REMARK

Stadium and Events Analytics: Drive revenue, improve operations & enhance security with AI-driven video analytics

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www.remarkvision.com

Next generation video analytics for events & stadiums

TOP RANKED AI BY VOT, ICCV & NIST

Real-time situational awareness

- People Counting
- Crowd Intelligence / detection
- Queue Management
- Flow Analysis

NIST NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY U.S. DEPARTMENT OF COMMERCE

VOT visual object tracking challenge

TRUSTED PRIVACY P ePrivacy

GDPR

Forensic Investigation

Remarks video analytics features advanced search methods to assist & speed up investigations.

- Metadata search for the target person, vehicle or license plate
- Run similarity search (face, pedestrian)
- Dashboard & reporting

Advanced AI analytics with real-time event alerts

Alert nearby law enforcement officers, security teams, & control centre's of criminal activity or aberrant behaviour that could turn into a crime:

- Intrusion
- Loitering
- Overcrowded
- Unattended Object
- Fire and smoke
- Weapon detection
- Slips, trips and falls

REMARK AI

How it works

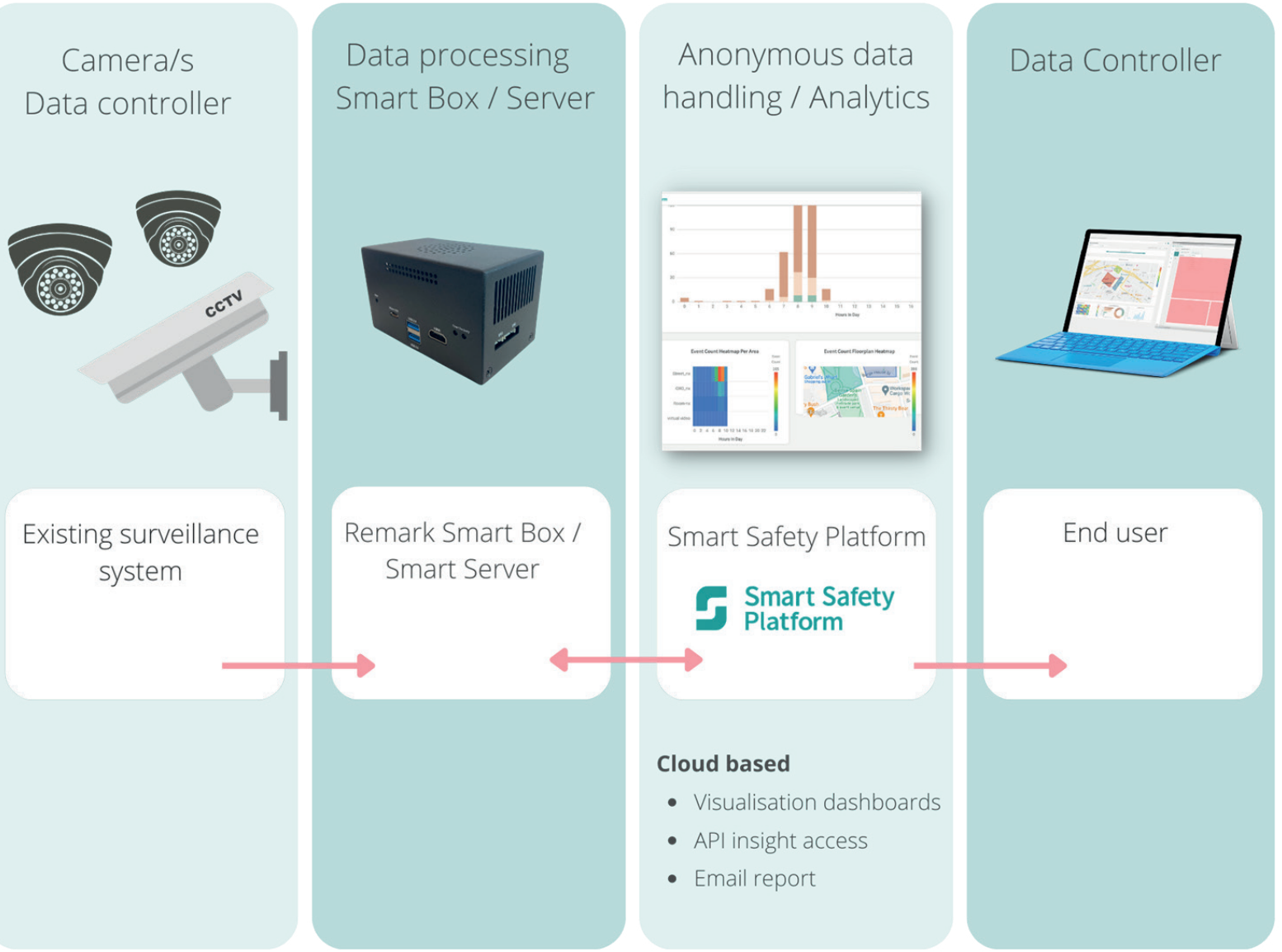
Remark's 'Smart Box' or Server connects to your existing security cameras to process video footage into anonymous analytics.

Anonymised analytics are accessible through the Remark AI Stadium and Event Solutions dashboard. Our highly optimised AI work with all IP camera brands, supporting RTSP or ONVIF or VMS.

Remark AI digitizes your venue and events and captures insights on the entire customer journey. In addition, our real-time data alerting feature, sends immediate notifications about significant customer events.

Remark AI is designed to comply with the strictest personal data regulations, enabling its deployment in retail stores without storing or transmitting any personal data from video cameras.

Remark AI converts video into anonymous counts, this is the only data transferred to Remark AI's dashboard.



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AI-DRIVEN VIDEO ANALYTICS

CONTENTS

REMARK AI

EVENT: OPERATIONS

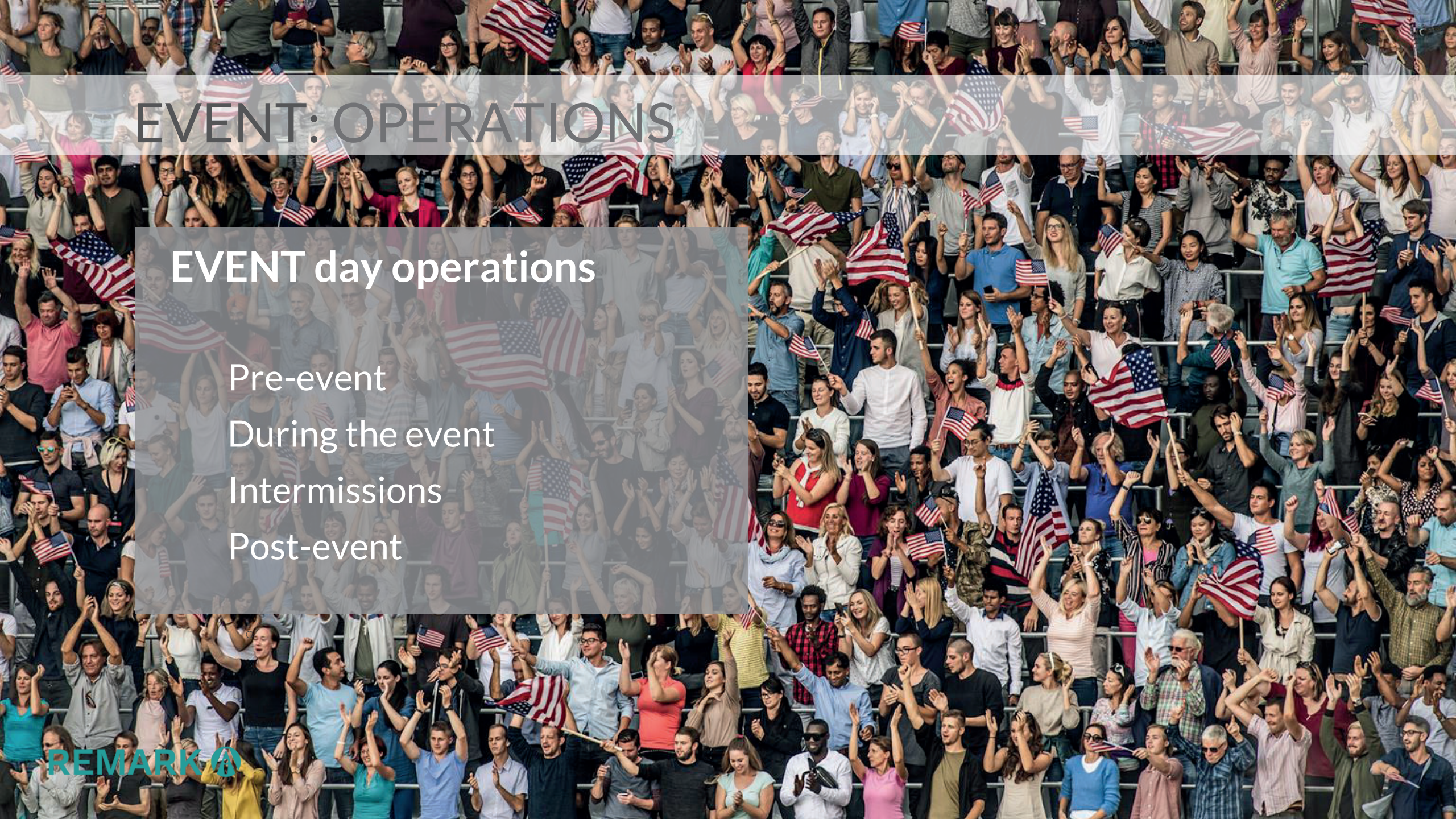
EVENT day operations

Pre-event

During the event

Intermissions

Post-event



Scope of work - Stadium analytics software

Our software digitizes the entire audience journey and delivers commercial insights.

