events.

# Create models in Google AutoML; Run & Send Alerts with Video Analytics



# Dace IT<sup>SM</sup> with Sense Traffic Pulse<sup>TM</sup>: Broadcast and Entertainment



Buyer	Use case / problem solved	Offerings
<b>VIDEO ENTERTAINMENT PROVIDERS (Studios, PayTV, Streaming services)</b> Video Operations Teams	<b>Video syndication:</b> Transform valuable video products and metadata for playback and display on any device (MVPD, OTT). and distribute to any business partner – globally.	Video Logistics Video Enrichment Video Analytics
	<b>OTT workflow with AI-enhanced metadata:</b> Orchestrate, track, and safeguard valuable assets when publishing original or licensed content to streaming platforms. Use Watson AI to apply time-based metadata and enable scene discovery.	Video Logistics Video Enrichment Video Analytics
<b>VIDEO ENTERTAINMENT PROVIDERS (Studios, PayTV, Streaming services)</b> Digital Products Teams	<b>Video playlist personalization:</b> Lift user engagement, video views, and ad revenue through personalized video streams. Machine-learning algorithms continually adjust recommendations based on user context, content, and audience patterns.	Video Recommendations
	<b>Asset search accelerator</b> natural language search to find relevant clips (TED)	Video Intelligence + UX services
<b>NEWS AND WEATHER BROADCASTERS-</b> Live TV Production Teams	Deliver automated, highly accurate closed captioning for live broadcasts.	Watson Captioning Live
	Archival footage search (NBC local news)	Video Intelligence + UX services
	Enable transcription search through auto-captioning large video archives	Watson Captions + UX services
© 2019 Dace IT <sup>SM</sup> d/b/a Sense Traffic Pulse <sup>TM</sup>	Create and distribute the most accurate, compelling, and visually stunning weather and traffic content across platforms.	Max Weather and Traffic

# Dace IT<sup>SM</sup> with Sense Traffic Pulse<sup>TM</sup>: Broadcast and Entertainment (con't)



**INTERNAL USE ONLY**

Buyer	Use case / problems solved	Offerings
<b>LIVE SPORTS AND ESPORTS -</b> Digital Media Teams/ Properties	Engage fans and streamline workflows by auto-creating clips of key moments on content archives	Video Highlights + UX services
	Engage fans and streamline workflows by auto-creating clips of key moments during live game play	Dace IT <sup>SM</sup> d/b/a Sense Traffic Pulse <sup>TM</sup> Research (resell) (ala Women's World Cup) – not productized
	Enable transcription search through automatically captioning large video archives	Watson Captions
	Auto-create personalized videos across platforms	Max Engage with Watson
	Infuse weather expertise into your mobile app or with our white-labeled app to drive engagement.	Max Mobile and Widgets
<b>LIVE SPORTS AND ESPORTS -</b> Event Production	Automated captions on live broadcasts	Dace IT <sup>SM</sup> d/b/a Sense Traffic Pulse <sup>TM</sup> Research (resell) (US Open) – not productized
<b>OUTDOOR EVENT VENUES</b>	Harness the most advanced weather and traffic monitoring and alerting system	Operations Dashboard
	Infuse weather expertise into your mobile app or with our white-labeled app to drive engagement.	Max Mobile and Widgets
	Auto-create personalized videos across platforms	Max Engage with Watson

# Buyers: Enterprise (Cross-industry)



Buyer	Use case / problems solved	Offerings
CMO	<u>Marketers</u> : Live-streamed and on-demand product launches, events, and video webcasts / webinars.	<ul style="list-style-type: none"> <li>Enterprise Video Streaming with WebEx integration for Webcasts</li> <li>- Video Intelligence for Archival Search</li> </ul>
CRO	<u>Sales and Channel Development and Training</u> : Live and on-demand video to train sales teams as well as extended salesforce: resellers, consultants, etc.	<ul style="list-style-type: none"> <li>Enterprise Video Streaming</li> <li>Add-ons:                             <ul style="list-style-type: none"> <li>- Video Intelligence for Archival Search</li> <li>- Video Recommendations for continuous ed.</li> </ul> </li> </ul>
CHRO	<u>Workforce Development and Transformation</u> : Live and on-demand video to train industry knowledge, leadership skills, diversity and inclusion.	<ul style="list-style-type: none"> <li>Enterprise Video Streaming</li> <li>Add-ons:                             <ul style="list-style-type: none"> <li>- Video Intelligence for Archival Search</li> <li>- Video Recommendations for continuous ed.</li> </ul> </li> </ul>
	<u>Corporate and Internal Comms</u> : Live-and on-demand investor presentations, all-hands events.	<ul style="list-style-type: none"> <li>Enterprise Video Streaming</li> <li>Add-ons: Video Intelligence for Archival Search</li> </ul>

# Enterprise B-to-B: future state

## Cross-Industry



Buyer	Use case / problems solved	Offerings
<b>COO</b> <b>(Future state/growth opp.)</b>	<ul style="list-style-type: none"><li>Analyze footage to solve operational problems in verticals we target today</li><li>(in-store video, online customer sessions, drone footage -Finance, Retail, C&amp;P, E&amp;U, Travel)</li><li>Partner/workshop with Dace IT<sup>SM</sup> d/b/a Sense Traffic Pulse<sup>TM</sup> SMEs and data visualization providers to GTM</li></ul>	<ul style="list-style-type: none"><li>Enterprise Video Streaming</li><li>Add-ons:<ul style="list-style-type: none"><li>- Video intelligence for "Intelligent indexing"</li></ul></li><li>Video Intelligence (stand alone)</li></ul>

# Video Analytics & AutoML Key Capabilities

- **Real-time and/or forensic** video processing
- **Static & cameras in motion** (body-worn cameras, smart phones, pan-tilt-zoom cameras, drones, dash, cctv, etc.)
- **Camera vendor agnostic**

*Note: No Facial Recognition, Skin tone or Ethnicity functions are supported in base product*



## TAG & SEARCH CONTENT IN VIDEO ARCHIVES

Organizations can quickly search for people, logos, objects, locations, gestures and more stored in video archives



## FIND VIPS / FAVORITE PLAYERS

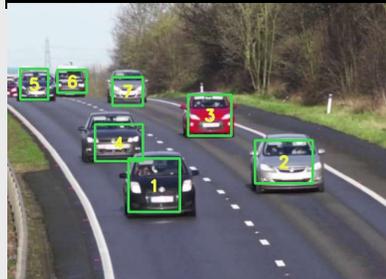
Content providers can easily and quickly search through video content to deliver fans clips of their favorite sports figures, celebrities and VIPs



## INAPPROPRIATE CONTENT

## REDACTION

Gestures, objects and people can be automatically redacted across multiple files; Manual option is available to redact specific content as needed.



## TRACK PEOPLE & OBJECTS

Direction, speed, and dwell time information is available as well as heat maps to better understand movement patterns.



## DETECT CHANGES TO PATTERNS

Receive automatic alerts from live streaming cameras when movement of objects is inconsistent with predefined patterns.



## MONITOR ACCESS TO RESTRICTED AREAS

Whether for safety or security reasons, restricted areas can be identified and monitored and alerts sent when unauthorized access is detected.

# Video Analytics Target Segments



## Media

Large enterprises want to mine decades worth of audio and video content.

- Enforce Logo exposure and compliance within content guidelines
- Improve performance and accuracy of archive content analysis (audio and video)
- Recognize gestures and actions in streaming and archived content

## eSports

eSports community managers want help monitoring and analyzing events

- Compliance with community and content guidelines
- Generate automatic highlight clips
- Support player coaching
- Player Integrity
- Improve predictive broadcast guidance

## Agriculture

Farmers need better ways to monitor daily operations and alert when issues detected

- Track animals and their behavior
- Track equipment location and proper usage
- Detect and alert on hazardous conditions
- Ensure workers are wearing Personal Protective gear
- Monitor access to restricted areas

## Retail

Retailers want to leverage existing video systems to improve the bottom line

- Detect and alert on shelf out of stock conditions
- Improve line management
- Detect and alert on spills and tripping
- Better understand shopper behavior with heat maps and dwell times

# Video Analytics provides value across industries

Media Broadcasting



Events



eSports



Retail

Worker Safety



Manufacturing



Energy & Utilities



Construction

Aviation



Agriculture



*Use Case: Media Broadcasting*

## A large media organization derives more value out of its huge video archive

### CHALLENGE

Millions of hours of video is stored in libraries and archives with only manual search and discover capabilities

### HOW VIDEO ANALYTICS CAN HELP

- Identify and tag objects, celebrities, events, locations and more in video content, uncovering insights and making video content available for reuse
- Custom models can detect objects such as particular models of cars, colors, specific clothing logos, and gestures.



