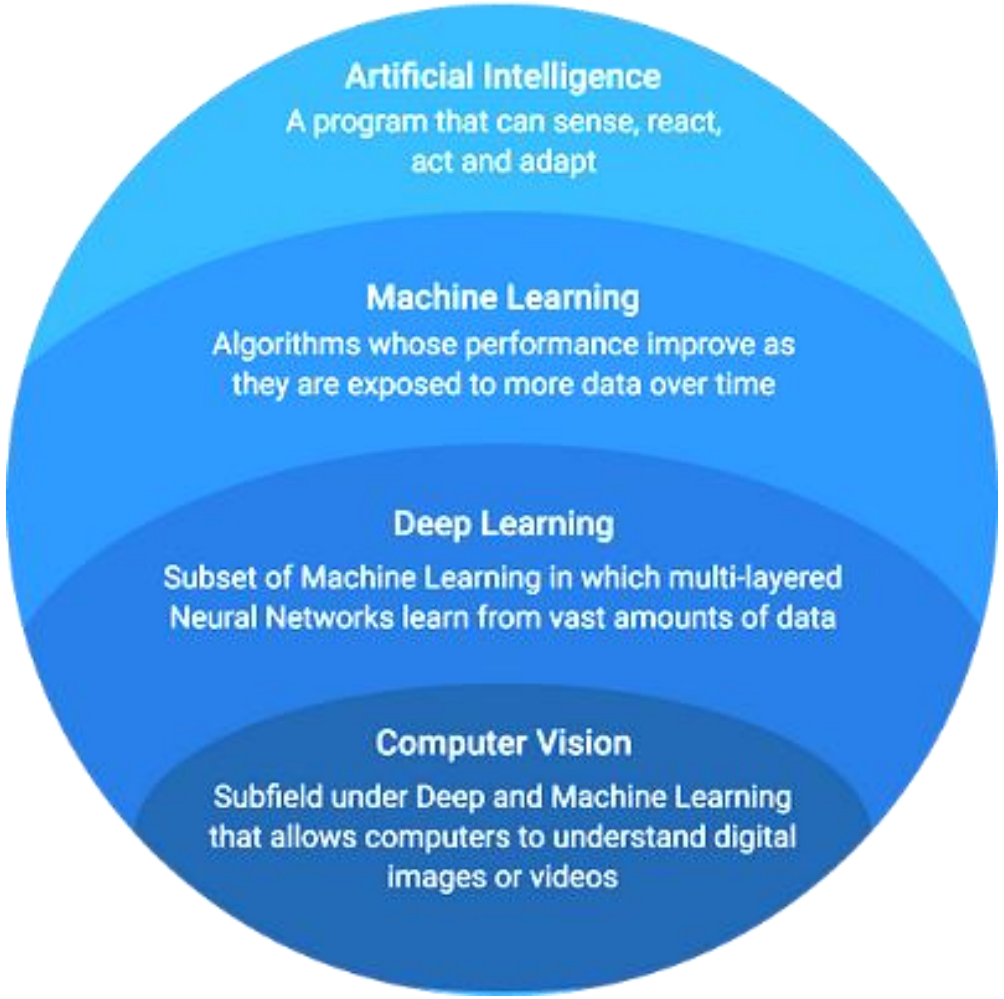
SparkCognition Visual AI Advisor

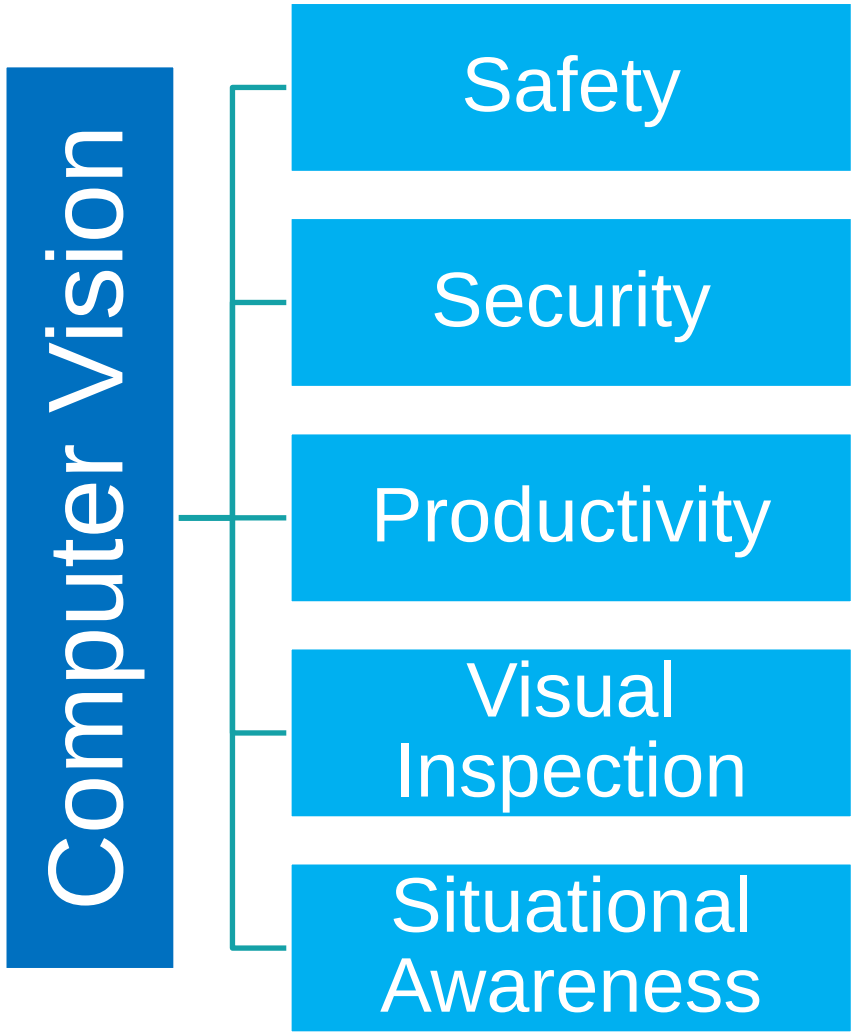
What is Visual AI

AI Enabled Computer Vision

- Capture and interpret rich media content like video and still images
- Classify objects (people, assets, etc.) with machine learning models
  Train machines to interpret and understand media content
- Capabilities include:
  - Object Detection & Tracking
  - Scene Understanding
  - Facial Recognition
  - Image & Video Forensics
  - Activity, Event & Threat Detection
  - Inspection



Visual AI Use Cases



- Accident detection
- Near-Miss detection
- Fires / Falls / Spills
- PPE compliance
- Equipment Compliance
- Traffic rule compliance

- Intrusion detection
- Space Encroachment
- Access Control
- Authorized Access
- After-hour Activity

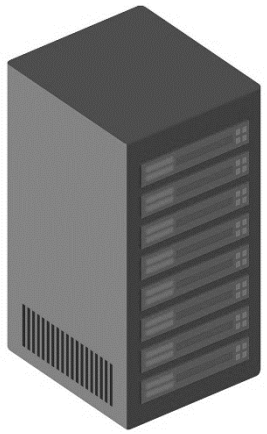
- Asset Utilization
- Turn-around Time
- Volume / Speed / Effort
- Measurements
- Mapping

- Defect Detection
- Quality Control

- Business Intelligence
- Customer Analytics
- Vehicle Analytics
- Behavioural Analysis