These insights help to increase sales, reduce costs and improve customer experience.

stadium traffic

At the entrance

Aisle traffic

Area impressions

Audience Seat Area Crowd Counting Occupancy

Floor plan Heatmap

In-stadium

Queue length

Service wait time

Point of purchase

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Data-driven intelligence: For operational efficiency

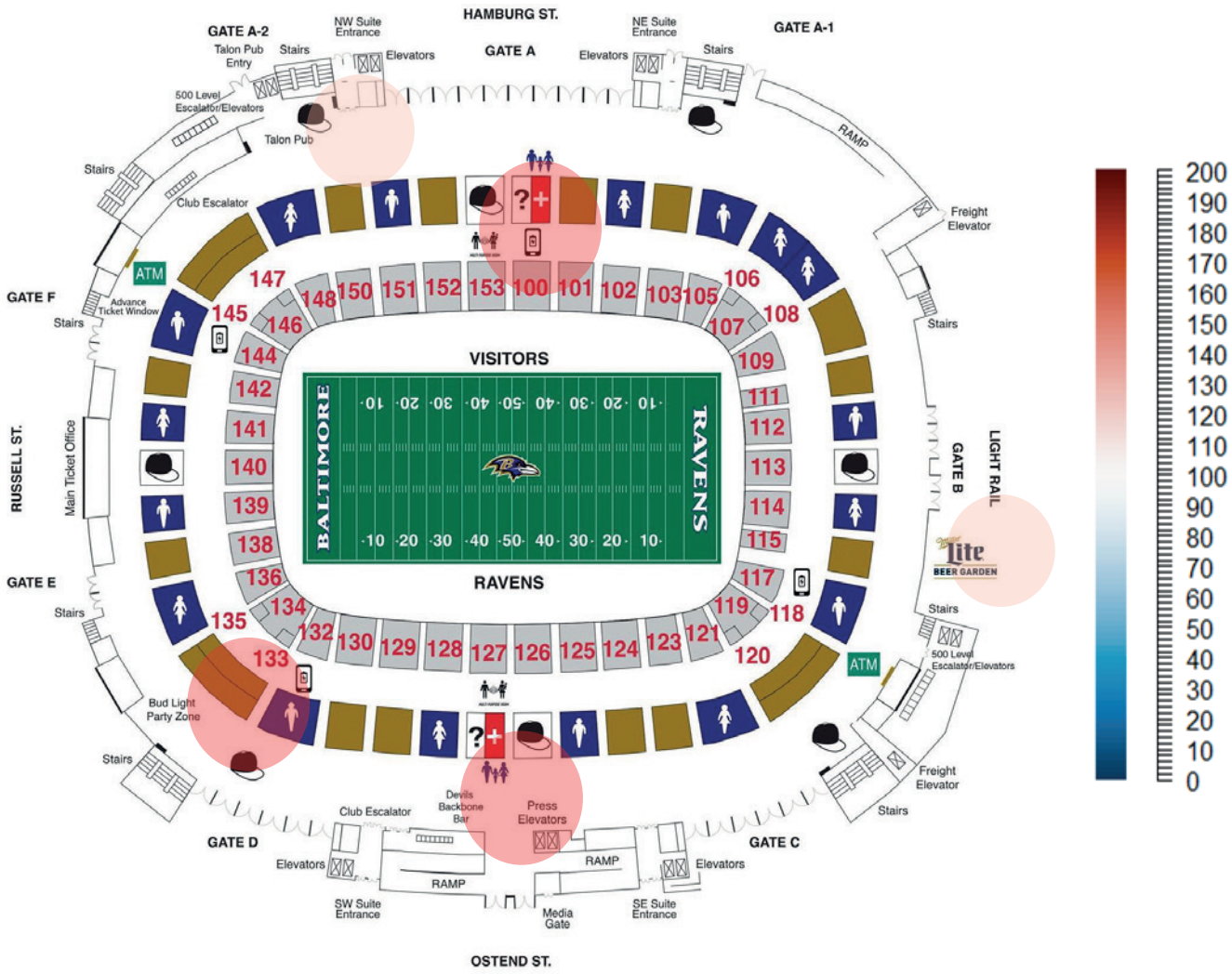
USE CASE

Uncover patterns, drive strategic decision making, and optimize operational and business practices with data-driven insights.

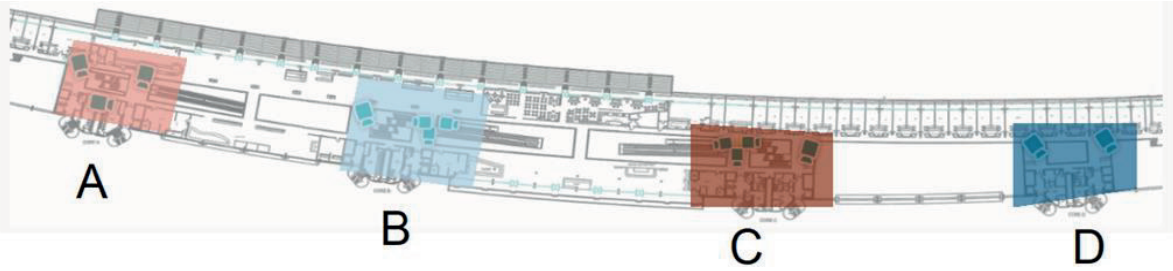
Use this data to:

- Uncover optimal areas for space planning: Retail, bars, restaurants etc.
- Evaluate and better plan for staff and security
- Inform the future design of the space
- Optimize the flow of footfall at heavy usage points
- Tracking employee compliance with safety requirements

This approach can be applied to seating, concourse, bar, restaurant, visitor, VIP and employee specific areas.



Understanding the Traffic



Entry and Exit

Area impressions

THE PROBLEM

Stadiums need to know how many customers are visiting to make informed decisions about staffing, inventory, and marketing.

THE SOLUTION

Remark AI solution for stadiums and events accurately counts venue traffic and provides real-time insights into footfall.

THE BENEFITS

Optimizing staffing levels based on customer demand information can lead to a 1% increase in store conversion.

Metrics

- Venue traffic
- Area impressions
- Aisle traffic
- Floor plan Heatmap

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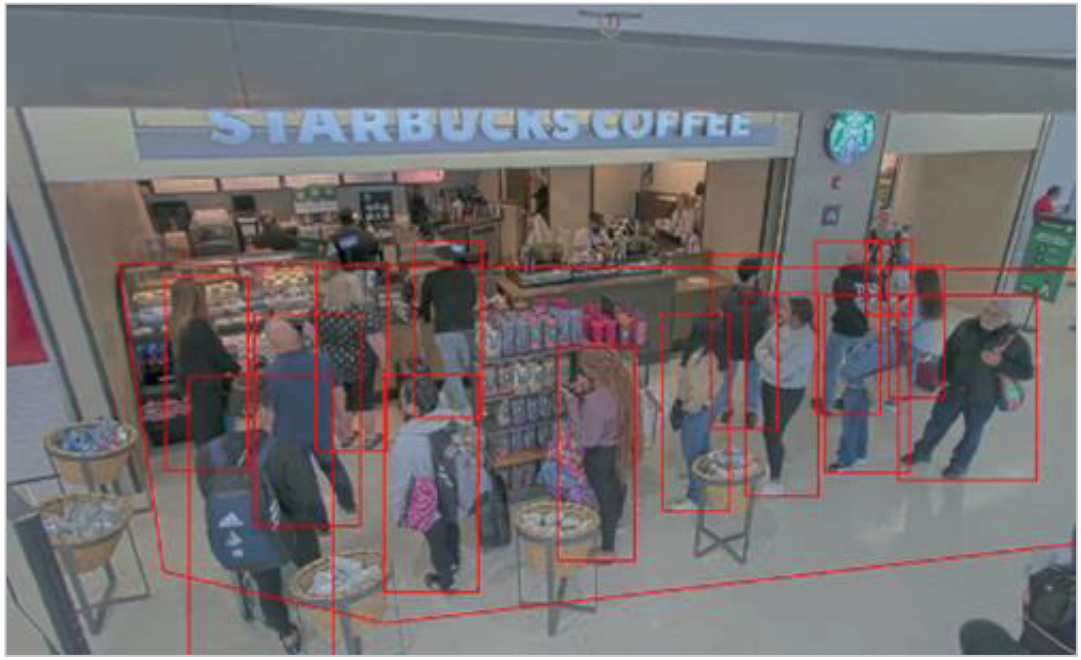
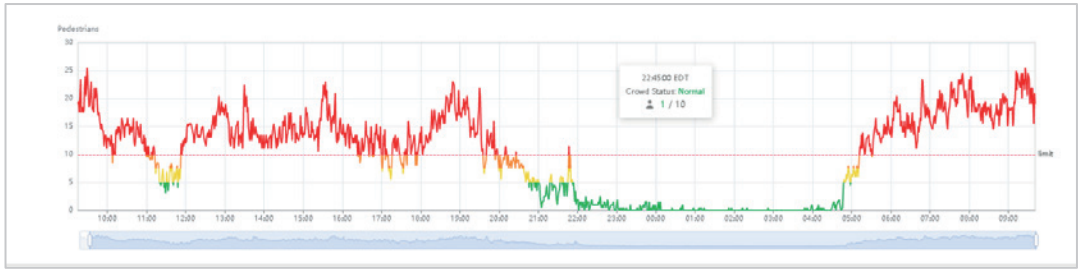
Queue management





THE PROBLEM

Long queues and high wait times are the most common reasons customers abandon their purchases.

THE SOLUTION

Trend analysis of the causes of long queues and real-time alerts when queue length reaches undesirable levels.

THE BENEFITS

10% reduction in queue length can lead to a 1-2% increase in sales revenue.