*Use Case: Events and Hospitality*

## A sports venue improves event operations, safety and fan experience

### CHALLENGE

Real-time monitoring and insights during major events hindered due to manual capabilities and processes

### HOW VIDEO ANALYTICS CAN HELP

- Monitor, assess and take action in real-time
- Oversee queues to optimize staff productivity and sales
- Monitor parking lot vacancies to route traffic and reduce backups
- Accelerate bag scanning, flagging prohibited items and reducing wait times
- Analyze crowd behavior and alert on rioting, fighting and general emotional overtone



Use Case: **eSports**



## An eSports league better manages its community interaction and brand/content compliance

### CHALLENGE

Need to monitor what communities are saying and doing in near real-time in order to ensure that inappropriate content (text / gestures) is quickly identified and deleted or redacted.

### HOW VIDEO ANALYTICS CAN HELP

- Analyze video streams and identify offensive content (inappropriate logos, gestures, text)
- Create reports for sponsors including issues and how they resolved, demonstrating added value.



## Use Case: *Retail*

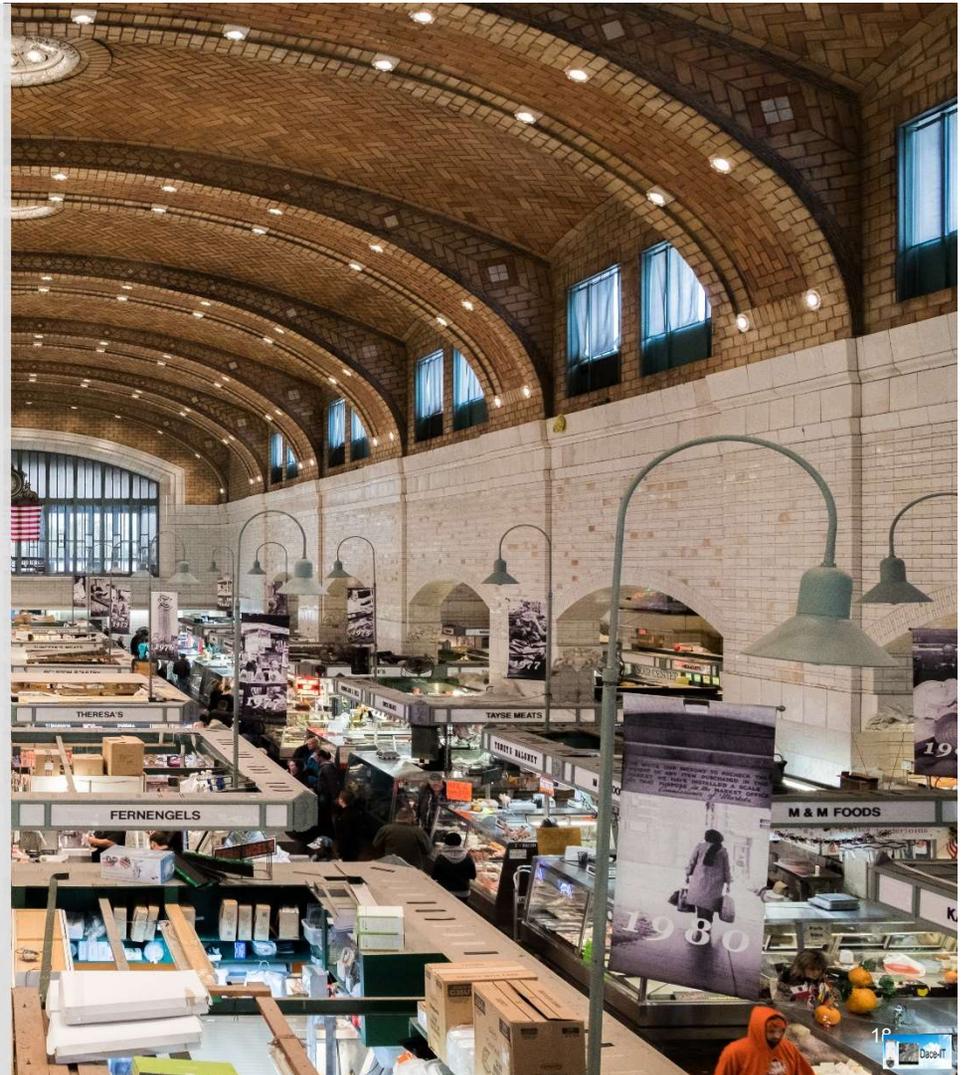
# A retailer improves operations and profitability through better inventory management and shopper insights

### CHALLENGE

Retailers want to better understand in-store shopper behavior to improve promotion placement, product sales and operational efficiencies. Monitor inventory levels and alert store personnel when shelf out-of-stocks are detected

### HOW VIDEO ANALYTICS CAN HELP

- Monitor shopper dwell times to build a “heat map”
- Count shoppers and track demographics
- Custom models can track products on shelves and alert store personnel when inventory runs low



**Slide 18**

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**AR6**

drop update image in

Amber Renard, 7/26/2018

Use Case: **Workplace Safety**

## Employers improve workplace safety and security

### CHALLENGE

Workplace injuries and illnesses cost U.S. companies alone \$250 billion annually. record more than 3 million serious injuries in the their OSHA log with the most common being clutter or spillage that causes tripping or slipping, improper use of chemicals, machinery and equipment and not complying with safety protocols.

### HOW VIDEO ANALYTICS CAN HELP

Ability to alert staff and take action when

- Hazardous conditions including clutter or spills are detected
- Protective gear is not worn or used properly
- Equipment is not stored or being used properly
- Unauthorized access to restricted areas
- Items are abandoned
- Intruders are detected

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<https://www.epi.org/publication/workplace-injuries-illnesses-cost-250-billion/>

Use Case: *Energy, Utilities, Oil, Gas*

## Leverage video intelligence to improve monitoring and management of equipment and critical infrastructure

### CHALLENGE

Need for cost-effective solutions to monitor critical equipment, sites and infrastructure for leaks, damage and required maintenance and alert in real-time when action is needed.

### HOW VIDEO ANALYTICS CAN HELP

- Visually detect and alert when detected
  - Equipment and infrastructure damage
  - Leaks, cracks, maintenance required
  - Unauthorized or improper use of equipment
  - Unscheduled movement of assets
  - Access to restricted equipment



Use Case: *Aviation*

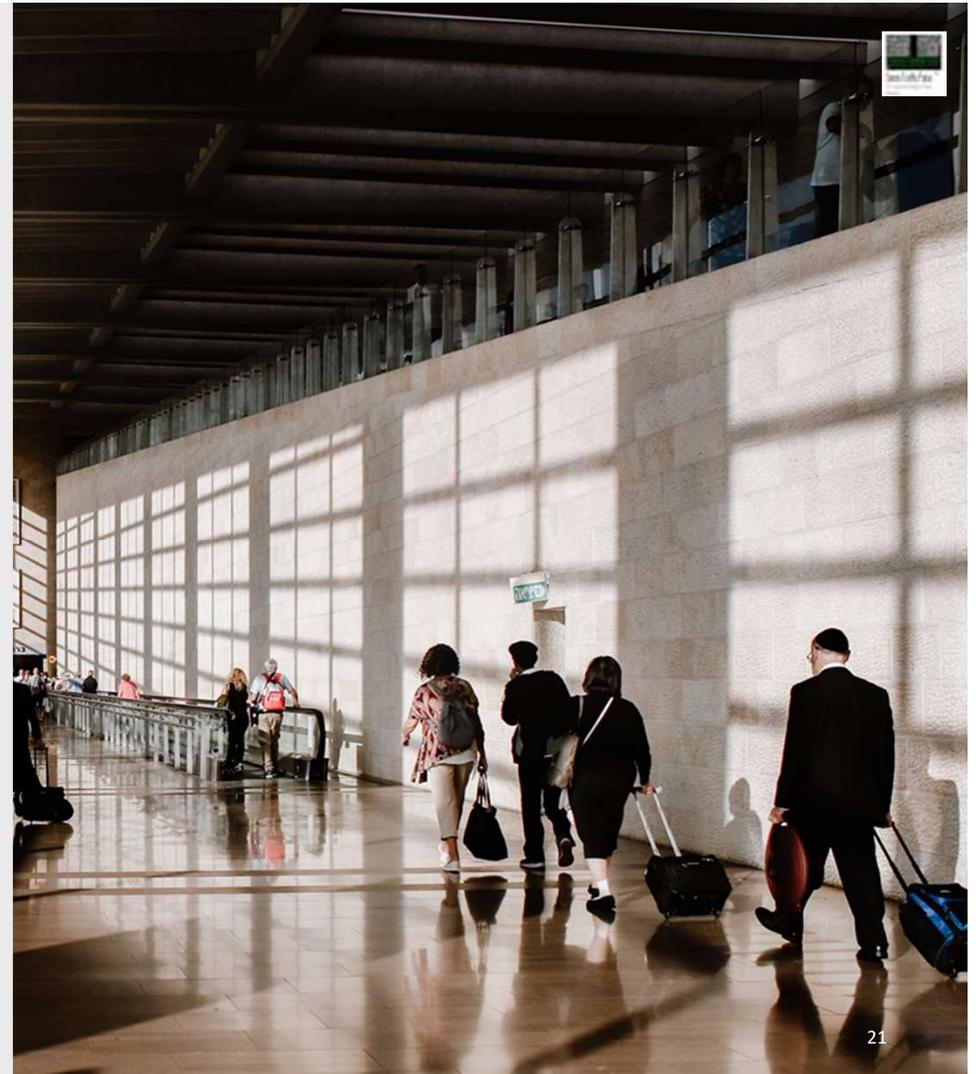
## Airports and airlines can optimize operational efficiencies while improving safety and security