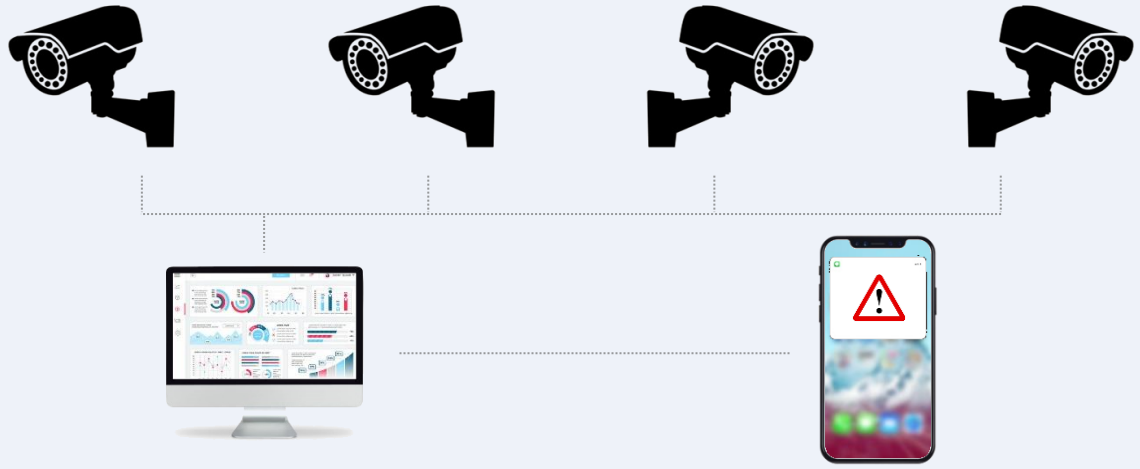
Conventional vs. AI Approach to Visual Analysis

TRADITIONAL APPROACH



- Collects and stores visual data
- Dead digital feed – no insights or actions
- Playback is retrospective (i.e., used for post-incident/accident investigation)
- No corrective actions issued; no real time risk dashboard

AI ENABLED APPROACH



Active Dashboard

Proactive Alerts

Proactive monitoring of people, process, and physical assets

Alerts sent to key stakeholders

Immediate feedback / corrective action taken

Reduced incident rates and increased productivity

Visual AI Advisor (VAIA)

CHALLENGE:

- > 1B CCTV Cameras Worldwide
- Minimal manual monitoring is the norm
- Average safety incident is > $120K/per and can carry regulatory fines
- Security violations can have serious repercussions
- Lack automation can compromise throughput

SOLUTION: VISUAL AI ADVISOR

- AI-Powered visual analytics platform
- 100+ use cases covering safety, security, productivity, visual inspection, and situational awareness
- Leverage existing infrastructure and actively responding in real time to events 24 x 7
- Manage risk and drive operational excellence

Benefits:

- Prevent catastrophic events and brand damage
- Mitigate worker injury
- Unlock transformational value from your existing CCTV infrastructure

Highlights:

- Library of over 100 pre-built computer vision use cases
- LC/NC (“drag-and-drop”) development environment for rapid customization and deployment of use cases and dashboards
- SME-driven continual learning improves performance and reduces false positives
- Real-time notification alerts via web, mobile app, email, SMS, and on-site alarms

Use Cases & Case Studies

The Cost of Poor Safety

THE NUMBERS:

- Private industry employers report nearly 3 million nonfatal workplace injuries and illness each year (15% of the total in manufacturing)
- There are ~5,000 fatal occupational injuries in the U.S. each year
- Musculoskeletal disorders (MSDs) account for the largest portion of work-related injuries and illnesses, accounting for 30% in private industry, over 60% of which are potentially preventable
- More than 5,000 workers are injured annually in explosions and fires on the job
- US fire departments respond to nearly 40K industrial or manufacturing fires each year (65% of these fires occur in the manufacturing sector)
- 16% of all oil & gas fatalities are due to fires and explosions

THE COSTS

- The cost of job injuries and illness exceeds $250 billion each year
- Annual worker injuries cost employers more than $2,000 per employee
- Direct costs of a single workplace safety incident averages a minimum of $40K with indirect costs projected to be 2-10 times higher
- Safety costs range from $47K per accident to $1.2M per fatality
- Fires cost U.S. businesses more than $2.3 billion in property damage

Industries with the highest fatality rates:

- Agriculture, forestry, and fishing and hunting
- Mining and quarrying
- Oil & Gas extraction
- Transportation and warehousing
- Construction
- Wholesale trade

Top workplace injuries:

- Overexertion involving outside source
- Falls
- Struck by object or equipment
- Other exertions or bodily reactions
- Roadway incidents involving motorized vehicle
- Slip or trip without fall
- Caught in / compressed by equipment
- Struck against object or equipment
- Repetitive motion involving micro-tasks

The Impact of Security Lapses

THE FACTS:

- U.S. companies spend around $40 billion every year on physical security to protect their organizations' people and assets
- Commercial video surveillance systems mitigate operational disruption, regulatory non-compliance, harm to employees, and damages due to theft and vandalism
- In a recent business survey, 28% of respondents reported an increase in physical security incidents in 2021, up from 20% in 2020
- Asset and inventory theft has increased broadly across industry categories including heavy equipment, vehicles, lumber, and retail items exacerbated by shortages in labor (security guards) and materials and cost surges
- Even as the shift to IP-based cameras and video storage systems accelerates, most surveillance video gets deleted before viewing to contain storage costs and because of ineffective monitoring practices

THE COSTS

- U.S. retailers lose more than $60B each year due to theft accounting for nearly 2% of their bottom line
- According to the FBI, cargo theft costs trucking companies and shippers up to $30 billion annually
- CCTV monitoring typically costs around $150 per camera per month ($1800 annually) vs. an avg. of $33K to hire an unarmed security guard

Top Targeted Industries:

- Transportation
- Construction
- Manufacturing / Warehousing
- Retail
- Food and Beverage
- Consumer Electronics
- Pharmaceuticals
- Building & Industrial – Home & Garden

Top AI-powered Video Surveillance Tasks:

- Perimeter monitoring / Intrusion detection
- Access control / detect unauthorized personnel
- Retail theft detection
- Site security and inventory monitoring
- Suspicious activity detection
- After hour dock activity detection

The Downside of Poor Quality

THE STAKES:

- Manufacturers lose billions of dollars each year due to quality issues and the associated costs of scrap and rework, downtime, delayed and lost sales, warranty/return costs, and damage to brand reputation
- Many organizations have true quality-related costs as high as 15-20% of sales revenue
- Appraisal costs associated with manual defect inspection can be significantly reduced by adopting a machine vision-based approach instead

RAPID ADOPTION

- Recent advances in machine vision systems that provide anomaly detection and visual inspection are spurring rapid adoption
- Advanced machine vision quality assurance (QA) will be operational in 80% of mass production facilities by 2025, compared with 5% in 2021
- Machine vision quality assurance will contribute 15% of operational cost reductions by 2025, compared with less than 5% in 2021

Top Targeted Industries:

- Automotive
- Consumer Electronics
- Semiconductors
- Food & Beverage
- Packaging / Labeling inspection

Benefits of Visual Inspection:

- High efficacy (low false positives / negatives)
- Higher throughput
- Less costly than manual inspectors
- Easily scalable to multiple lines and plants

Impact:

- AI-powered fire detection solution can detect fire signatures in mere seconds
- Avoid catastrophic fires that can cost significant property damage and mortal harm to employees

Case Study - Visual AI for HSE

USE CASE:

Major oleochemical operator lost nearly $400K worth of assets in a massive fire despite existing smoke detectors.

Proactively identify leading indicators of hazards affecting worker safety and operational integrity using Visual AI applied to existing security/surveillance cameras feeds.

SPARKCOGNITION SOLUTION:

SparkCognition Visual AI Advisor can detect and pinpoint the location of fires as soon as they start, using visual AI and machine learning to recognize fire signatures and immediately deploy real-time alarm and safety systems that traditional heat and smoke detection methods take minutes or longer to alert upon.