Metrics

Queue length

Service wait time

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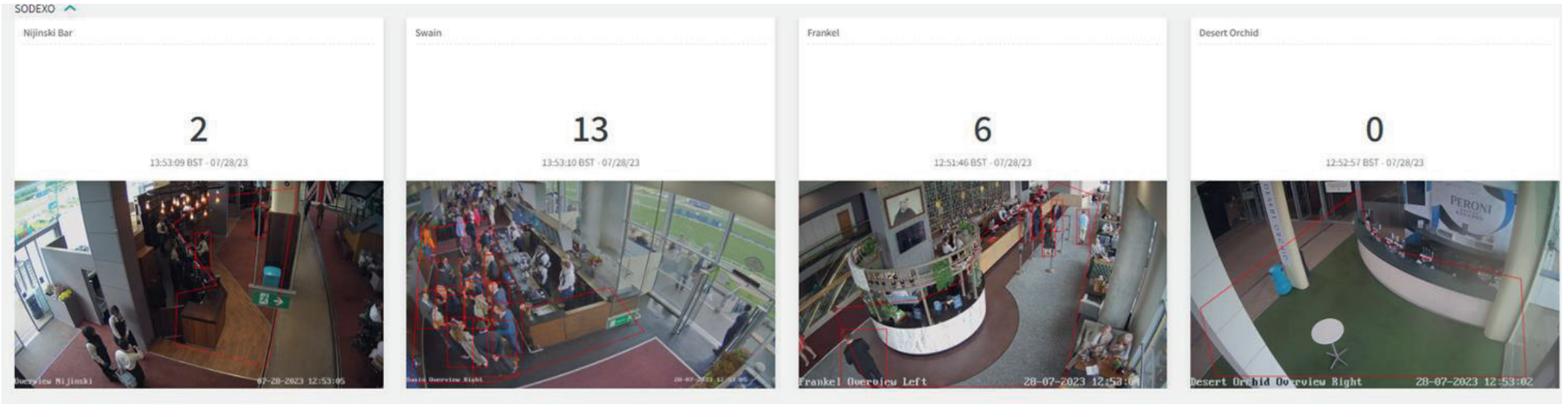
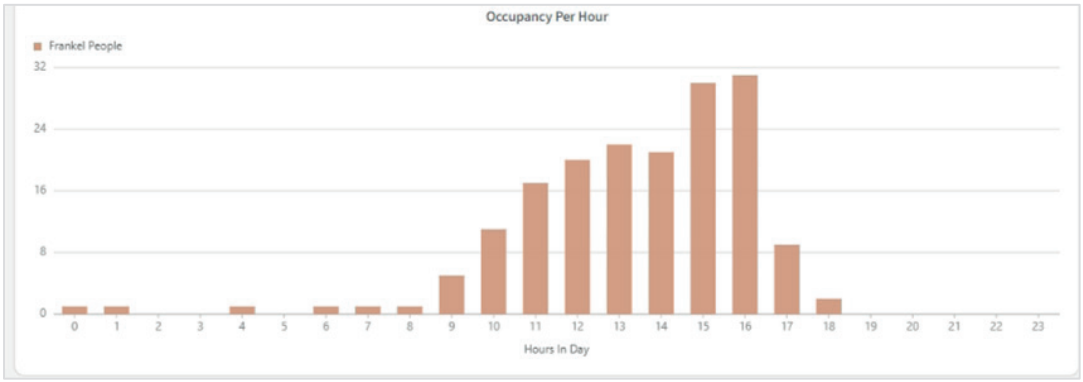
Analytics Dashboard: Real-time insights





Real-time insights on footfall traffic, store visits, and buying patterns. Optimize venue plan strategies, enhance experiences, and drive growth.

Staying ahead with data-driven decision making with:

- Real time monitoring
- Intuitive data visualizations
- Upload floor planning for heatmapping and merchandising insights.

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Pre-event day operations: Metrics

Capacity:

Identify pre-event hotspots

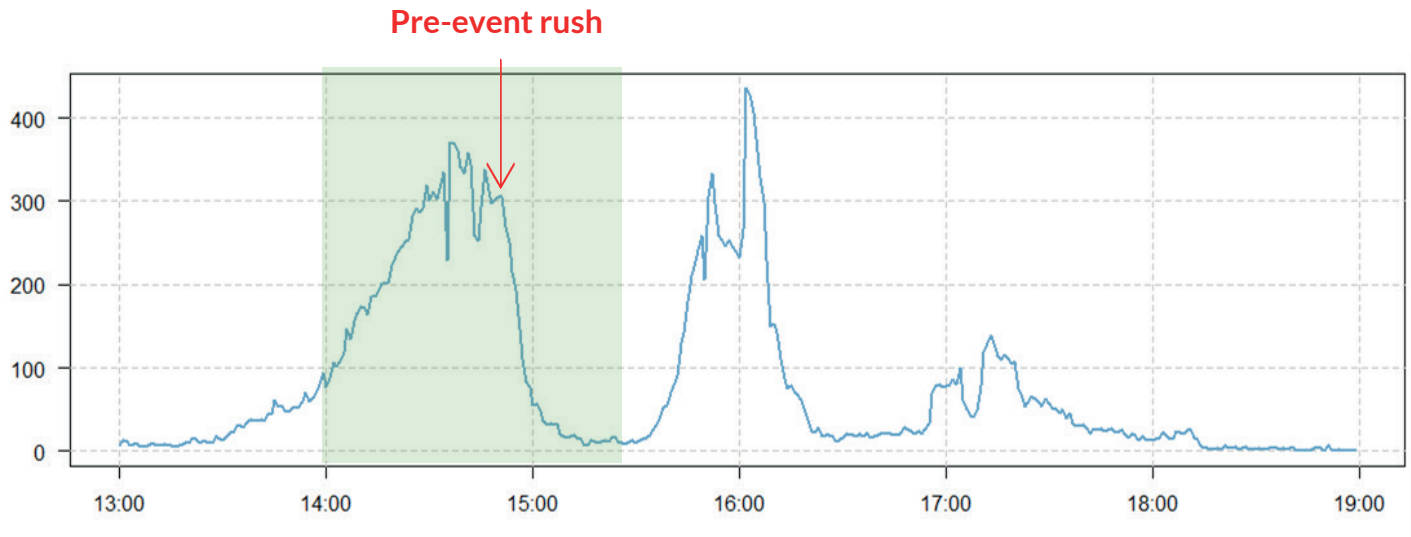
Traffic flow:

Direction of traffic after passing the turnstile

What areas of the venue generate the most traffic flow?

Why are people moving from one area to another?

Draw insights on the rush to seats before the event starts



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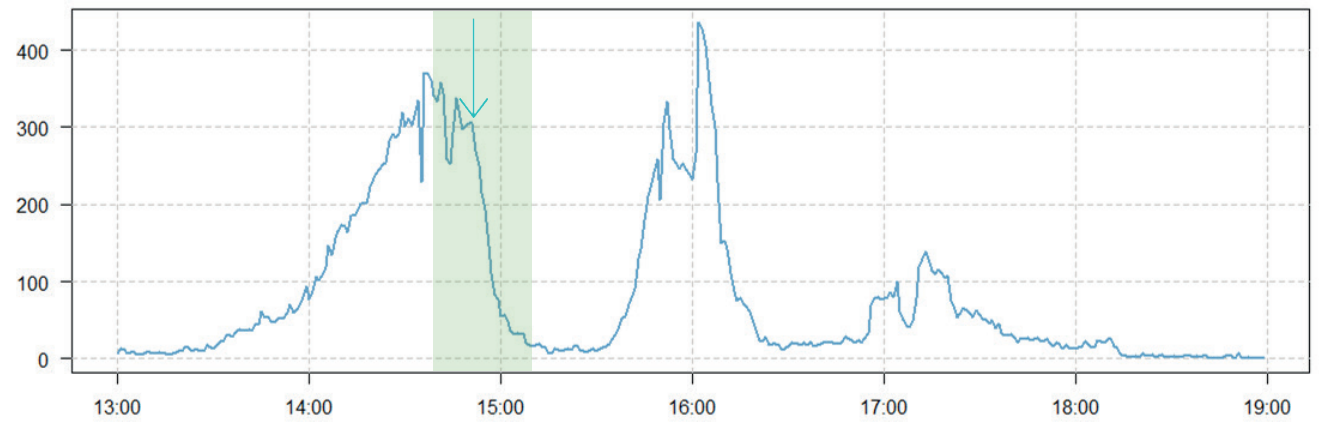
Pre-event rush: Insights

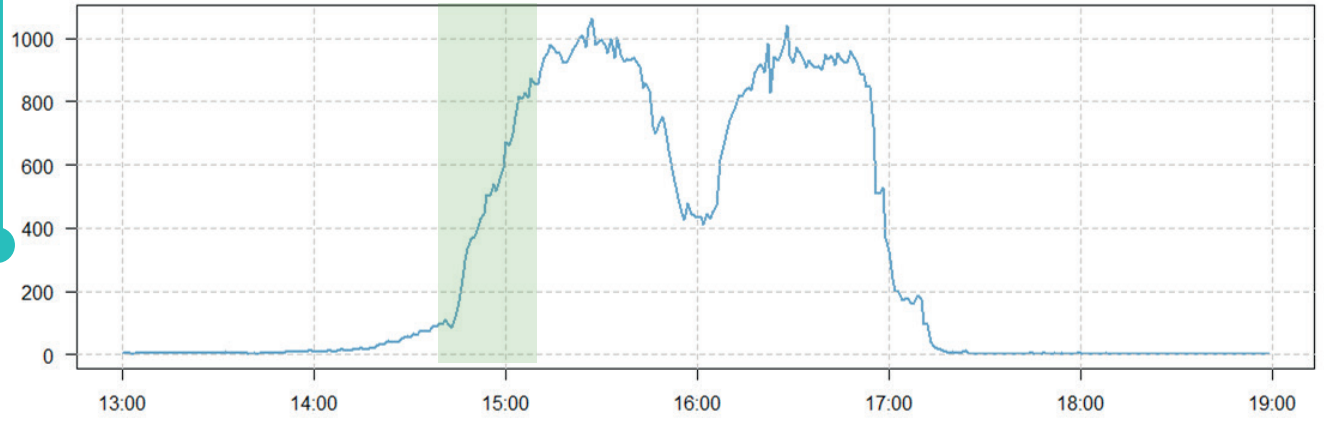
Visitor Zone

Spectator Stand

Pre-event rush



Identify relationships between different areas in the venue. For example, the 'pre-event rush' can be better understood by comparing occupancy in a visitor zone to capacity in the spectator stand.