### CHALLENGE

Airports are continuing to look for ways to optimize airport capacity, meet ever increasing customer expectations, manage crowds and queues while improving safety and security

### HOW VIDEO ANALYTICS CAN HELP

- Identify process delays on the tarmac and send alerts to improve gate turnaround time
- Monitor dwell times at key checkpoints to improve staff efficiency and reduce queues
- Alert on access to restricted areas
- Detect hazardous objects or situations and send real-time alerts



# Video Analytics Pricing



Cloud solution example

Select from two pricing metrics (# of cameras or # of hours per month); Requisite product components are in both

## 1. Real-time video analysis

Find Average Deal size nearest to opportunity size based on # Managed Client Device (cameras). See recommended guidance on discounting (make sure to consider PA Band Entitled Pricing).

- List price / camera = \$2000
- Client's entitlements are Recurring

## 2. Forensics (Post event) analysis

Find Average Deal size nearest to opportunity size based on # Monthly Hours (hours/month). See recommended guidance on discounting (make sure to consider PA Band Entitled Pricing).

- List price = \$2.5 per cpu hour per month
- Client's entitlement is perpetual license for Monthly Hour (hours/month of analysis) No roll-over of minutes

Average Deal size	# of Cameras	# of hours/month	List Price	Average Discount	Discounted price
PoC	50	800	\$100,000	35%	\$65,000
Small	100	1600	\$200,000	45%	\$110,000
Medium	250	4000	\$500,000	55%	\$225,000
Large	500	8000	1,000,000	65%	\$350,000
X-large	1000	16000	2,000,000	75%	\$500,000

# Positioning

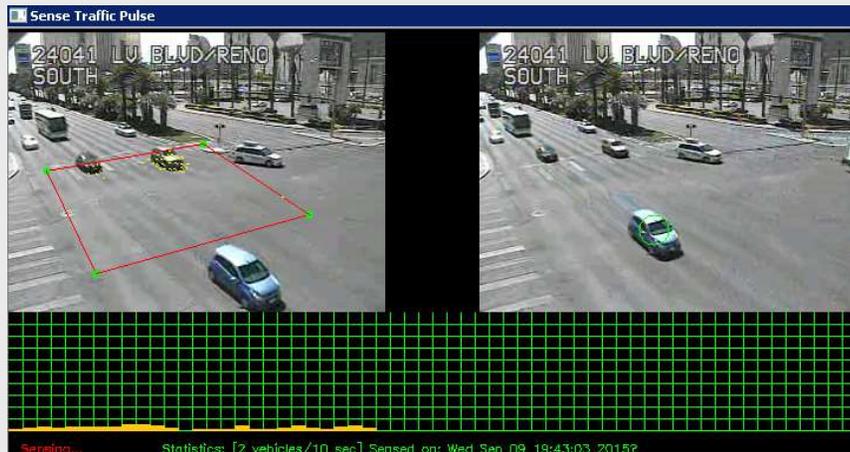


**Sense Traffic Pulse**™  
On Demand Intelligent Video  
Analytics



**aws** partner  
network

Standard  
Technology  
Partner



# Things to look for when identifying an opportunity

- Large Enterprises with decades worth of video content
- Large enterprises looking to get more out of existing video infrastructure



**Limited staffing** available to mine video and/or monitor operations

**Excessive false positives** with current solution

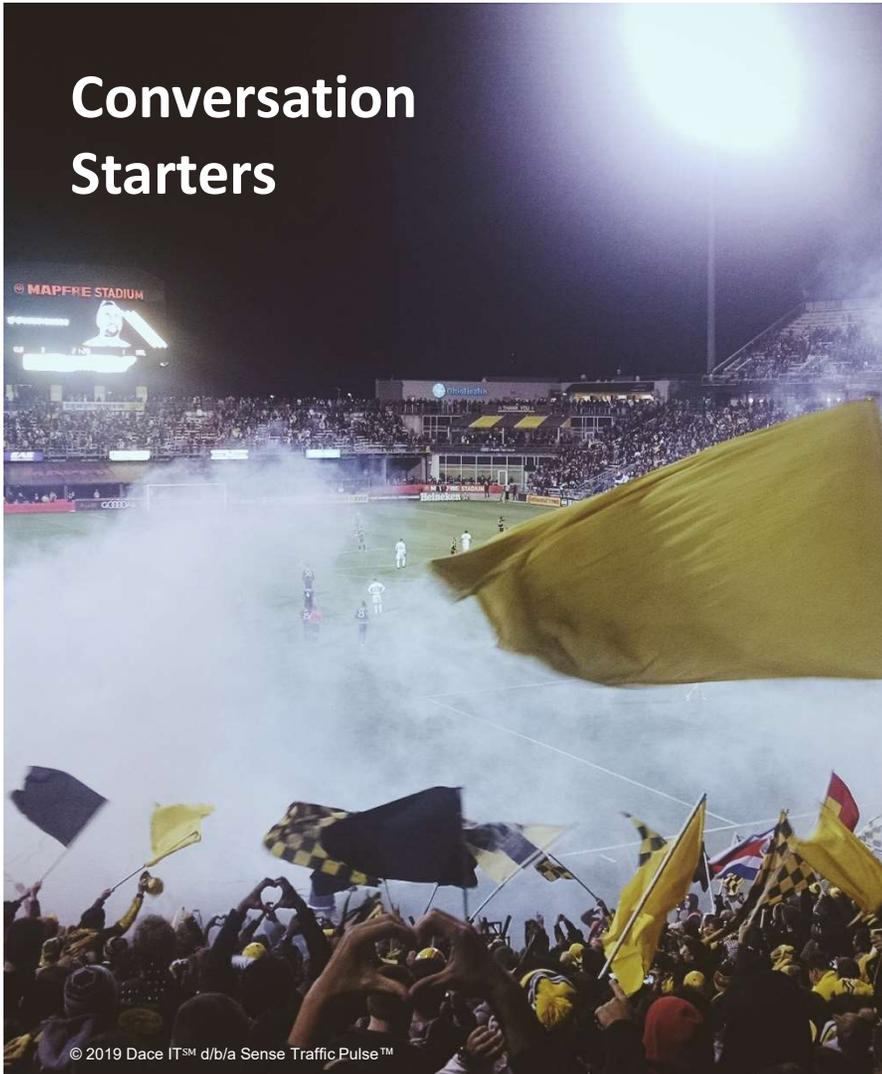
**Inability to integrate or upgrade models** to detect new actionable insights

**Need to run analytics on the edge** for faster responses to actions and upstreaming filtered data of importance

## Improvement of overall video strategy

- Inability to leverage the current video infrastructure; no intelligence mining
- Siloed video management solutions that do not provide a comprehensive monitoring and search capability
- Ineffectively analyzing growing amounts of video footage for proactive safety or customer experience
- Desire to increase value locked in video content

# Conversation Starters



## Target LOB and IT Buyers

1. How much time does your agency spend reviewing video to identify an event, person or object? Are the labor costs of monitoring video unacceptably high?
2. Is your organization/agency struggling to handle increasing video volume?
3. Are you proactive or reactive when faced with an incident?
4. Would you like to more easily mine and reuse existing video content by reducing search times?
5. Is your organization/agency interested in using video analytics for increased efficiencies in operations?
6. As video content continues to grow and will include video from non-traditional cameras (body cams, drones), are you looking to get more out of your video assets and investments?