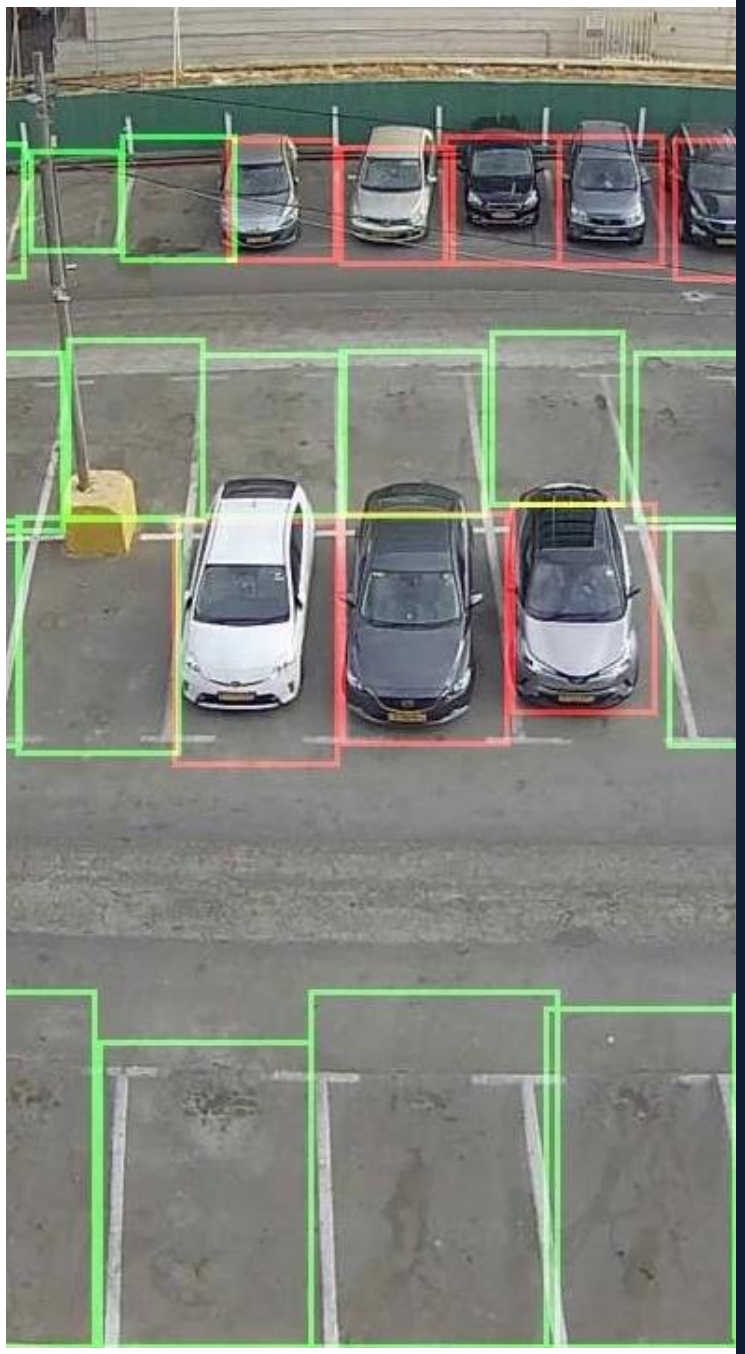
Improving Productivity with Visual AI

THE STAKES:

- Inefficiency costs companies anywhere from 20% to 30% of their revenue every year, according to research firm IDC
- According to the McKinsey Global Institute (MGI), overall operational cost savings due to the automation and productivity boost of various operations can range from 15% to 90%, depending on the industry

RAPID ADOPTION

- Many industrial and manufacturing companies are also looking to apply computer vision to assist in their efforts to optimize efficiency, increase productivity and asset utilization, and improve operations
- In a recent IDG survey, respondents overwhelmingly believe that computer vision can grow revenue (97%) while saving time and money (96%)



Top CV use cases to improve productivity:

- Utilization of warehouse, dock, and traffic areas
- Vehicle turnaround time analysis
- Vehicle trip utilization
- Personnel utilization and analytics
- Manufacturing assembly line optimization

Benefits of Vision-based Analytics:

- Increased throughput and asset utilization
- Improved situational awareness
- Workforce scheduling optimization
- Easily scales to multiple locations
- Leverages underutilized, existing surveillance cameras to deliver results quickly with high ROI

Better Customer Experience With AI

THE STAKES:

- The average U.S. store operation has an inventory accuracy of only 63% leading to poor customer experience and smaller basket size that impact the bottom line
- 80% of people stop doing business with a company because of poor customer experience
- Retailers lose $800 billion worldwide each year due to inventory distortion (including shrinkage, stockouts and overstock)

RAPID ADOPTION

- According to the 29th Annual Retail Technology Study by RIS, only 3% of retailers have already implemented computer vision technology, with 40% planning to implement it within the next two years
- 96% of retailers are investing in technology, such as computer vision, to improve operational efficiencies including:
  - 67% to improve inventory accuracy systems
  - 52% for analytics to optimize channel and product inventory strategies
  - 49% on self check-out capabilities
  - 43% on data-driven personalization

Top CV use cases in Retail:

- Inventory Management
- Retail Heat Maps
- Shopper Measurement (footfall analysis, pass-by traffic, interactions, cashier queue analysis, etc.)
- Crowd Analysis
- Product Placement

Benefits of Vision-based Analytics:

- Improved customer experience
- Increased revenue through more effective inventory management
- Improved situational awareness
- Detailed insights into the buyer's journey
- Easily scales to multiple locations
- Leverages underutilized, existing surveillance cameras to deliver results quickly with high ROI

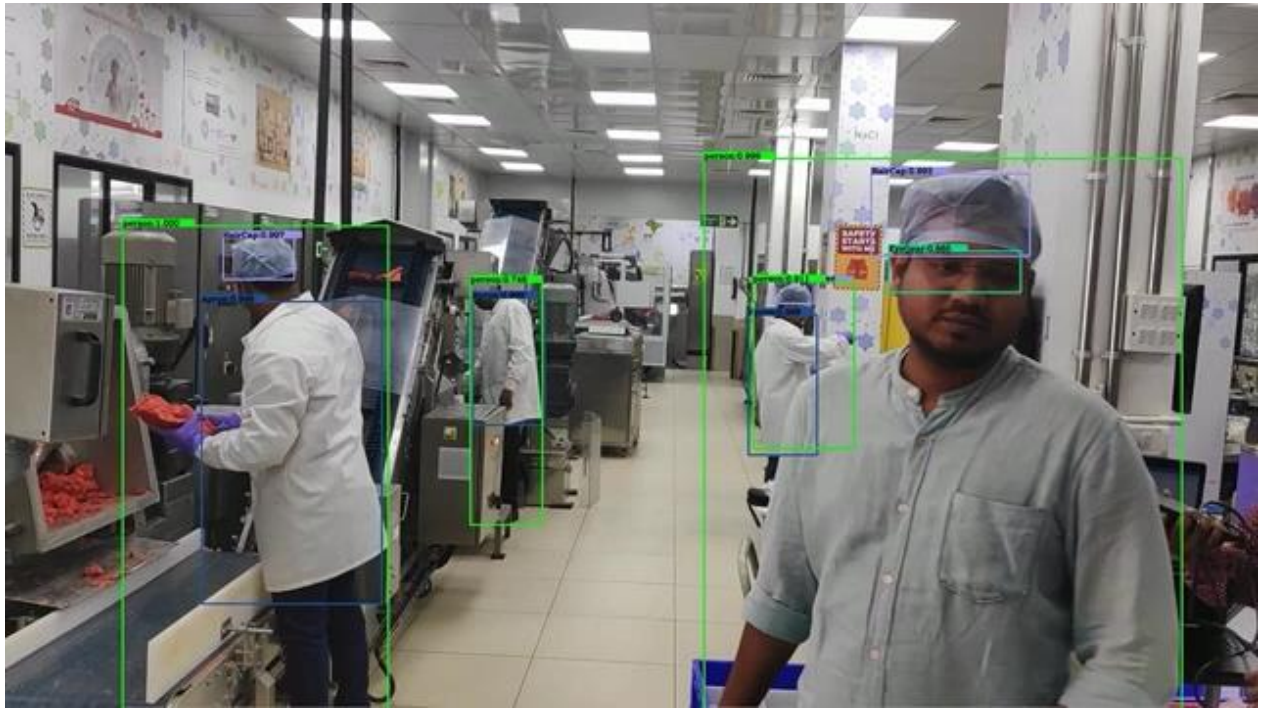
Use Case: PPE Checks

VAIA checks PPE compliance

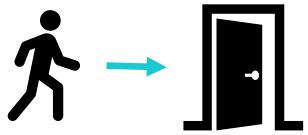
VAIA informs supervisors, warns worker, logs incident