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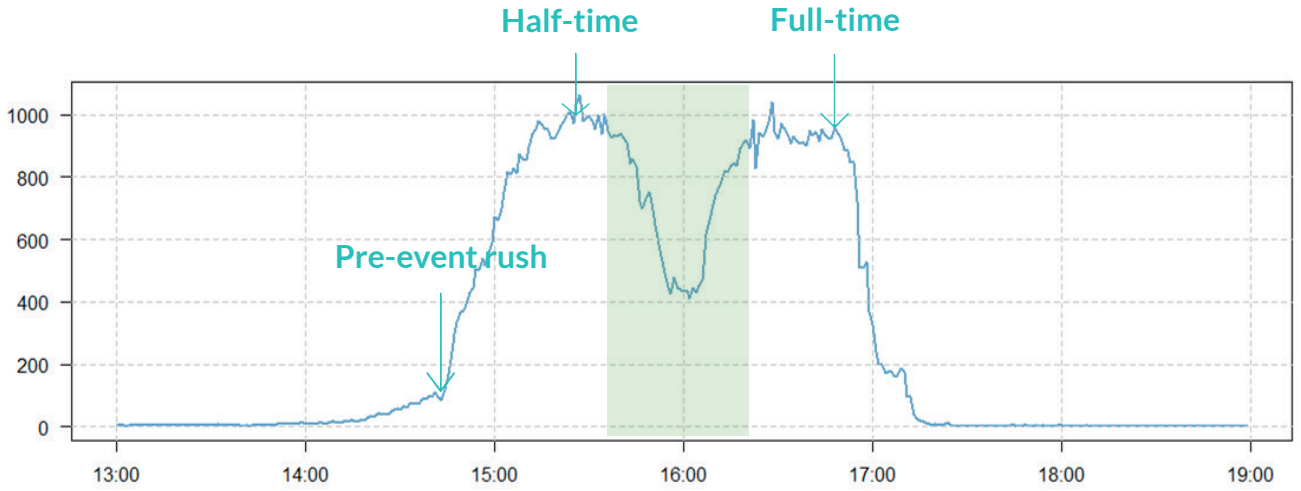
During event: Operations / Metrics

Stand Capacity

Overall capacity rate: How full is the venue?

Section capacity rate: Most and least popular sections?

Peak Occupancy time: Improve resource allocation



Trend analysis

Validation
Verify the actual utilization of seats during an event. Identify discrepancies between ticket sales and actual seat utilization.

Dynamic Seat Preference
Identify patterns of fans relocating to different sections or seats.

Combine with ticket sales
To add a more granular and real-time perspective on seat utilization.

Operations intermissions: Metrics

Crowd density:

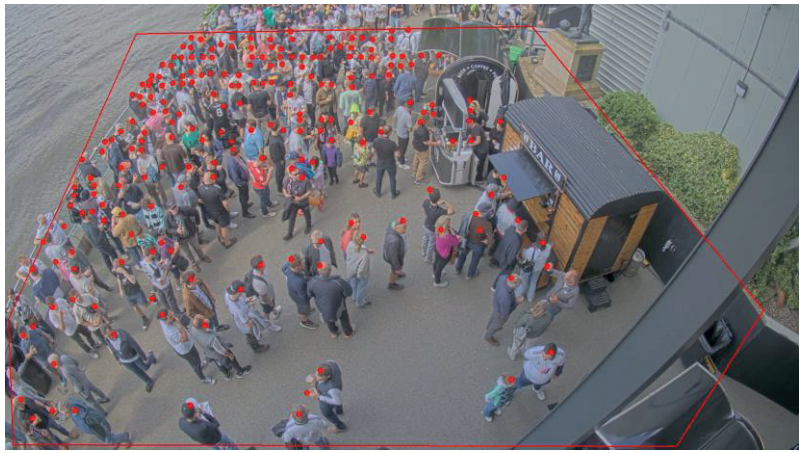
Max and average capacity

Real time overcrowding alerts

Queue length – concourses, concessions and restrooms

What attracts fans to a particular area?

Larger polygons can be drawn to measure whole areas



Traffic flow:

Measure the movement of people in different areas:

- Flow per 15 secs, 30 secs, 60 secs, 5 mins & 10 mins
- Understand the intention of traffic

Smaller polygons can be drawn to measure queue lengths, this provides deeper insights into area engagement

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Crowd Intelligence: Post event operations

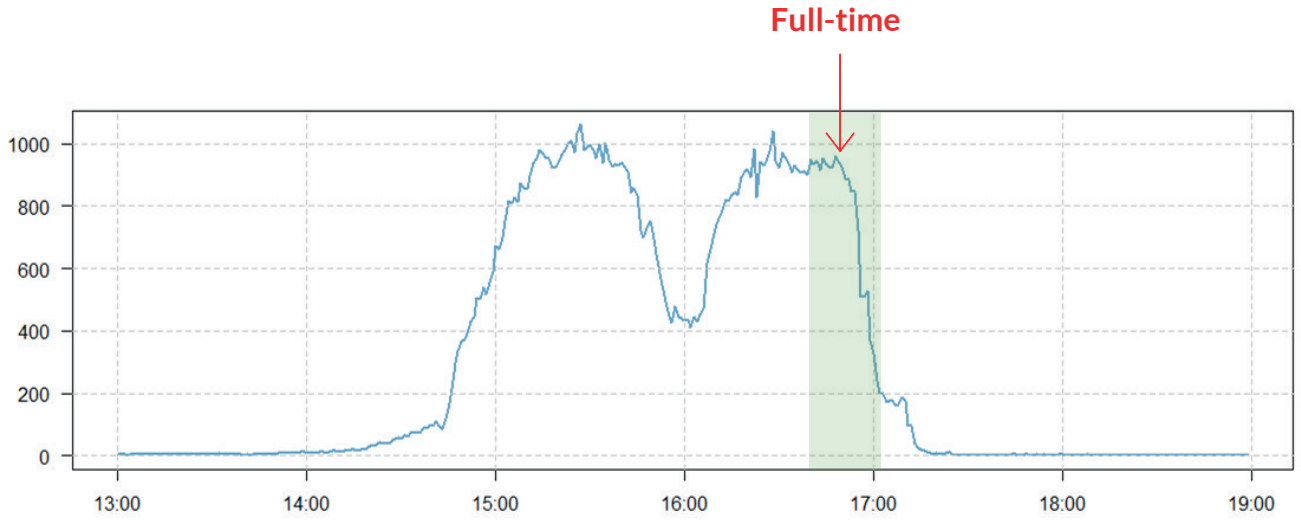
Metrics during the event:

Crowd density:

Exit Capacity

How long does it take to clear the stands?

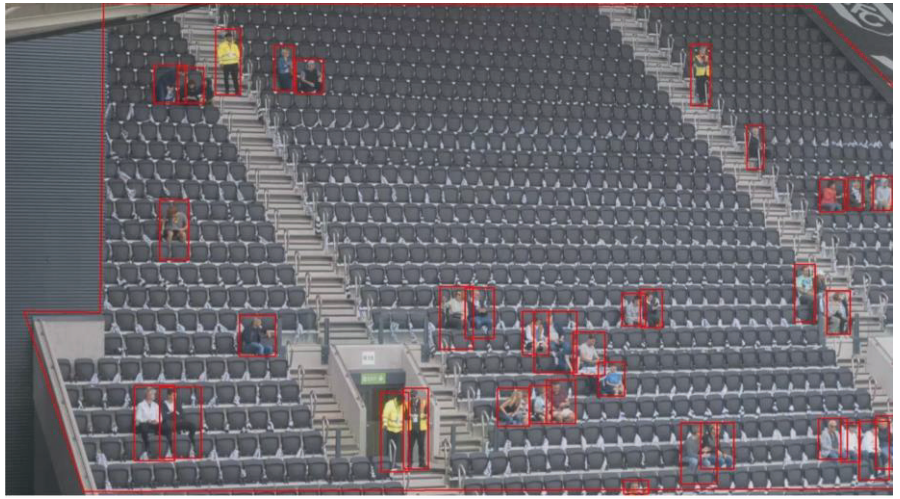
How many people are in the venue after the event?



Traffic flow:

Exit flow rates

Bottleneck Identification: Identify areas or exits within the venue where congestion is likely to occur.