## Key Vendor Strength / Weakness Analysis and Dace IT<sup>SM</sup> d/b/a Sense Traffic Pulse<sup>TM</sup> Positioning response

Company	Strengths	Weaknesses	Dace IT <sup>SM</sup> d/b/a Sense Traffic Pulse <sup>TM</sup> response	Competitor's edge
<b>IntelliVision</b>	<ul style="list-style-type: none"> <li>Efficient and effective VMS , camera agnostic with advanced capabilities</li> </ul>	<ul style="list-style-type: none"> <li>Depends on partners for selling its offerings.</li> <li>No self learning capabilities and compound real time alerting</li> </ul>	<ul style="list-style-type: none"> <li>Domination in complex behavior analysis, self learning, scalability, extensibility &amp; advanced analytics</li> </ul>	1000+ deployments, video summary capability
<b>Avigilon</b>	<ul style="list-style-type: none"> <li>Appearance search technology. Identifies objects and searches from video</li> <li>Acquisition by Motorola is expected to strengthen its supply chain and operations</li> </ul>	<ul style="list-style-type: none"> <li>High dependence on partners and resellers</li> </ul>	<ul style="list-style-type: none"> <li>Domination in complex behavior analysis, self learning, scalability, extensibility. Wider presence in worldwide than Avigilon</li> </ul>	Edge based solution
<b>Cisco</b>	<ul style="list-style-type: none"> <li>Technologically advanced - with VA software embedded on IP cameras and other video equipment</li> <li>Strong and diverse customer base</li> </ul>	<ul style="list-style-type: none"> <li>Dependent on hardware sales for its growth in the video analytics market, as software is embedded within hardware</li> </ul>	<ul style="list-style-type: none"> <li>Camera agnostic offerings and integrates with multiple VMS . No dependency on camera hardware. We offer both face and number plate detection</li> </ul>	Brand presence in security space
<b>Agent Vi</b>	<ul style="list-style-type: none"> <li>Offers broad range of capabilities both on cloud and on –prem</li> <li>Camera agnostic, cutting edge deep learning principle. Offers BI and visuals</li> <li>Strong competitor to Dace IT<sup>SM</sup> d/b/a Sense Traffic Pulse<sup>TM</sup></li> </ul>	<ul style="list-style-type: none"> <li>No compound alerting</li> <li>Analytics capabilities cannot be as wide as Dace IT<sup>SM</sup> d/b/a Sense Traffic Pulse<sup>TM</sup></li> </ul>	<ul style="list-style-type: none"> <li>Domination in complex behavior analysis, self learning, scalability, extensibility and compound alerting. Can connect weather and traffic data together which very less companies offer</li> </ul>	Edge based solution Offered first deep learning offering
<b>Identiv (3VR)</b>	<ul style="list-style-type: none"> <li>Video review and search software, integrates with any VMS, Cloud-based Video Surveillance Solutions, and Physical Security Information Management Systems (PSIMS)</li> </ul>	<ul style="list-style-type: none"> <li>No compound real time alerting, camera tampering capability</li> </ul>	<ul style="list-style-type: none"> <li>Open and extendible architecture, integration with sensors, VMS, cognitive capabilities. Can connect weather and traffic data together which very less companies offer</li> </ul>	Customer presence
<b>Honeywell</b>	<ul style="list-style-type: none"> <li>Well established brand name in video analytics market</li> <li>Offers both VMS and camera embedded analytics</li> </ul>	<ul style="list-style-type: none"> <li>Lacks some of the new capabilities like video summary, self learning when compared with competitors</li> </ul>	<ul style="list-style-type: none"> <li>Domination in complex behavior analysis, self learning, scalability, extensibility &amp; advanced analytics</li> </ul>	Brand presence in this field

# Dace IT<sup>SM</sup> d/b/a Sense Traffic Pulse<sup>TM</sup> Differentiators

## Drive better decisions faster with Video Analytics & Google Vision Vision



### FLEXIBLE

Easy custom models

Create new, custom models easily without engaging AI experts or development teams; Camera and VMS vendor agnostic; Live and post event analysis.

### ACCURATE

Continuous learning

Configurable deep learning capability enables reduction in false positives and continuous system improvement over time.

### SPEED

Better performance

Optimized GPU-based power hardware and advanced algorithms deliver higher performance for workloads such as video indexing & automated redaction

### TRUSTED

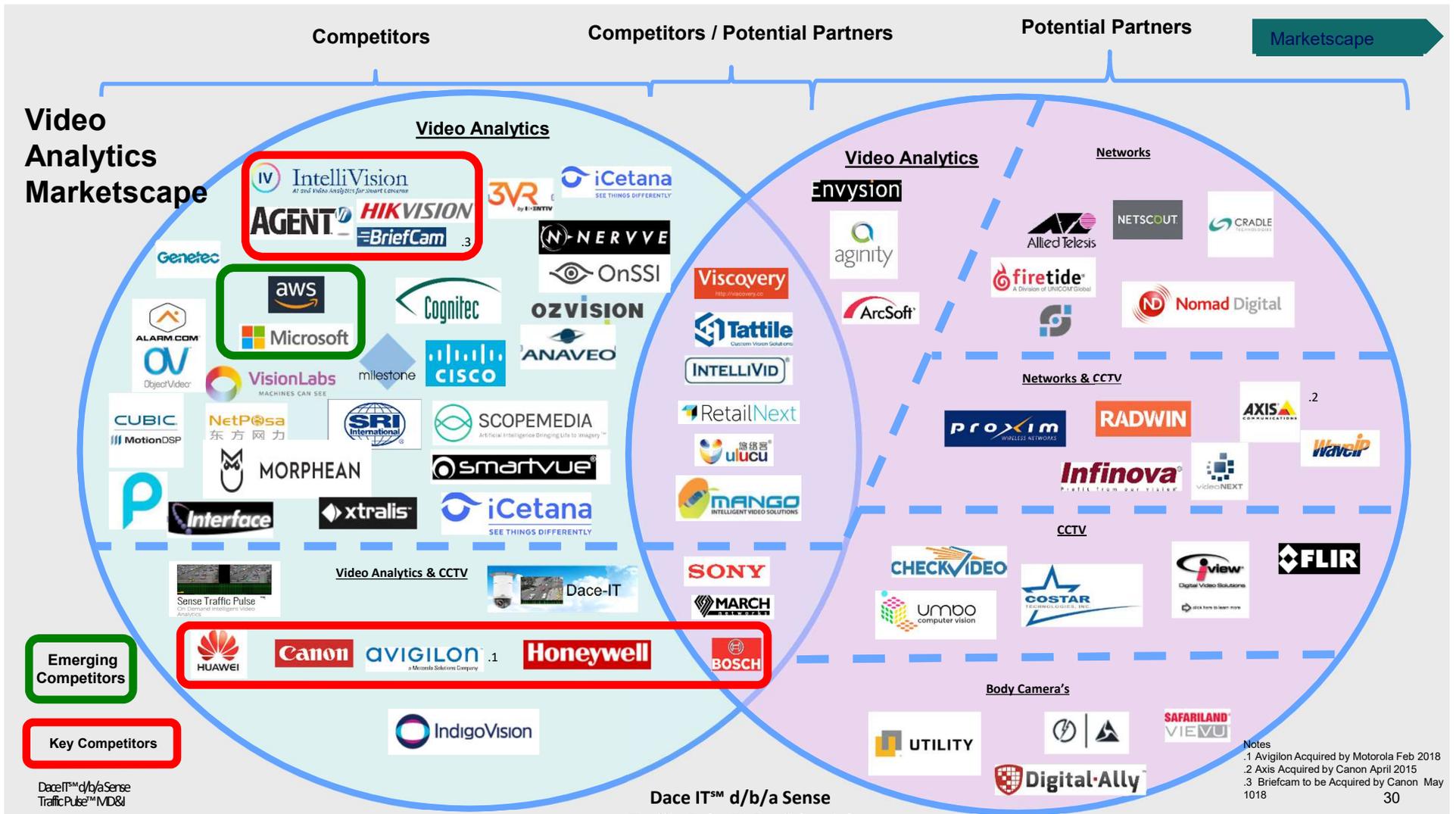
Backed by Dace IT<sup>SM</sup> d/b/a Sense Traffic Pulse<sup>TM</sup>

Based on real-world experience and decades of innovation by Dace IT<sup>SM</sup> d/b/a Sense Traffic Pulse<sup>TM</sup> Research & Development.

Exception  
process to  
add to  
**Face**  
**Recognition**  
to a  
Video  
Analytics  
opportunity

- Exceptions are granted on a case by case basis and require several levels of approvals
- Please account for sufficient time for this process (1-2 weeks). Also allow for services resources/\$\$ to integrate FR into the base solution (assuming approval)
- Do not finalize the deal with the customer until all approvals are received
  1. Seller completes the end-user questionnaire (attached) and sends it to **admin@US.Dace IT.us**