Trend analysis to understand WHY

Processes updated then validate effectiveness



Use Case: Unauthorized Access Detection (Entry Checks)



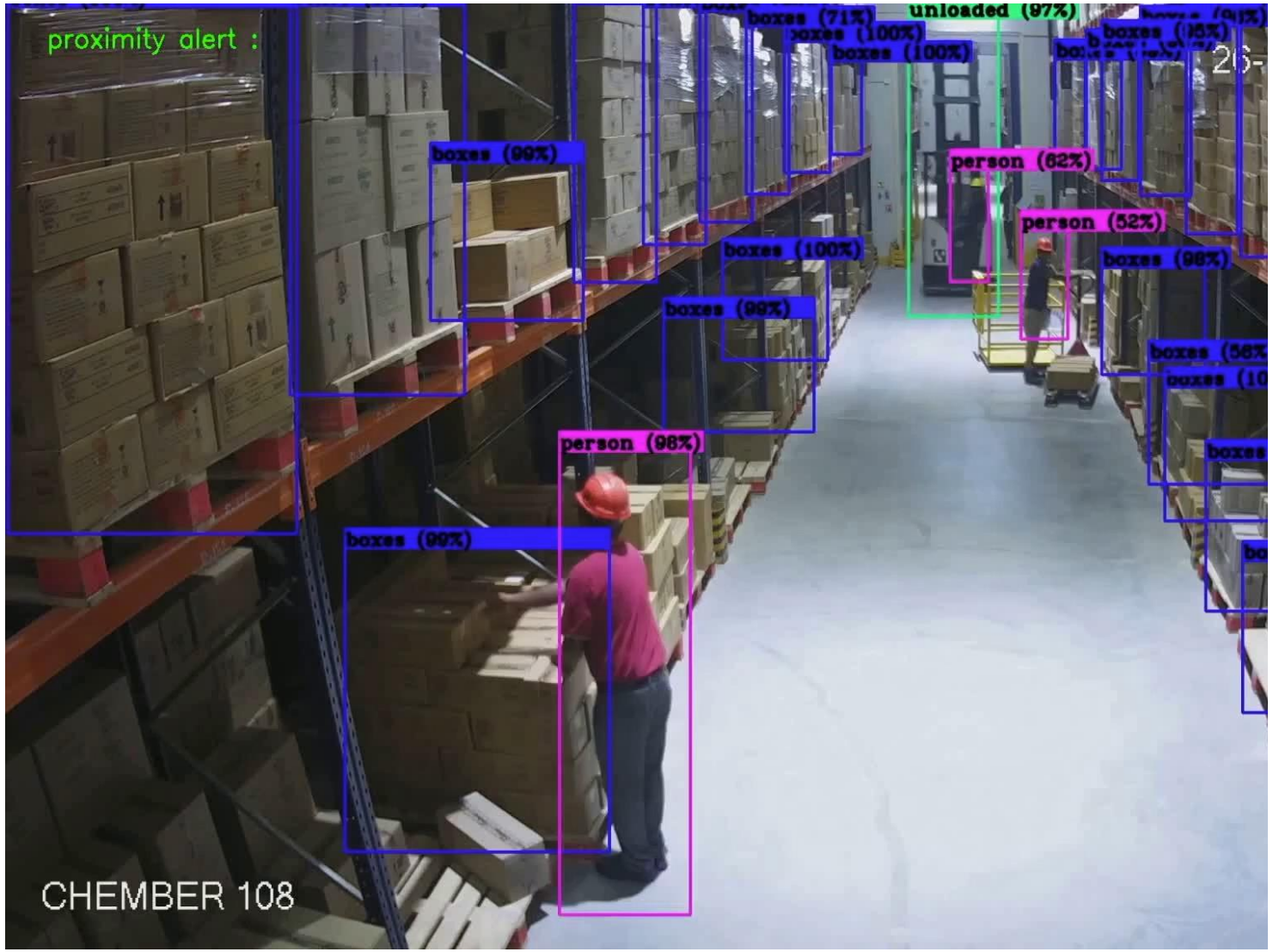
Person approaches Access point

VAIA recognises face, measures temperature of worker, checks PPE compliance

VAIA logs entry or flags warning

VAIA unlocks access, updates person count

Use Case: Moving Vehicles



Vehicle approaches Pedestrian

VAIA issues Warning, logs event

Vehicle speed monitored

VAIA issues Warning, logs event

Vehicle usage monitored