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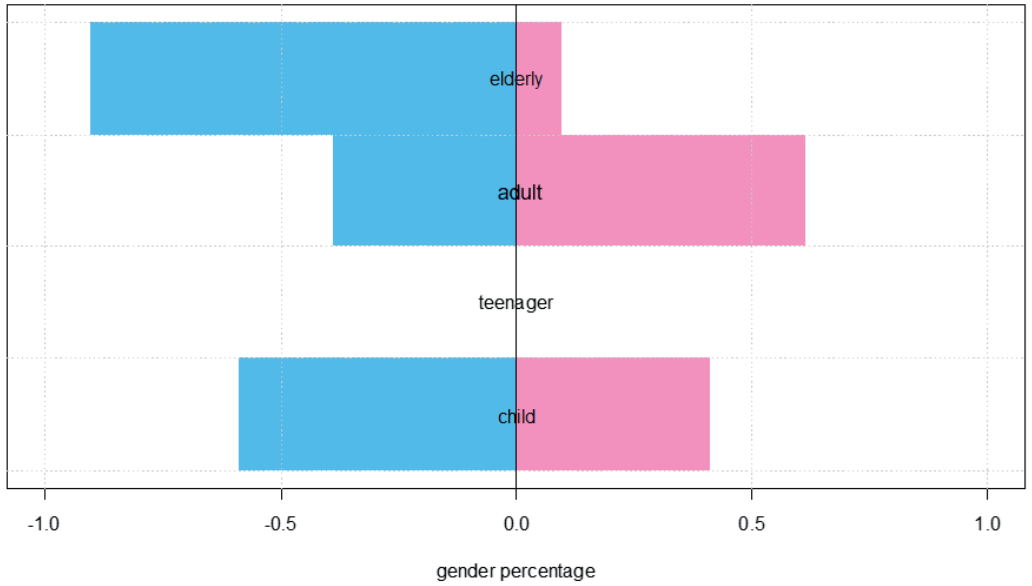
Demographics of visitors

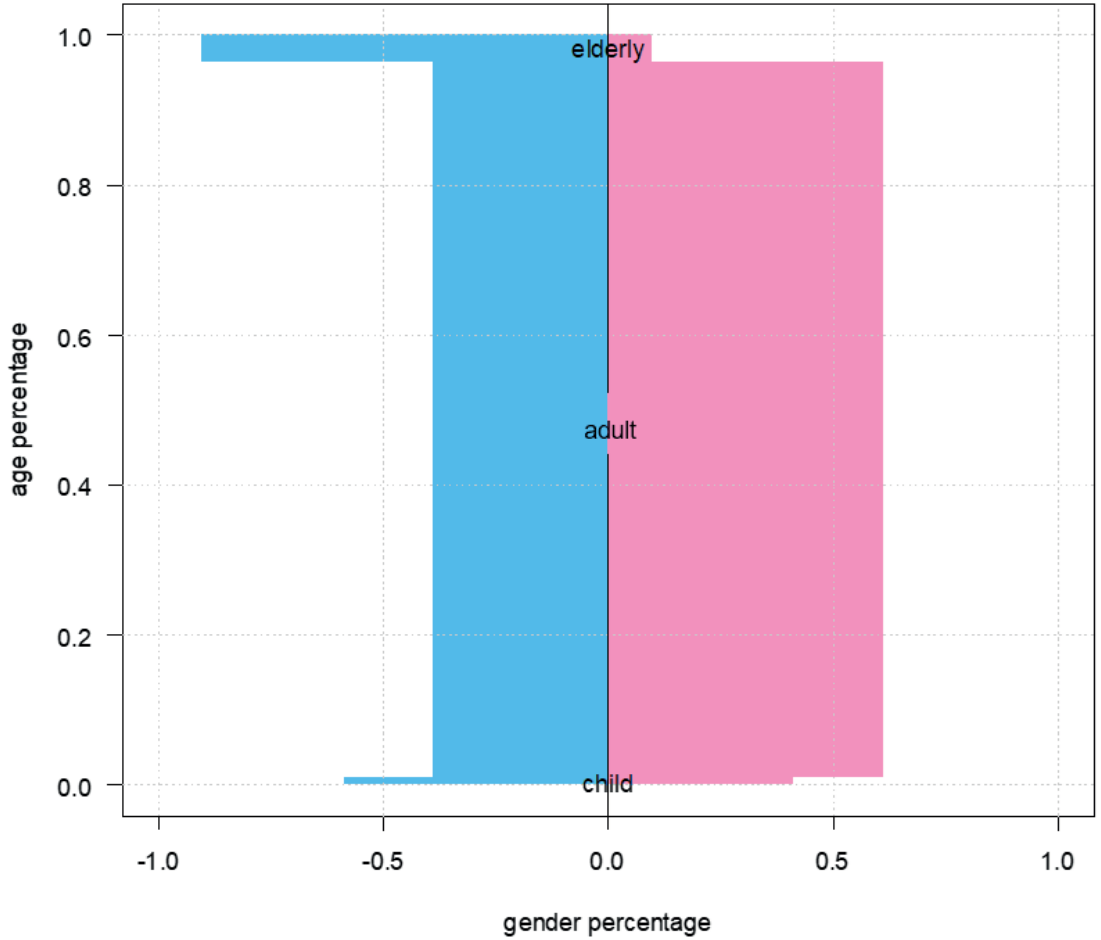
SUMMARY OF VISITOR ATTRIBUTES

4% of visitors are elderly 90% vs 10% male vs female

95% of visitors are adults 43% vs 57% male vs female

1% of visitors are children, 59% vs 41% male vs female





Notes: AI model classification

An elderly visitor is someone older than 60

An adult is someone aged 20 to 60

A child is someone aged below 20

Male

Female

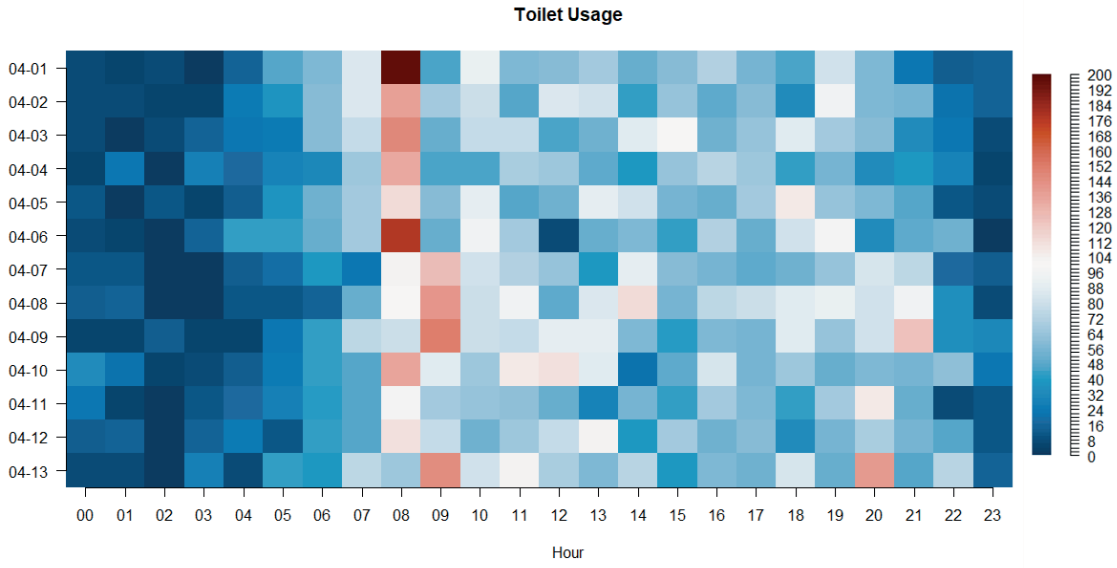
REMARK AI

Facility Usage Statistics

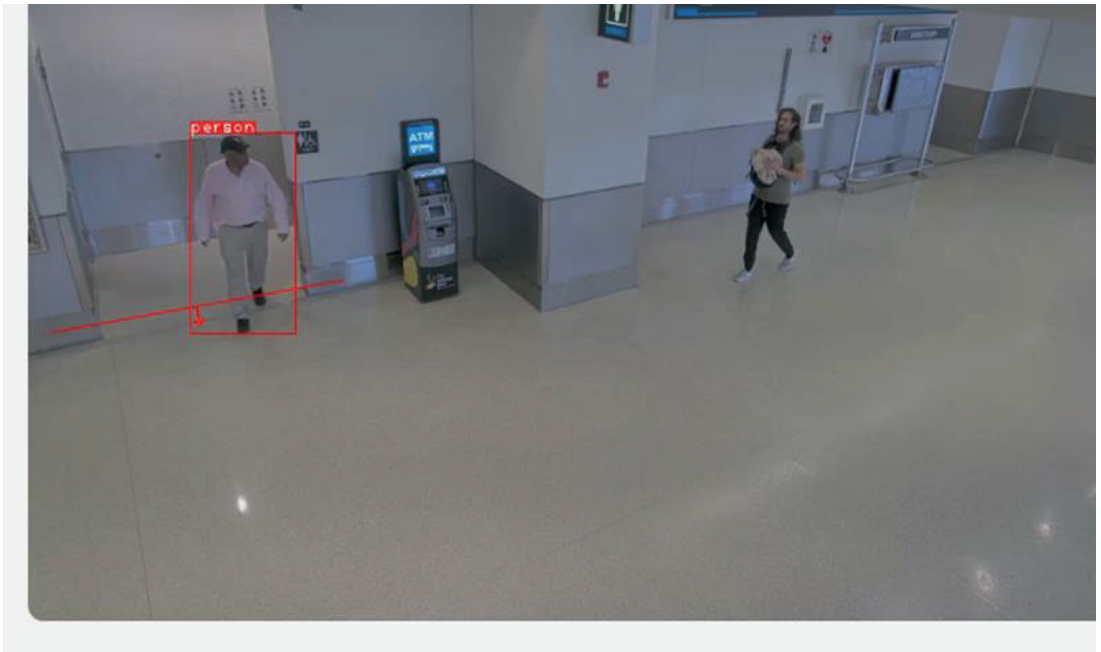
USE CASE

Usage data can be used to send prompts to cleaning staff.

Direct traffic to low usage restrooms to reduce wait times.



Above heatmap shows hourly usage dashboard.