# Competitive Analysis



# Top Vendors: Solution Capability Comparison

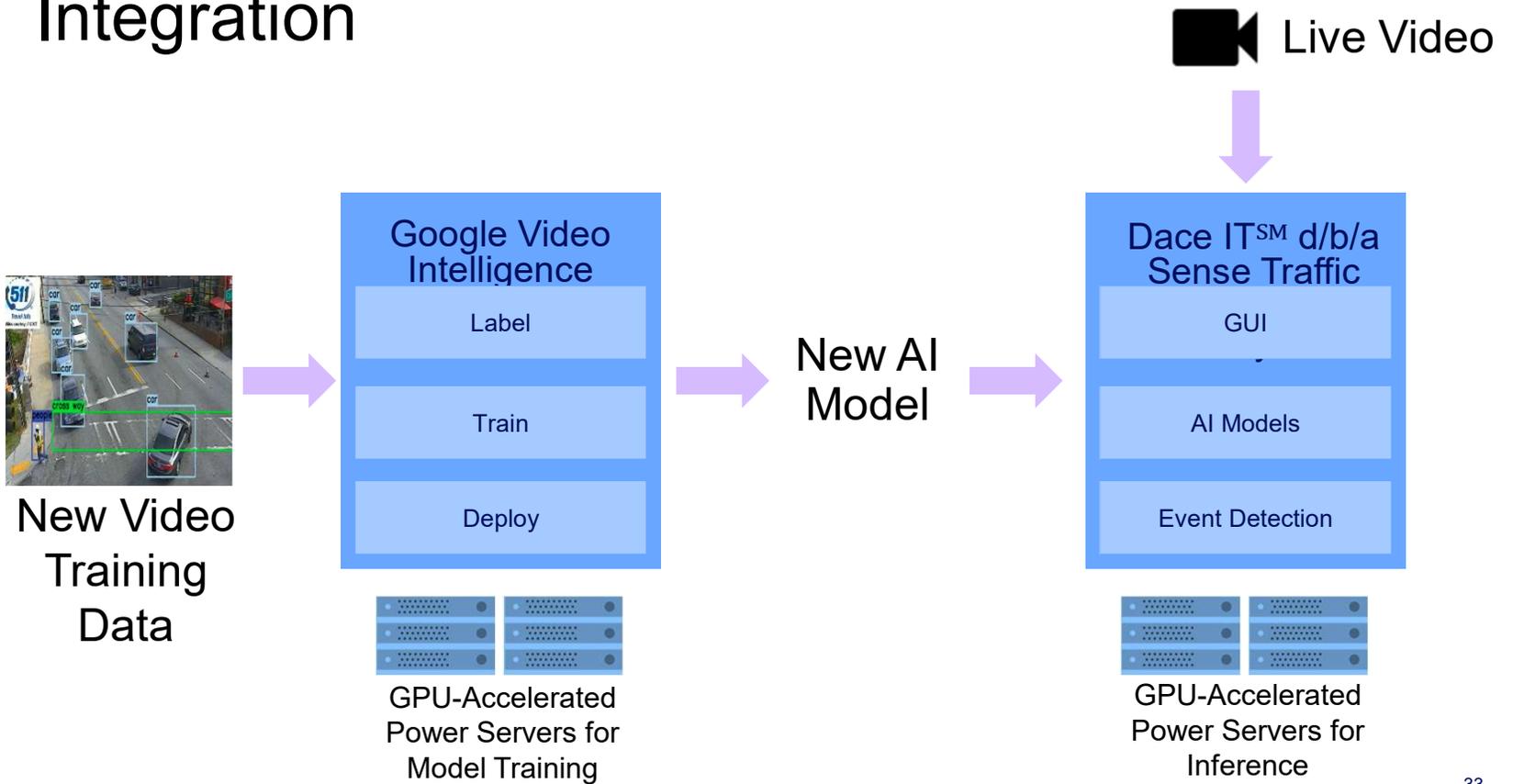
<b>Key Capabilities</b>	<b>IBM</b>	<b>IntelliVision (Aquired by Nortek)</b>	<b>Honeywell</b>	<b>Cisco</b>	<b>Bosch</b>	<b>Identiv (3VR)</b>	<b>Agent Vi</b>
Key Differentiations	Camera agnostic and advanced analytics software	Provides video summary, save times. 1000+ customer deployments	capable of monitoring and analyzing the behavior of up to 20 objects per camera view	Video analytics hosted on Cisco devices.	Video analytics at the edge, in built in video analytics	Combines analytics, video storage in one system	Camera agnostic, cutting edge deep learning principle. Offers BI and visuals
Behavior analytics (motion, loitering, tripwire)	✓	✓	✓	✓	✓	✓	✓
Complex behavior( color, size , speed, running, crossing)	✓	✓ (running/ crossing)	✓	✗	✓	✓	✓
Subject identification (person, vehicle, animal)	✓	✓	✓	✓	✓	✓	✓
Camera tampering / real time alerting	✓	✓	✓	✓	✓	?	✓ (real time alerting)
Complex real time alerting (region of interest, direction)	✓	✗	?	✓ (dwell time)	?	?	✗
Compound real time alerting (combination of alert to reduce false positives)	✓	✗	✓	?	✓ (no false alerts)	✗	✗
Full incident indexing (stores and indexes all alerts)	✓	✓	✓	✓	✓	✓	✓
Object detection ( object left, removed, bag left etc)	✓	✓	✓	✓	Very basic	✓	Advanced
Video counter (counts people, vehicle, lane, objects)	?	✓	✓	✓	✓	?	✗
Facial recognition	✓	✓	✓	? (not specified)	?	✓	?
License plate recognition	✓	✓	✓	?	?	✓	?
Video summary (reduces a long archived video into a manageable video summary with actual events)	?	✓	✓	?	✓	?	✗
Analytics self learning, auto improvement	✓	✗	✗	✗	✗	✗	✓ (auto learning on object classification)
Alert searching (incident video search)	✓	✗	✗	✗	✗	✓	✓
Edge based solution (camera based etc.)	✗	✗	✓	?	✓	✗	✓
Provide HW/camera as well	✗	✗	✓	✓	✓	✓	✓ (HW)
Server based solution	✓	✓	✓	✓	✓	✓	✗

? = Capability Unknown

# Key Components of Video Management & Analytics

- **Camera** - Static (CCTV) cameras, body-worn cameras, etc. (through partners like Axis, Canon, Pelco, etc)
- **Video Management** - Access to video streams from camera, storage, view, etc. (through partners: Genetec, Milestone, Pelco, etc.)
- **Video Analytics** - Getting insight out of video, finding objects and patterns of interest, being alerted on events, etc. through Dace IT<sup>SM</sup> d/b/a Sense Traffic Pulse<sup>TM</sup> Video Analytics
- **Solution / Application** - Ex. Command & Control Center for public safety, etc. through partner solutions or Dace IT<sup>SM</sup> d/b/a Sense Traffic Pulse<sup>TM</sup> On-demand Intelligent Video Analytics offers outsource dataset labeling image, audio, and video data.
- **Hardware** - including networking, edge devices, server / cloud deployment, storage, etc. Available through Google Cloud Platform
- **Software** - to support the end-to-end process for processing, analyzing video data and presenting insight to users through combined Dace IT<sup>SM</sup> d/b/a Sense Traffic Pulse<sup>TM</sup> & partner solutions
- **Custom models** - to train custom models for domain specific solutions through Dace IT<sup>SM</sup> d/b/a Sense Traffic Pulse<sup>TM</sup> Google Video Intelligence
- **Services** - to address the end to end process from assessing the existing environment, designing the to-be-state (incl. hardware and software selection), building out the solution and operating/maintaining it through Dace IT<sup>SM</sup> d/b/a Sense Traffic Pulse<sup>TM</sup> PSO

# Google Video Intelligence + Video Analytics Integration



# Video Analytics Capabilities

CUSTOM MODELS (Google Vision Vision)

## People

- Person attributes (hair color, facial hair, gender, age, clothing colors & patterns)
- Trails or tracks (foot traffic)
- Tripwire / zone intrusion
- Heat map of dwell times
- Complex alerts
- People count and Crowd formation
- Redaction

## Object

- Speed and direction
- Abandoned object or object missing
- Tracks of objects; Object counts
- Heat map
- Loitering / Illegal parking / Intrusion
- Tripwire (cross virtual line in camera)
- Complex alerts
- Metadata to external systems
- License plate recognition (via 3<sup>rd</sup> party)

## Examples

### OUT OF THE BOX

#### Indoors

Customer Journey	Track where customers spend their time
Person Search	Search for person based on <b>face</b> or clothing attributes
Queue Length	Monitor line length (events, stores, gates, exits)
Abandoned object	Identify abandoned object and send alert
Restricted Zones	Monitor restricted areas and notify if intrusion
Unusual Behavior	Notify if loitering is detected
Tripping Hazard	Identify hazards that could cause trips/falls
Object management	Identify abandoned objects and where they collect
Crowd Management	Detect crowds forming
Customer Footfall	Count how many people enter / exit the terminal

### OUT OF THE BOX

#### Outdoors

Vehicle license recog.	Identify vehicles parked or entering airport grounds
Abandoned vehicle	Detect and alert security
Illegally parked vehicle	Detect and alert security
Suspicious vehicle /Loiter	Detect and alert security
Curbside congestion	Detect and alert security at pickup and drop off locations

### WITH CUSTOM MODELS (Examples)

Object identify & search	Confirm objects and alerts
Apron operations	Monitor fuel, baggage, food trucks. Alerts for delays
Safety Hazards	Detect flocks of birds, runaway carts, items on road
Safety inspection	Help with visual inspection

# Video Analytics Differentiators

## Flexible

- Camera and VMS vendor agnostic
- Ability to analyze video from static and moving cameras
- Metadata can be made available to external systems

## Accurate

- Extend model to recognize new objects / behaviors
- Minimize false positives
- Full Event Indexing
- Advanced Color Recognition
- Sophisticated Behavioral Alerts
- Compound Alerting; Real-time alerts
- Statistical analyses