Resource Tracking

Activity tracked

Heat Maps

Process Optimisation

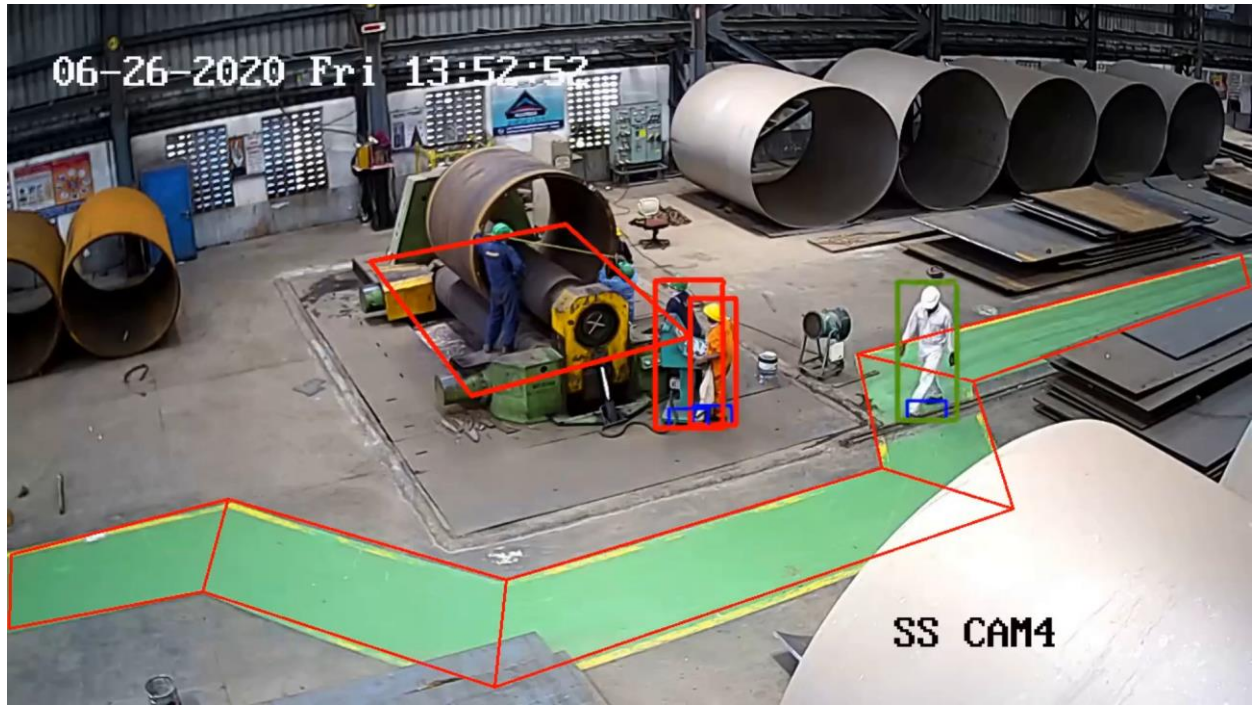
Use Case: Machine Guarding

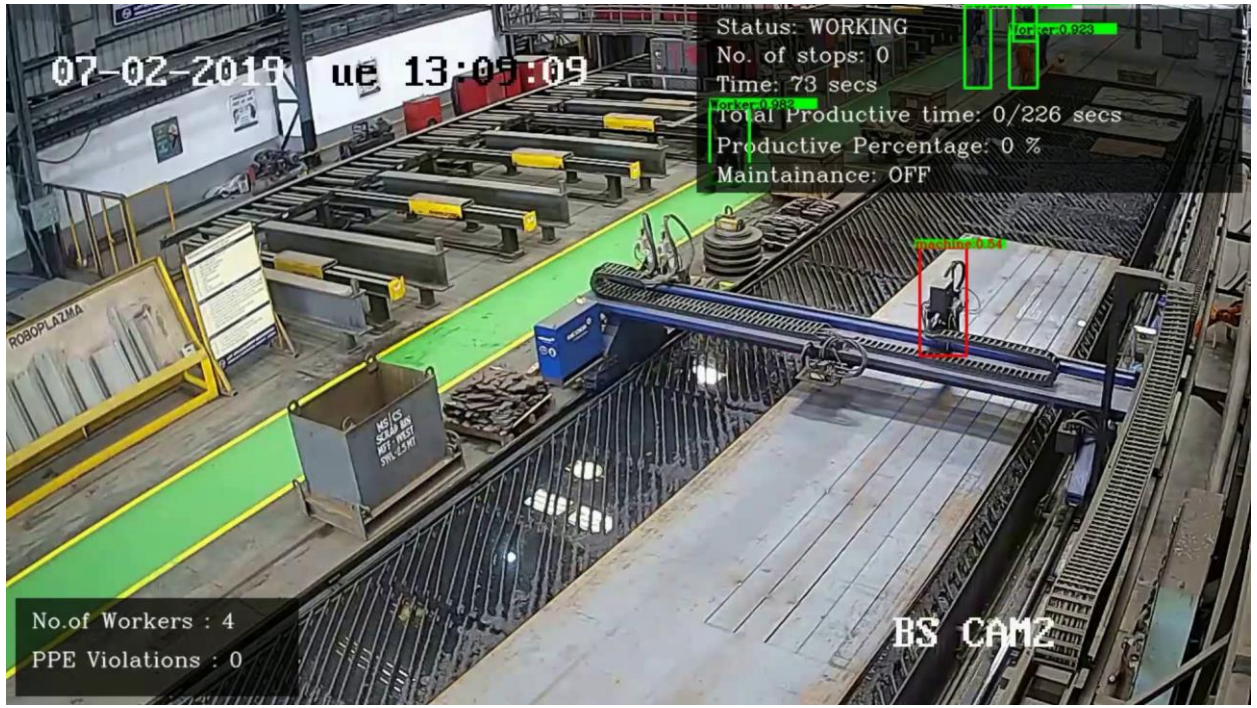
Machine status detected

Person detected in designated area

VAIA informs supervisors, warns worker, logs incident

VAIA disables machinery operation





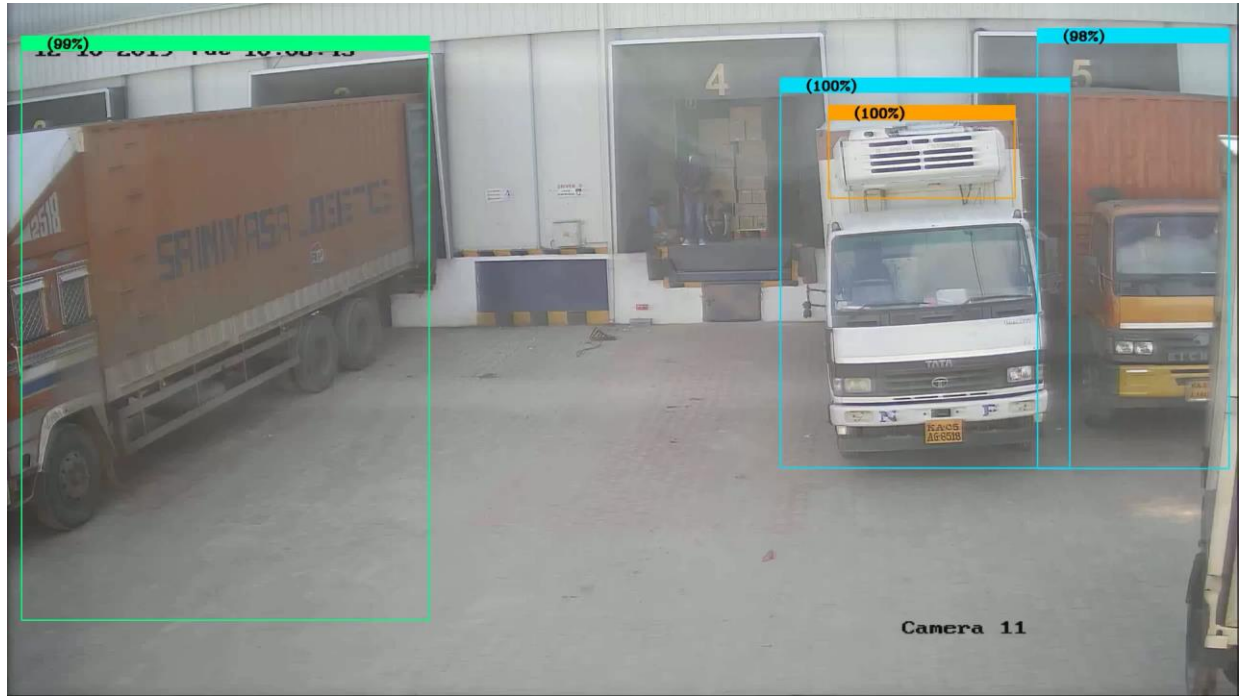
Use Case: Truck Management

Vehicle approaches Access point

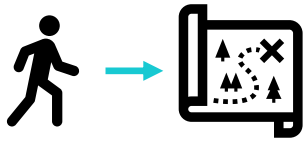
VAIA uses Face Recognition to identify person and ANPR to identify vehicle