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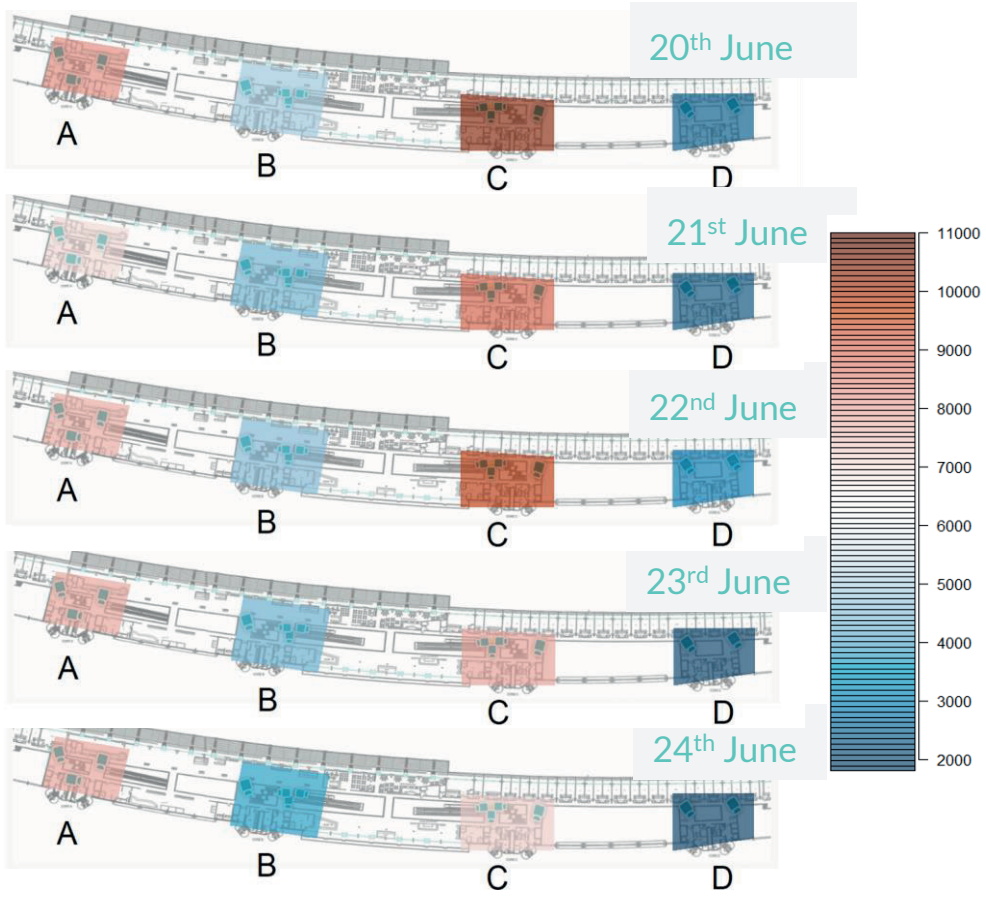
Commercial Insights Report



A summary of the key findings and commercial insights discovered during the pilot.

The report include insights into:

- Venue traffic and marketing effectiveness
- Comprehensive age and gender segmentation
- Customer journey and experience
- Queue management
- Staffing allocation

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EVENT: Security OPERATIONS

EVENT security analytics

- Occupancy over-limit
- Loitering
- Intrusion
- Unattended Object Detection (bag, luggage etc.)
- Slips, trips and falls
- Fire and Smoke

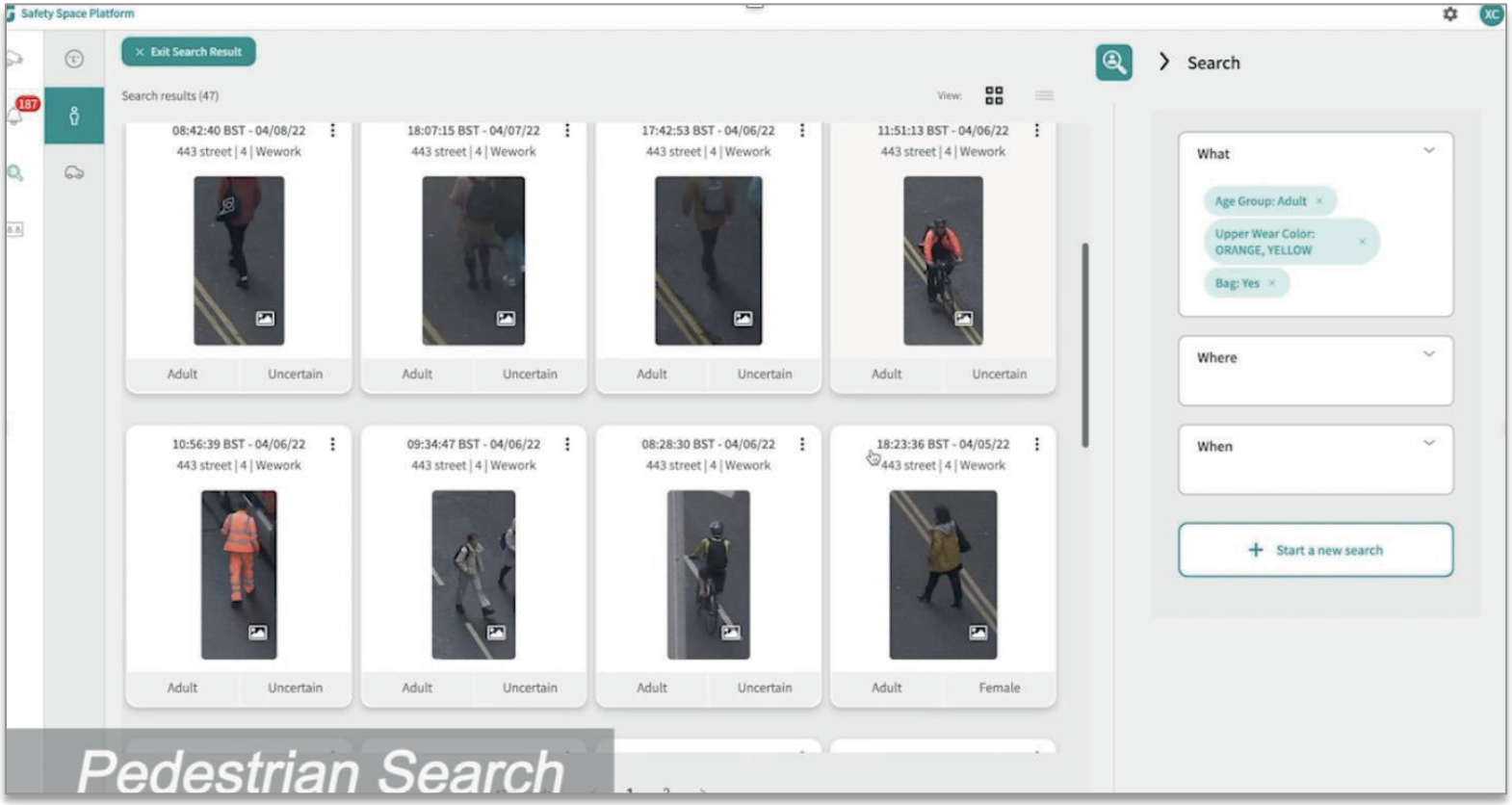
Improve Security Investigations Operation Efficiency
Advanced video search: meta search by pedestrian attribute

Use case

Find people of interest in minutes

Improve incident management

Produce evidence packets to share with law enforcement



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Improve Security Investigation Operation Efficiency