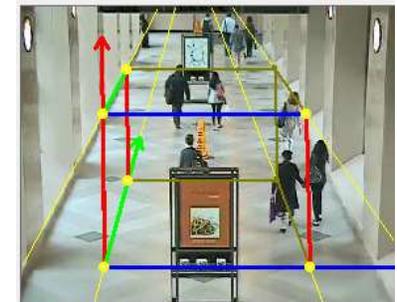
## Faster Search

- Easy to use attribute search capabilities
- Rank ordering of search results based on confidence scoring

## Faster in large scale use cases

- High scalability able to capture and process billions of events monthly
- Enhanced to address challenges of urban environments and crowds

[DEMO LINK](#)



## Sense Traffic Pulse™ Video Analytics 2.0 Future Capabilities

Feature/Capability	Video Analytics 2.0
Abandoned object / New object in frame	Yes
Loitering (people or vehicles) and Tripwires	Yes
Heat map (dwell times)	Yes
Track object direction; Count objects/people; Detecting crowds	Yes
Rapid search of recorded video (with confidence score)	Static & moving
Real time and compound alerts	Yes
Metadata available to external systems	Yes
Redaction	Yes
VMS supported	Genetec Security Center 5.7 SR1 and SR5, Genetec Security Center 5.5 SR4 and SR5, Milestone XProtect Corporate 2013 R2, and later, Pelco VideoXpert 2.0
Searching for people using attributes (Deep Learning)	Yes
Support for Power 9 system	Yes (Phase 1)
Integration with Google Vision Vision modeling tool	Yes
Container-based delivery for faster install/upgrades	Yes
Composite object detection and alerting	Yes
Tensor RT for scalability	Yes

**Note: No Facial Recognition, Skin tone or Ethnicity functions in base product**

See Announcements for more detailed descriptions

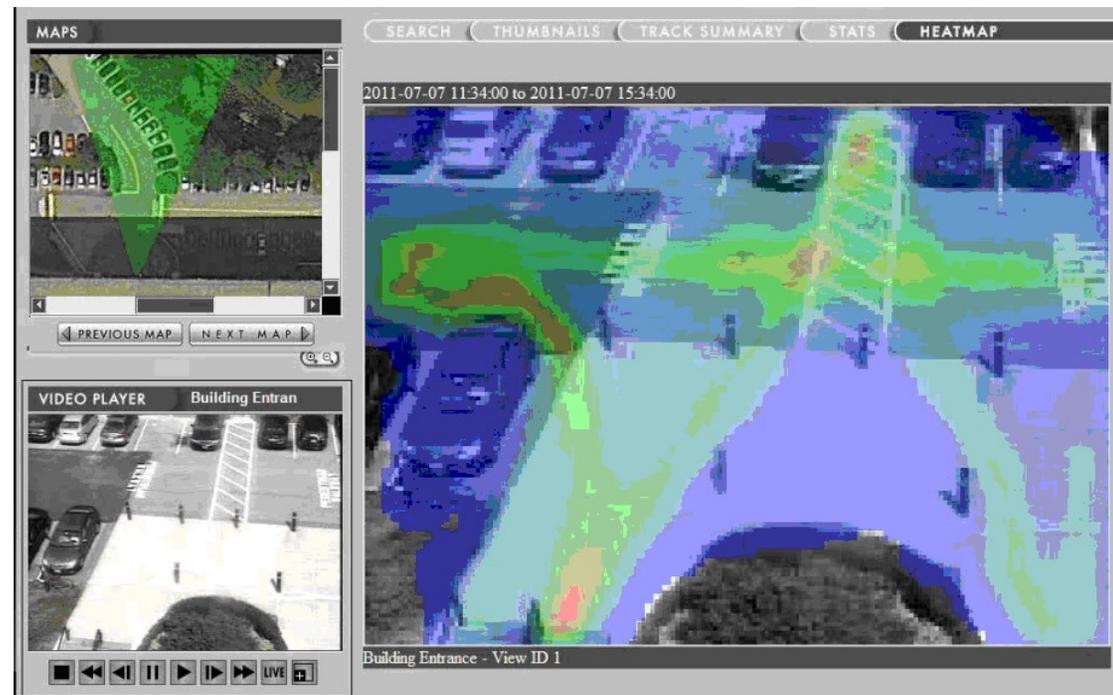
# Identify Abandoned or Suspicious Objects

- Alert for combination of situations (i.e. bag left unattended for certain period)
- Designed specifically for high population areas to reduce false alerts
- Detects objects in varying situations (i.e. bad lighting, lot of activity)
- Combines learning to realize “is it still there?” – background, object identification and duration



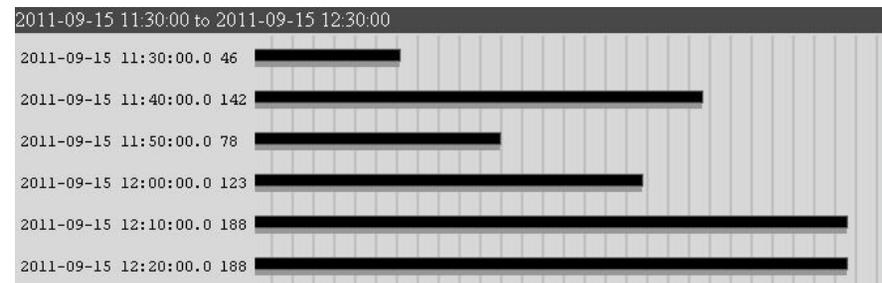
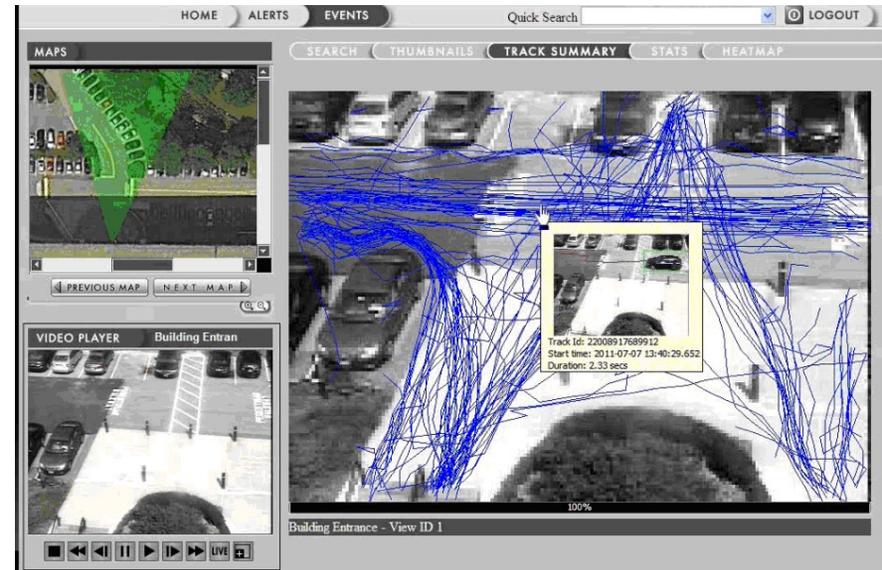
# Heat Map

Demonstrates the areas where the movement of objects was greater, and the items in red are where the object's stay longer



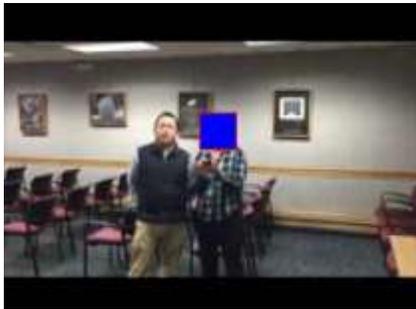
# Tracking

- Shows the path that the object has gone through.
- Passing the cursor over the line shows the event photo.
- Clicking the photo displays the recorded video of the event.
- Activity Histogram



# Redaction

Obfuscate people or objects in the video for privacy or to protect confidential material



Blank Fill



Gradient Map



Blur



Pixelate

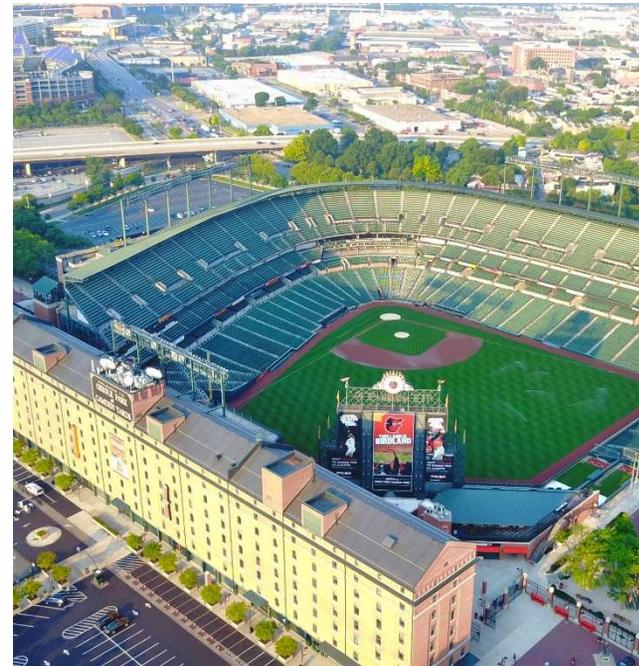
# Behavioral Analytics

- Classification - size, speed, trajectory, color, time, duration, shape, features
- People Search
- Vehicle Search
- Tripwires
- Directional motion
- Region of interest & un-interest
- Object removal
- Abandoned object
- Crowd behavior
- Counting
- Loitering
- Speed detection