Vehicle weight / driver & Licence data stored
Check for fittings on truck

VAIA logs entry, unlocks access, updates vehicle count



Use Case: Intrusion / Geofence



Person detected in unauthorised area

Drone launched for closer inspection

VAIA informs supervisors, logs incident

Use Case: Man Down / Ergonomics

Person detected in distress

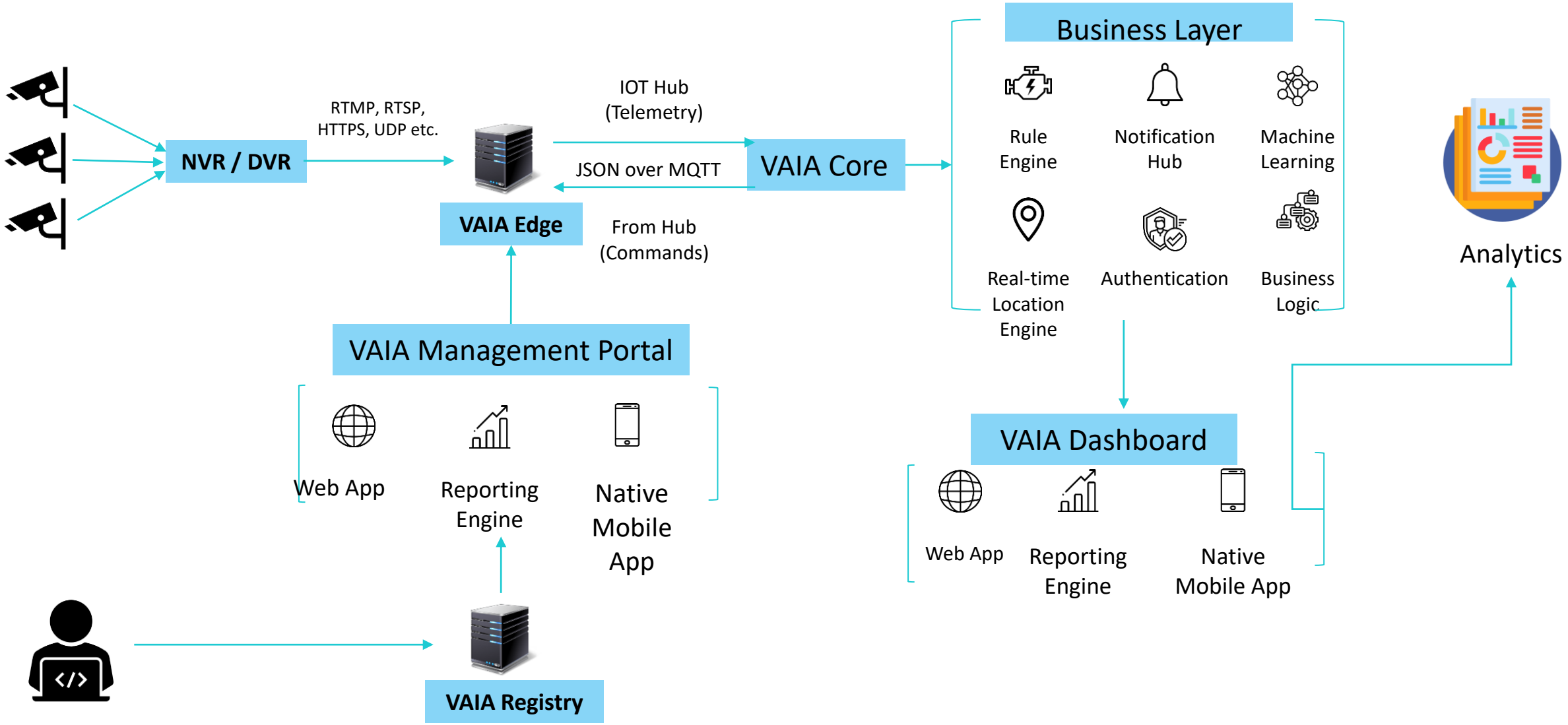
VAIA requests assistance

VAIA informs supervisors

VAIA disables machinery operation

VAIA Working & Benefits

How it Works



Customer Benefits

Trained visual AI models are available for over 120 use cases, and specialty use cases can be accommodated. All delivering:

- Accident Avoidance
- Safety Assurance
- Worker Productivity
- Regulatory Compliance
- Enhanced Quality
- Process Optimizaiton
- Productivity Gains
- Reduced Downtimes
- Cost Savings

Works on your existing CCTV infrastructure

Real-time reports and alerts on customized dashboard

Integration with SAP database

Cloud and on-prem deployment options

Android/iOS mobile apps

Hierarchical asset management, camera onboarding

Configure users - Add/remove

Optimized solution results in up to 70% cheaper hardware vs. other solutions.

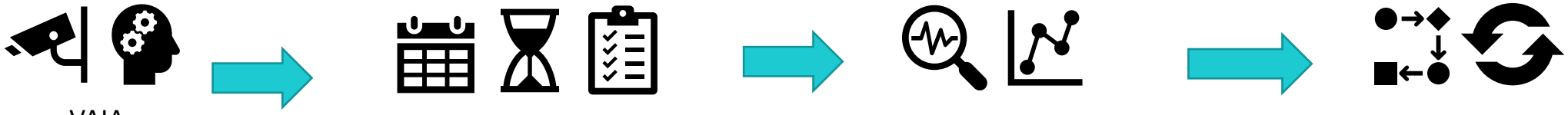
Quick deployment timelines

Deployed AI models are scalable and can be upgraded at any point of time.

User management and role-based access to users.

Premise-wide heat map of generated alarms per day

Visual AI Advisor – Evolving Health & Safety



VAIA
Artificial Intelligence

Automated Reports (100% with zero effort and no User Bias)

Trend analysis to understand WHY

Processes updated then validate effectiveness

VAIA Artificial Intelligence Enables Efficiency

- More incidents monitored AND more ***focus on positive change***
- HSE staff can reduce time on manual auditing and spend time on ***creating change***
- Changes made by Health & Safety staff can be measured for real impact based on trend data for before & after ➔ Decision made on ***quantitative*** data not just ***qualitative*** data

VAIA
Artificial Intelligence

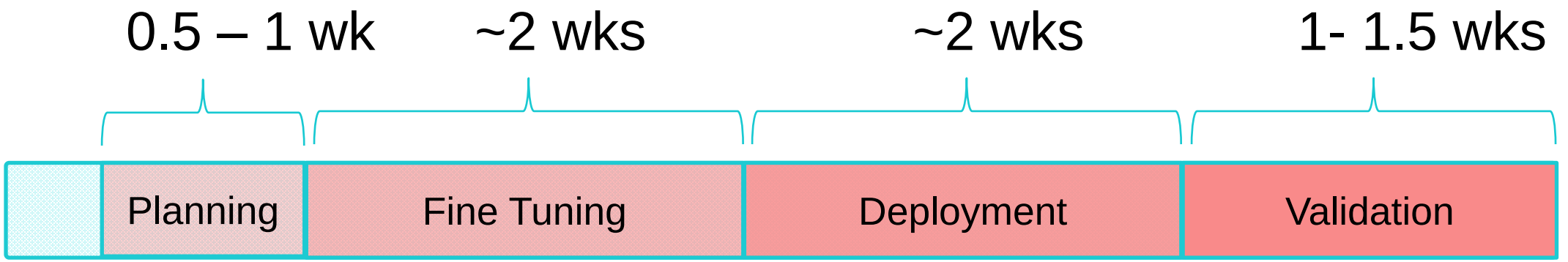
Real-time Alarms

VAIA Artificial Intelligence Can Mitigate Incidents

- VAIA can reduce accidents / near misses directly via ***real-time alarms***

Proactive → Instigate and Measure Change
Move from Audit to Anticipation & Action

Getting Started



- Location prep (power, mounting, connectivity)
- Placement planning
- Define area of interest
- Activity monitoring

- Collect image data for training
- Define labeling standards
- Create labels
- Train/evaluate/score models

- Adjust detection/classification algorithm
- Adjust detection outputs/alerts (if necessary)
- Continuous monitoring and review escapes
- Adjust positioning or camera parameters as necessary

- Review of detections/alerts
- Integration testing with Enterprise systems
- Spot testing of detection/classification of results

Key Principles of SparkCognition Visual AI

Vision AI used to detect and alert across multiple business categories:

Safety

detect and alert on pre-specified unsafe employee actions and behaviors

Security

detect and alert on security issues related to property and physical plant

Productivity

measure key KPI's, modify SOP / process flow, based on feedback

Inspection

detect, alert and reject inferior products

Situational Awareness

top-down view of physical plant(s) to understand how / when / where people and assets interact