FEATURE

Loitering detection

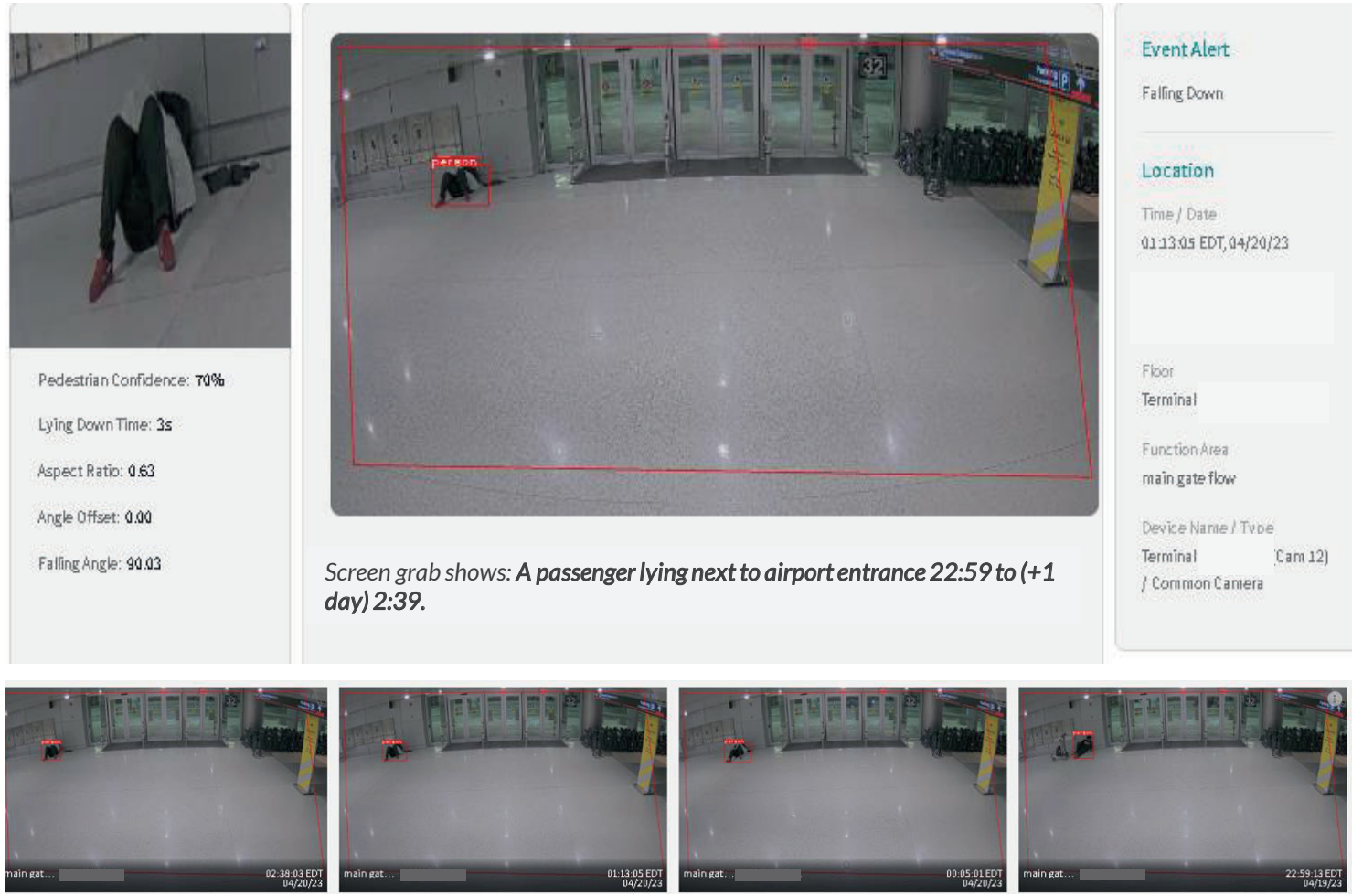
USE CASE

Identifying loitering behaviour

Identifying lying down behaviour

Improvement of visitor's experience

Reduced public safety concerns



Screen grab shows: ***A passenger lying next to airport entrance 22:59 to (+1 day) 2:39.***

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Improve Security Investigation Operation Efficiency

FEATURE

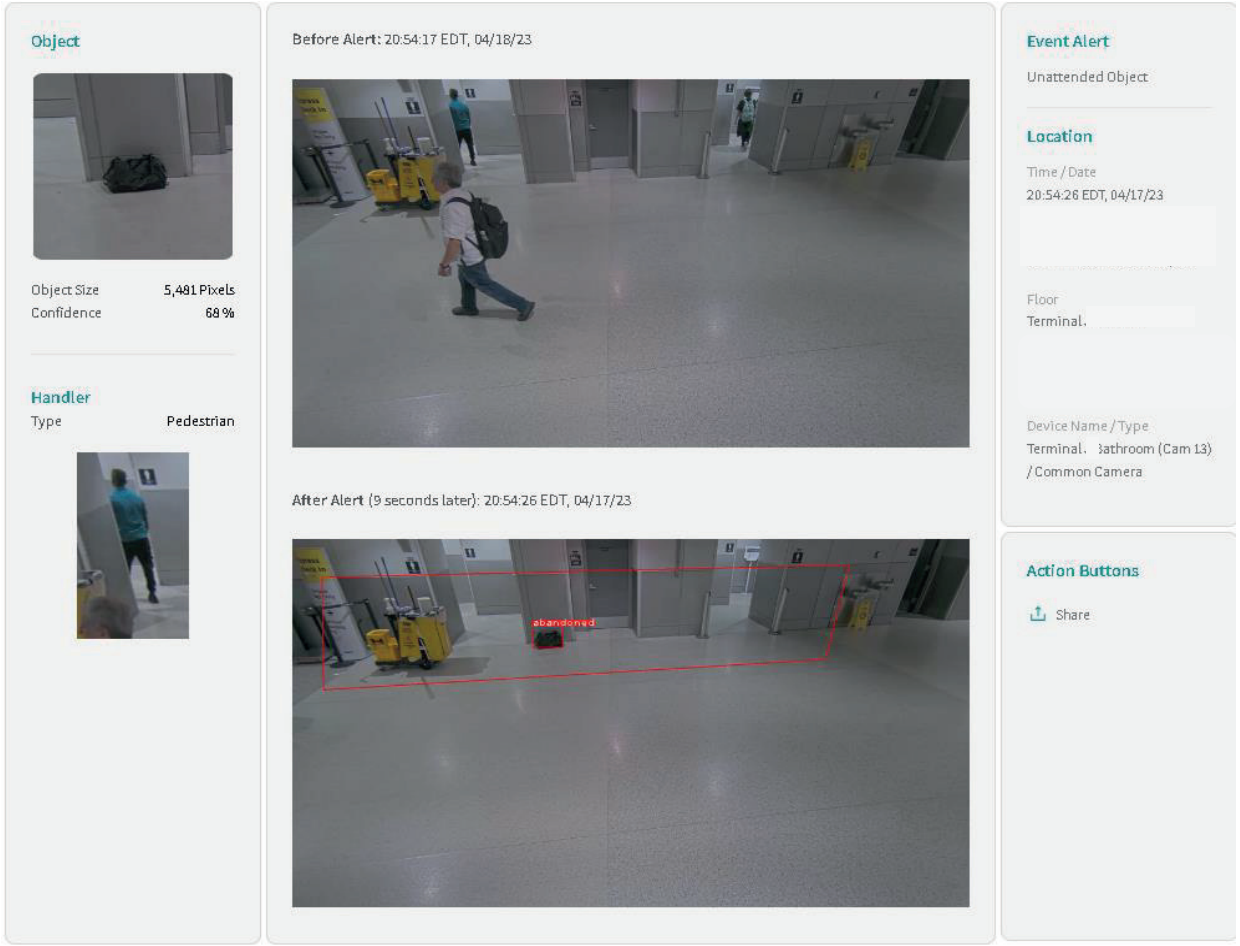
Object detection: Unattended luggage

USE CASE

Automate lost and found process

Suspicious object detection

Remove unused cleaning equipment from fan areas



Picture shows. ***Investigative analytics***

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REMARK SMART BOX

Smart Box / AI Edge Server

Remark Smart Box Integrates with:

- Any IP camera
- Any mainstream VMS
- OpenAPI support

SMART BOX MINI

Up to 8 cameras

SMART BOX 2000

Up to 30 cameras

SMART BOX 2x4000

Up to 100 cameras

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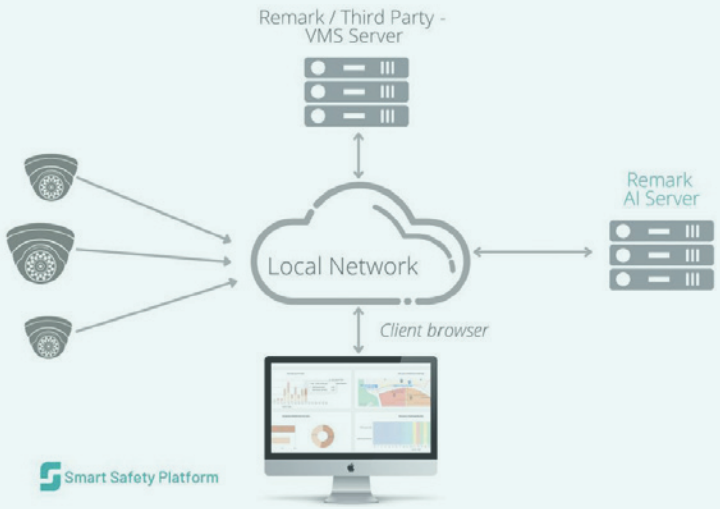
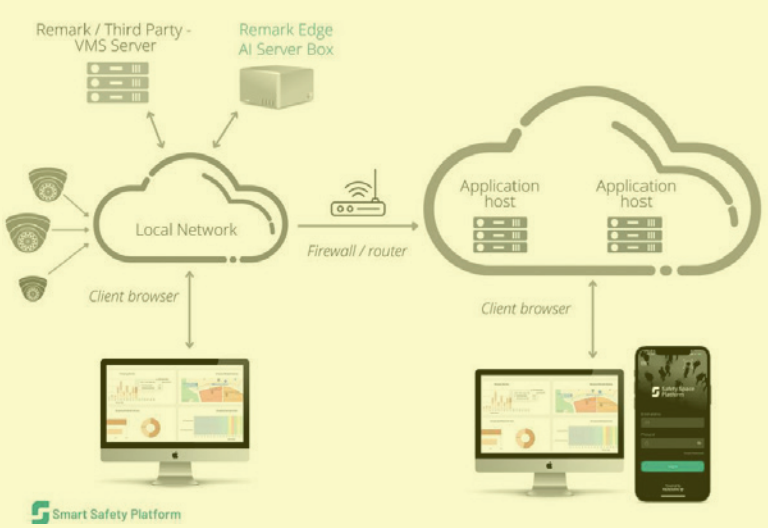
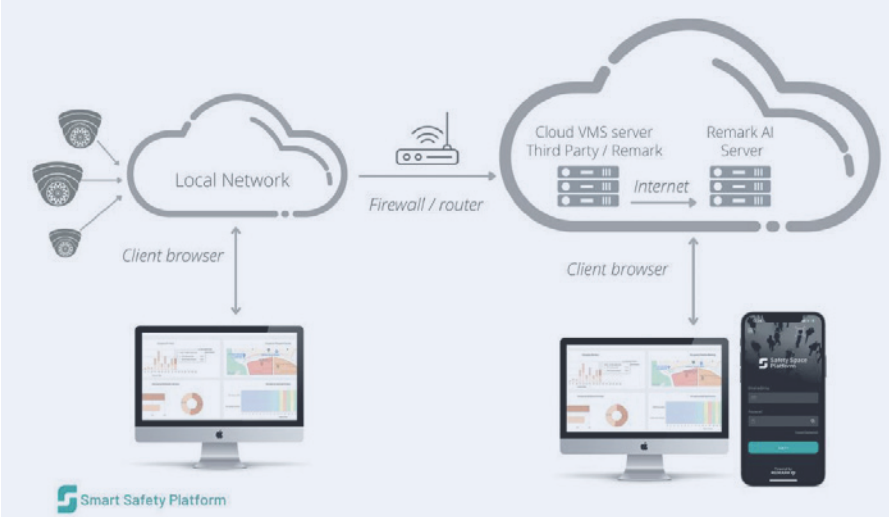
Deployment



On-Premise Deployment



Hybrid
Deployment



Cloud Deployment

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CASE STUDIES

Fremont Street , Las Vegas

City of Seoul, Korea

City of Edinburgh, UK

FREMONT STREET
LAS VEGAS

Footfall counting at scale & speed

Fremont Street wanted to become more data driven in their approach to events

Fremont Street is one of the most famous places in Las Vegas attracting millions of visitors a year.