# Location monitoring

- Classification  
Size, speed, trajectory, color, time, duration, shape, features
- People Search
- Vehicle Search
- Tripwires
- Directional motion
- Region of interest & un-interest
- Object removal
- Abandoned object
- Speed detection



# Multiple Attribute Query Example

male, bald with  
eyeglasses, beard



Bald="Yes"

Skin="Light"

Eyeglasses="Yes"



**90.89**

Eyeglasses 98.14

Bald 95.44

Skin Tone 79.10

**88.98**

Eyeglasses 99.02

Bald 77.54

Skin Tone 90.38

**88.60**

Eyeglasses 99.20

Bald 78.97

Skin Tone 87.64



**86.36**

Eyeglasses 81.72

Bald 87.06

Skin Tone 90.29

**84.23**

Eyeglasses 78.99

Bald 77.11

Skin Tone 96.58

**83.08**

Eyeglasses 90.85

Bald 75.72

Skin Tone 82.69

# Tracking

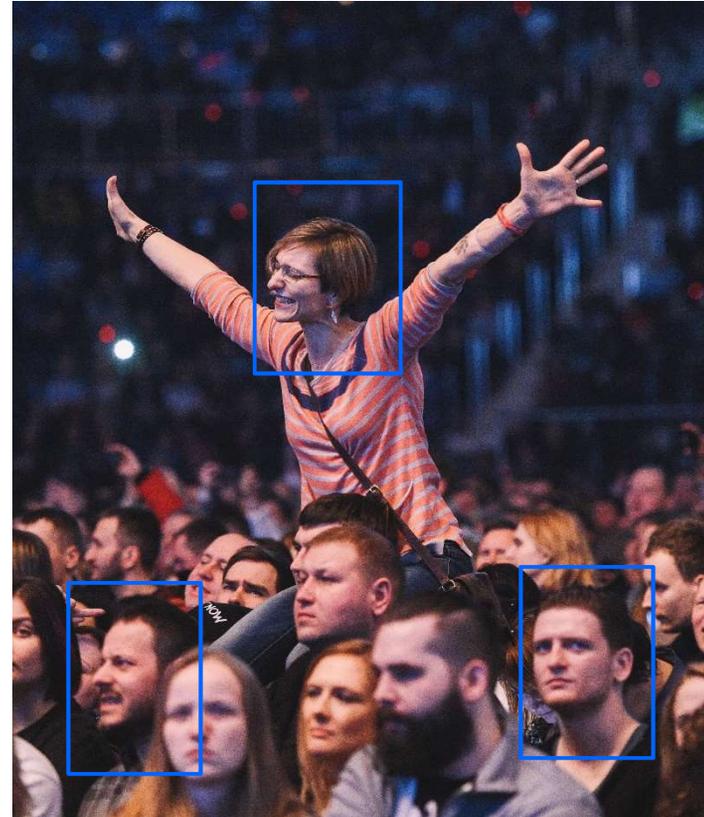
- Shows the path that the object has gone through.
- Passing the cursor over the line shows the event photo.
- Clicking the photo displays the recorded video of the event.
- Activity Histogram

The screenshot displays a web-based tracking application interface. At the top, there are navigation tabs for HOME, ALERTS, and EVENTS, along with a Quick Search bar and a LOGOUT button. The main interface is divided into several sections:

- MAPS:** A satellite map view showing a green highlighted area with a green arrow indicating a path.
- VIDEO PLAYER:** A video player window titled "Building Entran" showing a recorded video of a building entrance.
- TRACK SUMMARY:** A large window showing a complex network of blue lines representing movement paths over a satellite map. A yellow box highlights a specific event, with a tooltip showing: "Track Id: 22008917689912", "Start time: 2011-07-07 13:40:29.652", and "Duration: 2.33 sec".
- Activity Histogram:** A bar chart at the bottom showing activity levels over time. The x-axis represents time from 2011-09-15 11:30:00 to 2011-09-15 12:30:00. The y-axis represents activity count. The data points are: 2011-09-15 11:30:00.0 (46), 2011-09-15 11:40:00.0 (142), 2011-09-15 11:50:00.0 (78), 2011-09-15 12:00:00.0 (123), 2011-09-15 12:10:00.0 (188), and 2011-09-15 12:20:00.0 (188).

# Crowd monitoring

- Identify what to watch (i.e. people gathering in locations / flash mob situation)
- Determine the situation for awareness (i.e. number in one area over time period)
- Notify personnel to address crowd management
- Face capture, facial search
- Crowd behavior
- Counting
- Loitering



# Compound Alerts / Complex Events

Distinguish traffic vehicles from trains

TIME: 0.0  
STATIC: 0

Robust to headlights during night time

The full scenario

Municipio de Tigre

Smart Analytics at work

# Events & Alerts for Traffic Management

## Advance Traffic Information

- Quantity, speed & type of traffic through a location
- Status of location: free, congested,...
- Direction of traffic

## Alerts

- Monitor scene for specific pre-defined activities and alert the user immediately



## Sense Traffic Pulse™ & Google Vision: Value Proposition

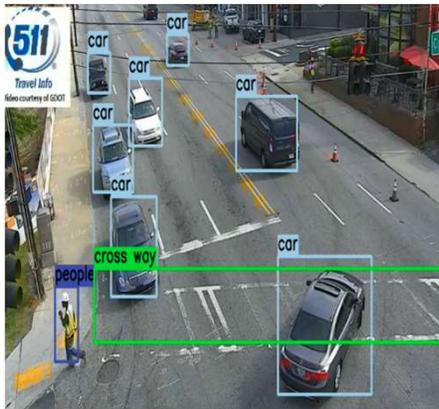
- AI Made Simple
  - Clicker tools to train models with no coding or expertise in technologies
  
- End to End ecosystem
  - Disjoint activities streamlined into simple sequential tasks
  - Life cycle management for models and data
  - Train on server but deploy on cloud or edge for inference
  
- Enterprise grade offering
  - Collaborative platform between several personas
  - Open architecture extensible with existing enterprise assets
  - Backed with support and services from Dace IT<sup>SM</sup> d/b/a Sense Traffic Pulse™ and Partner: Google Cloud Professional Services Organization

# AutoML Core Capabilities

- Classification of Images
- Object Detection
- Auto labeling of images and Videos
- Prebuilt models for classification
- RESTFul interface to integrate into solutions
- Import Custom Models to train and host for inference
- Data Augmentation
- Compress and accelerate models for FPGA
- Dace IT<sup>SM</sup> d/b/a Sense Traffic Pulse<sup>TM</sup> Video Analyti for end user experience

# Sense Traffic Pulse™ & Google Video Intelligence : “Point and Click” AI for Images and Video

## Label Image or Video Data



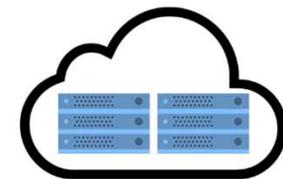
## Auto-Train AI Model



## Package & Deploy AI Model



Edge



Cloud

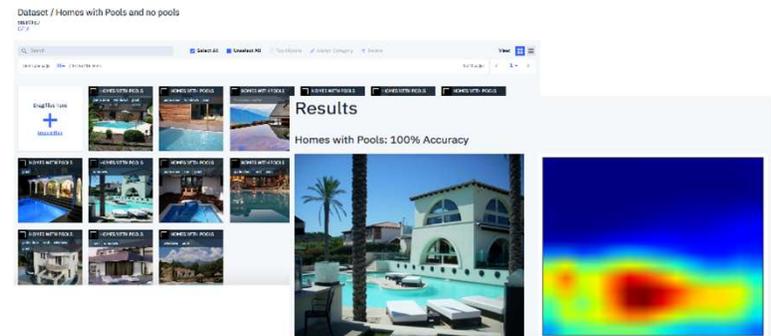


On premise

## Sense Traffic Pulse™ & Google Video Intelligence Capabilities: Core Capabilities

- Clicker tool for modelling
- Classification of Images
- Object Detection
- Custom training and monitoring
- Prebuilt base models with optimized hyper-parameters
- Host trained models for inference