Use existing CCTVs / No new equipment required

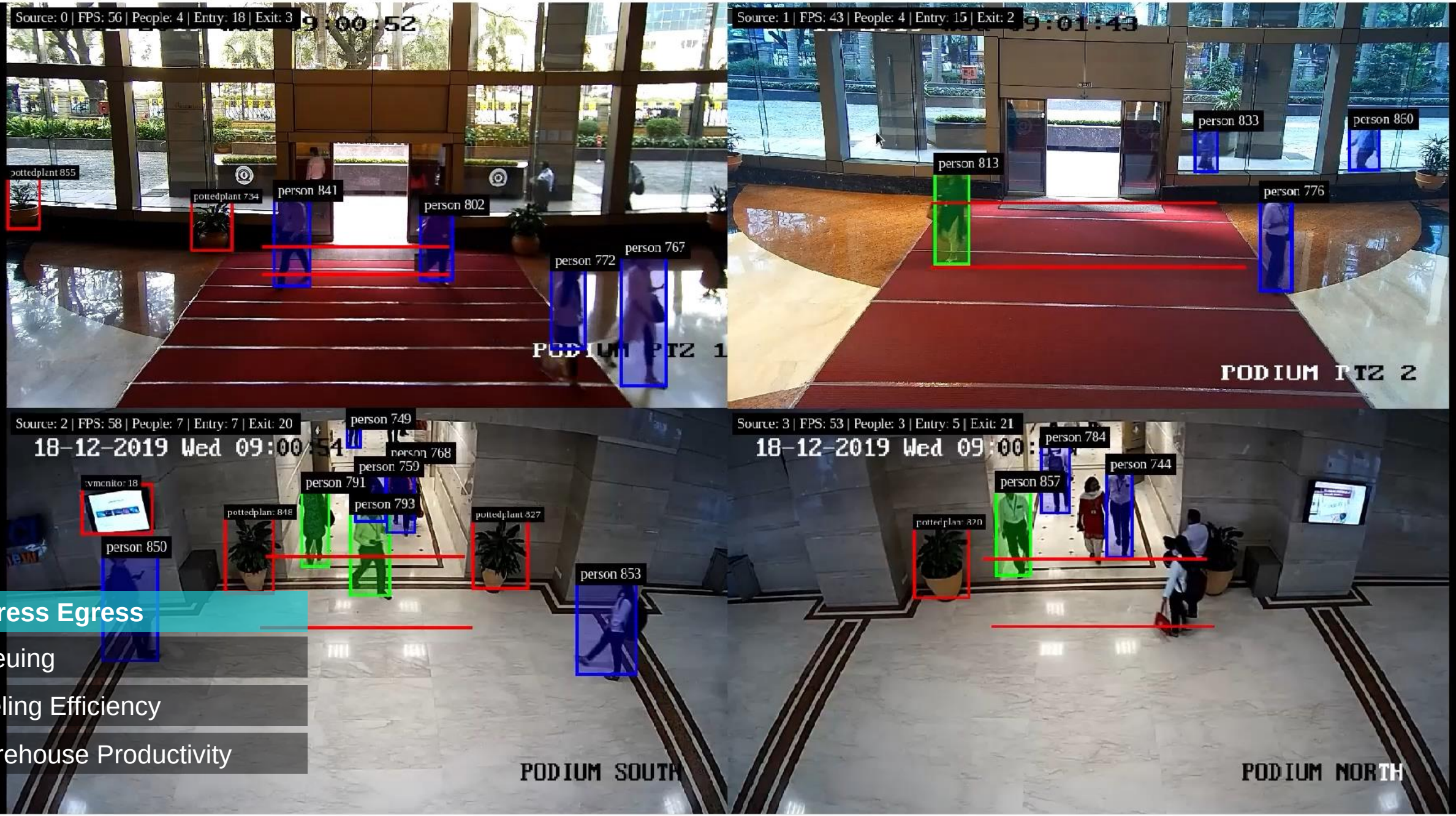
125+ out-of-the-box use cases / Ability to customize use cases

Deploy in days / Scale to thousands of cameras

Consolidates all CCTV video feed into a single pane of view / Alert only on exceptions