Concerts and events are a big part of the experience. It became necessary to measure the impact of the events from a marketing, operations and security perspective.

Using their cameras we were able to provide real time alerts on occupancy and draw on historical data to improve the planning of future events.

The result: The Freemont team are now using objective data to make decisions.

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EVENTS
SEOUL KOREA

New Year Celebrations

SEOUL METROPOLITAN GOVERNMENT

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The situation: On the night of 29 October 2022, a crowd crush occurred during Halloween festivities in the Itaewon, Seoul, South Korea.

At least 159 people were killed & 196 others injured. 130 thousand visitors joined the event that day. Over 300 visitors were stuck in an 18m^2 alley, collapsing 6-7 layers of body.

Described as ‘the deadliest crowd crush in the country’.

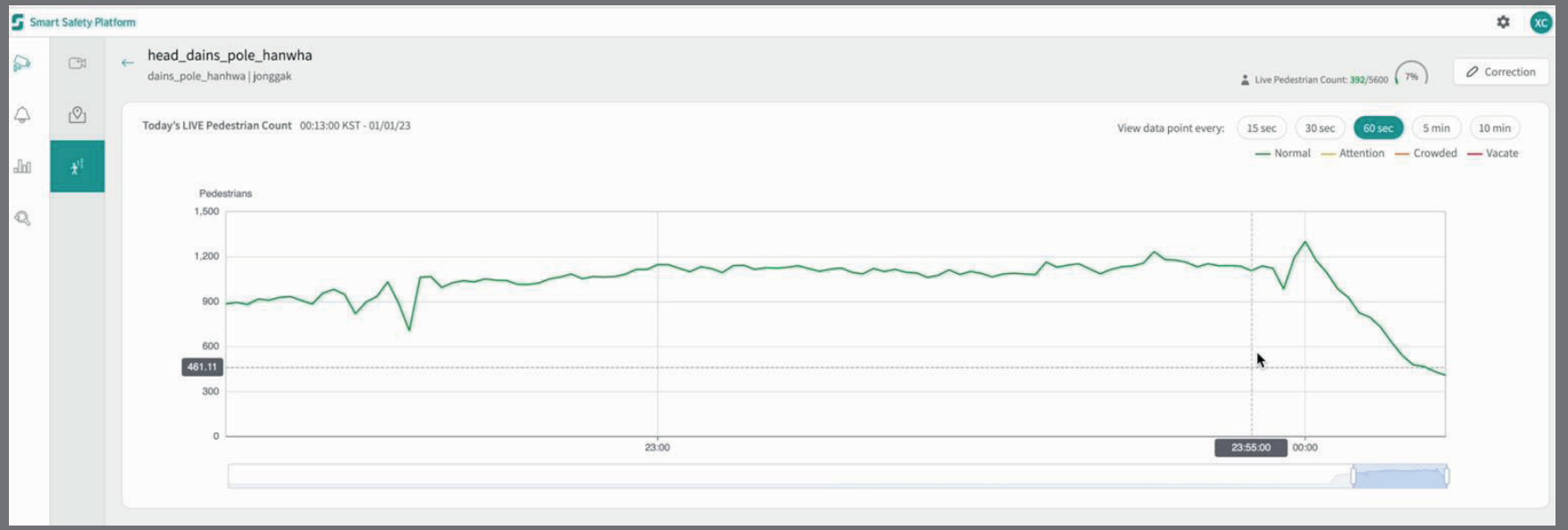
EVENTS
SEOUL KOREA

New Year Celebrations

SEOUL METROPOLITAN GOVERNMENT

REMARK

The solution: After the disaster review, Remark cooperated with Seoul to prepare for future New Year count down celebrations, delivering real-time monitoring for crowd density and actionable insights for data-driven decision making.

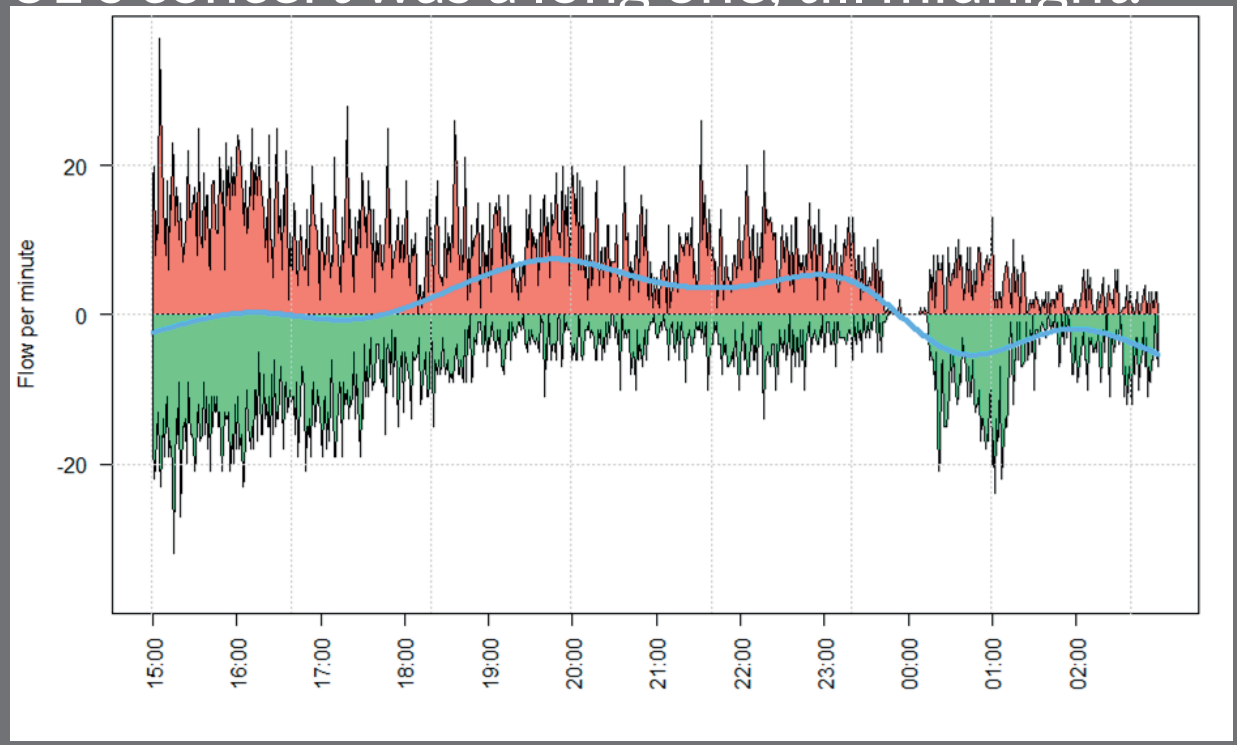


EVENTS
THE CITY OF EDINBURGH

Hogmanay Celebrations

The situation: Two concerts were held on 2022-12-30 and 2022-12-31.

1. 12-30's concert was a short one, non-overnight
2. 12-31's concert was a long one, till midnight.



EDINBVRGH
THE CITY OF EDINBURGH COUNCIL

REMARK

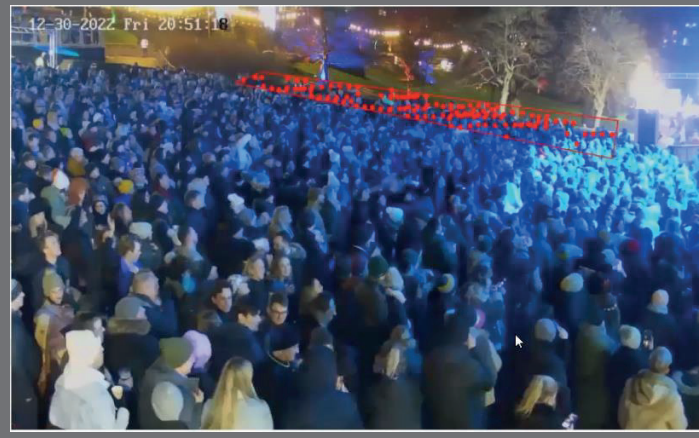
EVENTS
THE CITY OF EDINBURGH

Hogmanay Celebrations

The situation: The stage was separated into 5 parts:

1. Front
2. Middle
3. Left
4. Right
5. Rear

All the numbers are summed as a total for the whole stage occupancy



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Trusted globally ..

Fremont Street EXPERIENCE

brightline

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brightline

PORT OF DOVER

Springfield clinic

ROYAL ASCOT

Lotus's

1 HOTELS

METROPOLITAN POLICE

milestone

Genetec

IPCONFIGURE

STIIIZY

FFC

Nx Witness VIDEO MANAGEMENT SYSTEM

Wynn | Encore LAS VEGAS

Meadows

SG SCIENTIFIC GAMES

telent talent with technology

THE COSMOPOLITAN of LAS VEGAS

AXIS COMMUNICATIONS

AAEON an ASUS assoc. co.

ARROW

advancis

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AI-driven video analytics with real-time event alerts

FOR INCREASED SAFETY, SECURITY & OPERATIONAL EFFICIENCY

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