### Label & Train



### Label & Train



# Sense Traffic Pulse™ & Google Video Intelligence Capabilities (cont)

Auto Label & Train

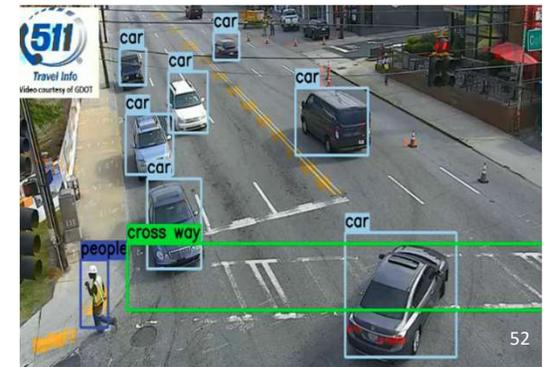
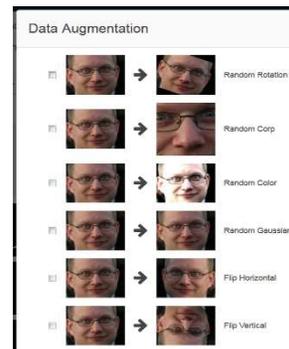
[DEMO LINK](#)

- Auto labeling of Images and Videos
- Data Augmentation to work on limited datasets
- RESTful interface to create custom solutions
- Compress and accelerate large DNN models to infer on Edge devices

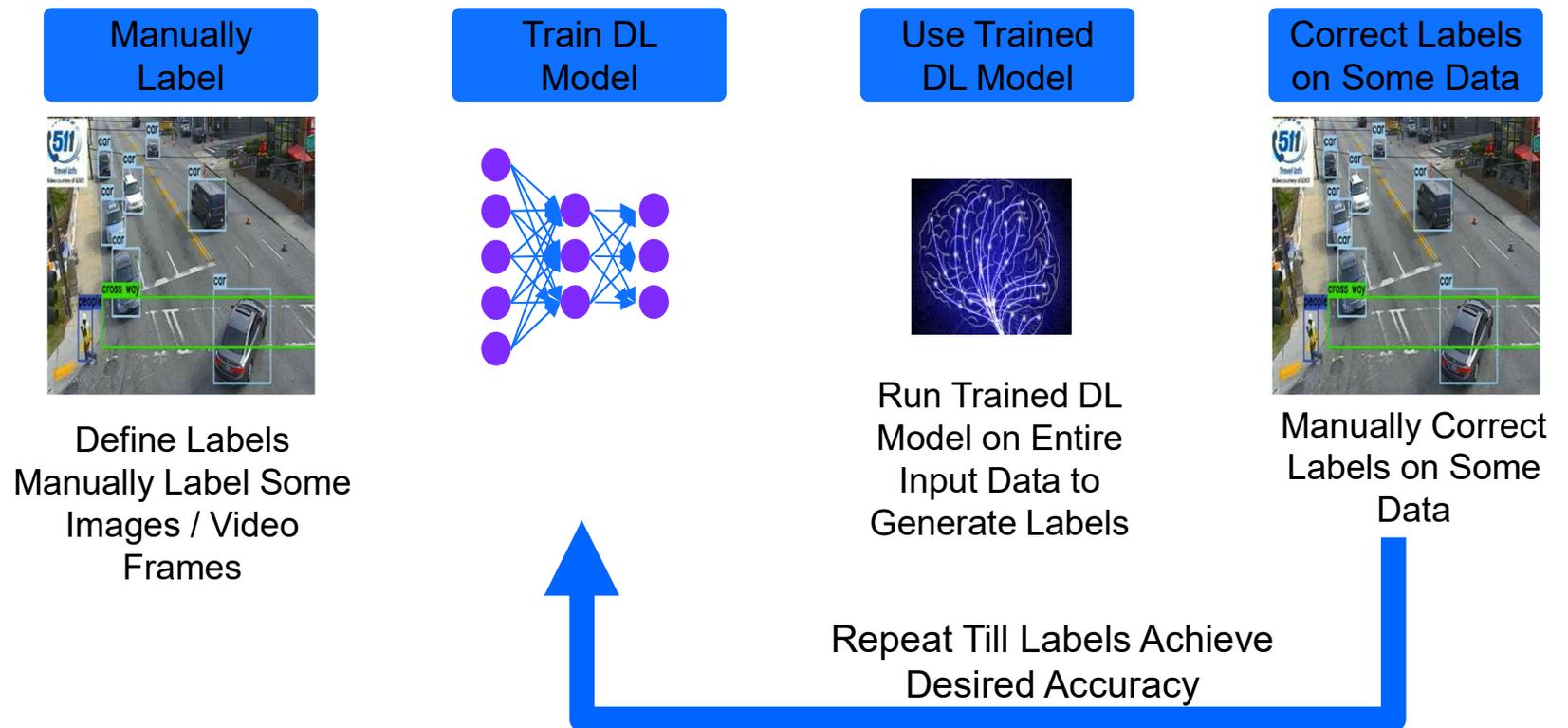


Augment

Custom solutions



# Semi-Automatic Labeling using AutoML



# Installed base models

- Prebuilt base-models for known objects around us
- Prebuilt base-models transfer learn faster on the defined topics
- Import custom base-models for transfer learning



### Add Dataset - Image Classification

DataSet Name

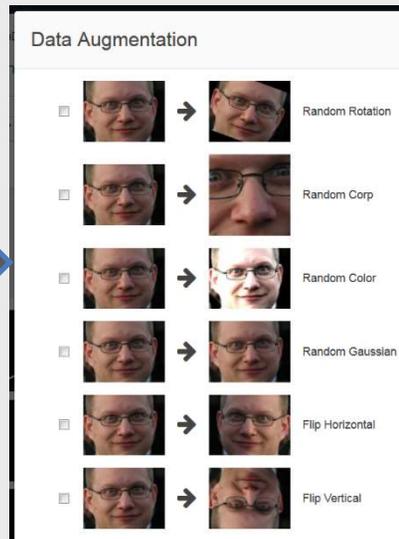
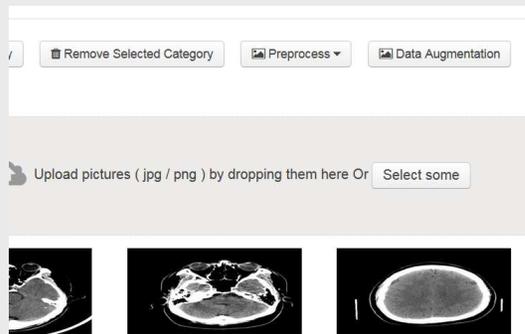
Scenario -- Flower

- Flower ( various flowers )
- Landscape ( mountain, coast, forest, country side )
- Chinese food ( dumpling, rice, noodle, seafood, etc. )
- Action ( fishing, reading, climbing, etc. )
- Scene ( airport, street, building, campus, etc. )
- Face ( human face )
- Vehicle ( Jeep, Car, Sport Car, SUV, Van )
- Others ( other scenarios )

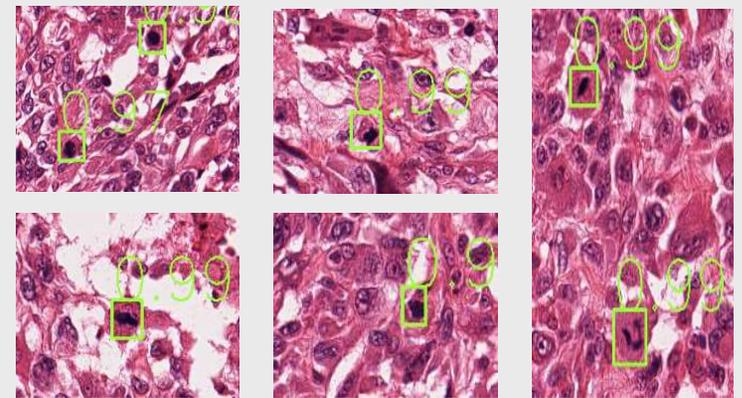
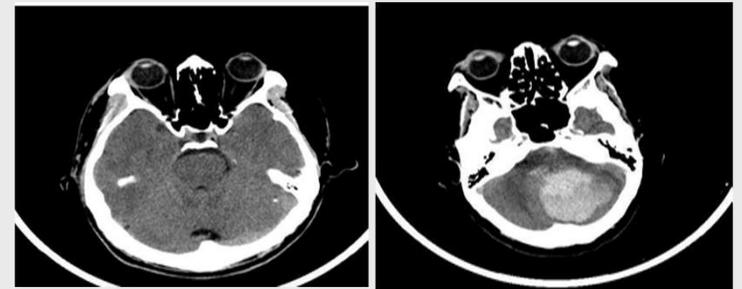
Cancel Add Dataset

# Augment limited datasets for higher accuracy (coming soon)

- The variety of images for medical research are limited
- Software can apply filters to augment data and increase images for training
- Augmented data reduces overfitting for small datasets and increases accuracy



Medical image analysis for cerebral hemorrhage



Accuracy: 97.9%