Visual AI Advisor – Productivity and Situational Awareness Examples

1. Ingress egress
2. Queuing
3. Fueling efficiency
4. Warehouse productivity

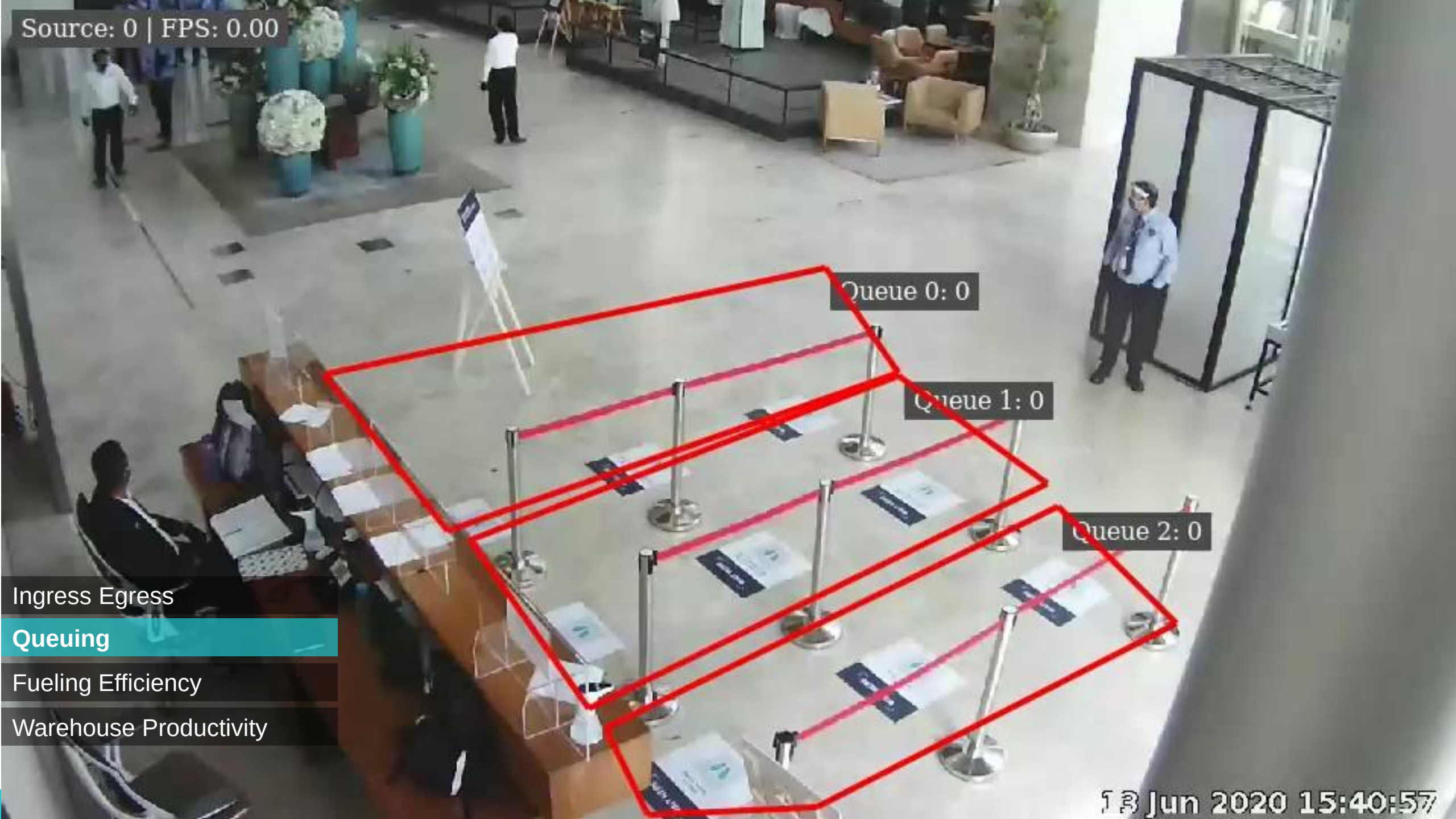


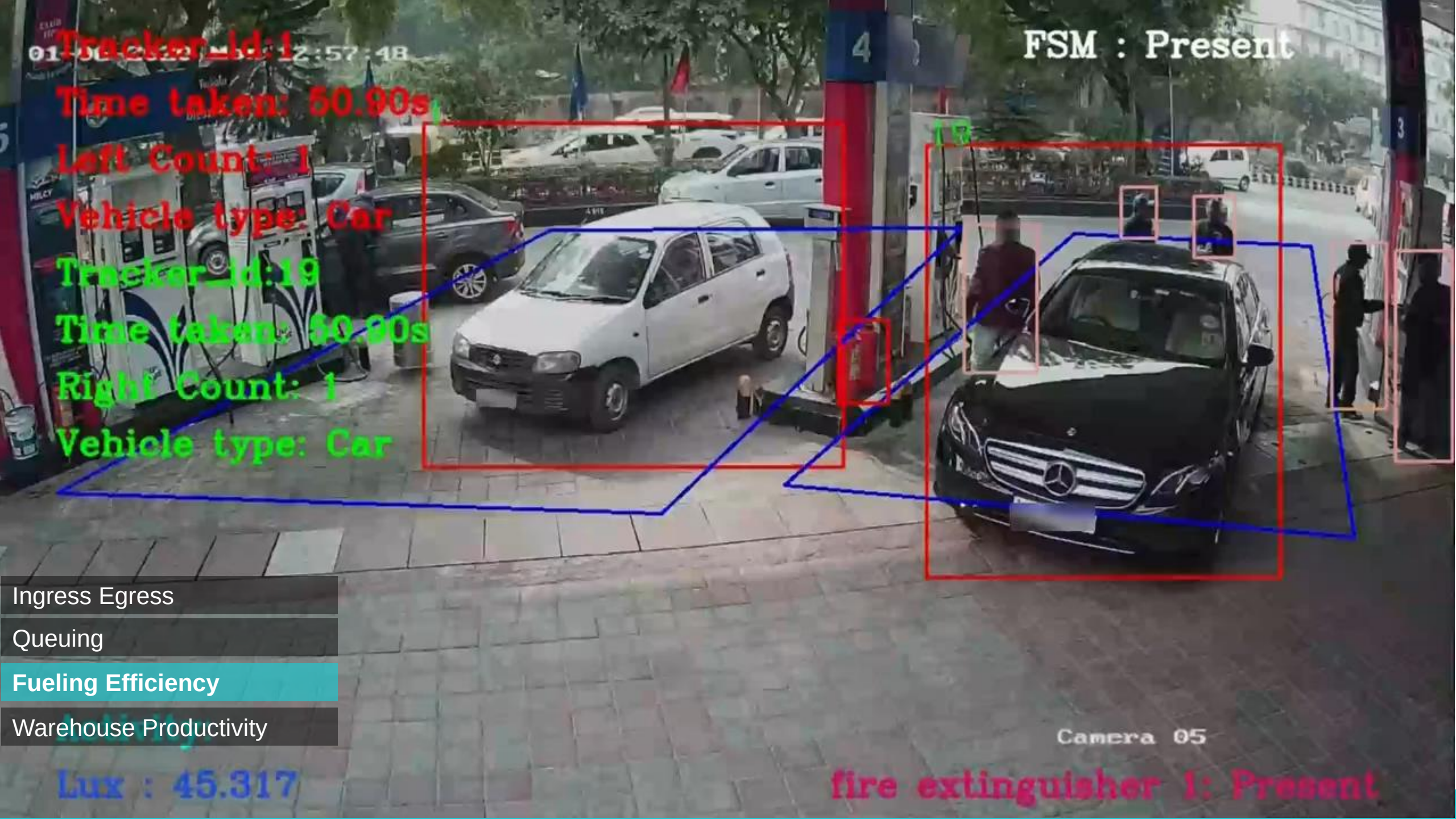
Ingress Egress

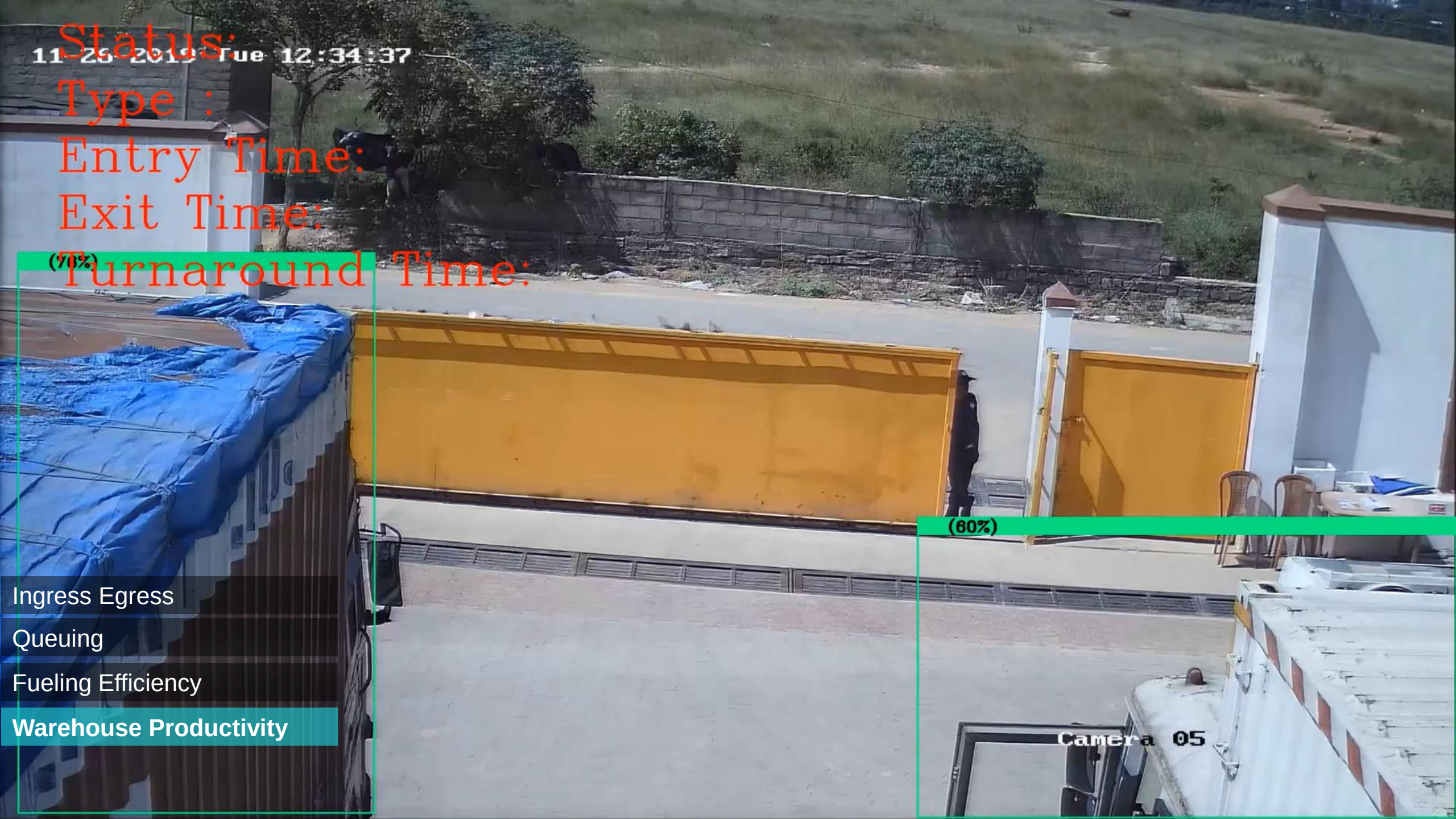
Queuing

Fueling Efficiency

Warehouse Productivity


Source: 0 | FPS: 0.00
Queue 0: 0
Queue 1: 0
Queue 2: 0
Ingress Egress
Queuing
Fueling Efficiency
Warehouse Productivity
13 Jun 2020 15:40:57


Tracker Id: 1
12:57:48
Time taken: 50.90s
Left Count: 1
Vehicle type: Car
Tracker Id: 19
Time taken: 50.90s
Right Count: 1
Vehicle type: Car
FSM : Present
Ingress Egress
Queuing
Fueling Efficiency
Warehouse Productivity
Camera 05
Lux : 45.317
fire extinguisher 1: Present


Status:
11-25-2019 Tue 12:34:37
Type :
Entry Time:
Exit Time:
Turnaround Time:
(76%)
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Camera 05
Ingress Egress
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Warehouse Productivity