

# Partnering with Retail Customers

CV for Retail



# Agenda

- 01 | Tiger Analytics Overview
- 02 | Tiger CV Capabilities
- 03 | CV for Retail
- 04 | Select Use Cases - Retail CV





01

## Tiger Analytics Overview

# Who Are We?

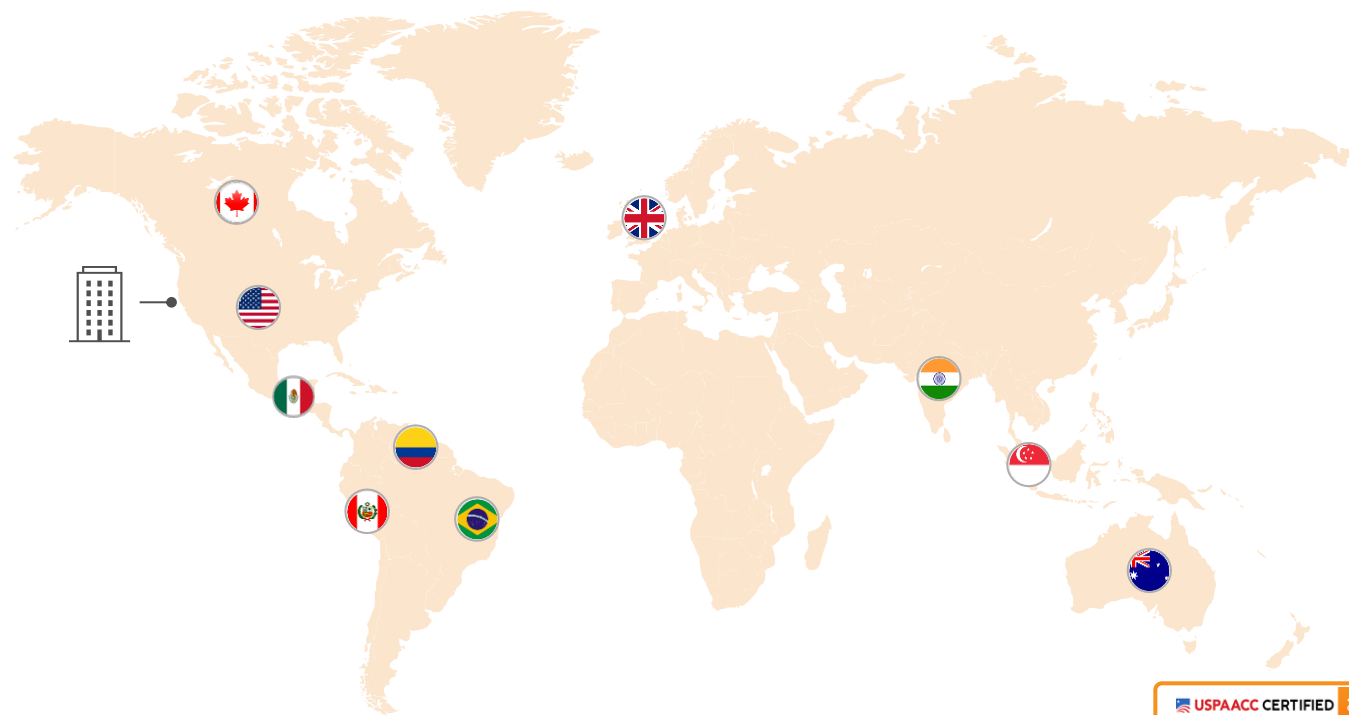
We're passionate about solving some of the toughest **business problems** out there using AI and analytics.

## Our Focus

Providing certainty for a better tomorrow.



# Fastest Growing Services Provider of Data, Technology and Analytics Solutions



## Global Delivery

**HQ:** Santa Clara, CA, USA

**Locations:** USA, UK, Singapore, Australia, Canada, Mexico, LATAM and India

**USPAACC CERTIFIED**  
Asian American/Minority  
Owned Business

2022-24

A minority-owned-enterprise certified by USPAACC



**5,000+**

Data & AI Professionals



**75+**

Fortune 1,000 Clients  
across Industries



**80%**

Revenue is repeat business  
from existing clients



**~10%**

Attrition rate &  
highly engaged team

# Key Recognitions



Wave Leader in  
Customer Analytics  
Service Providers **2023**



Leader and Rising Star  
in Data Science and  
Engineering **2023, 2022**



Leader and Star  
Performer - Analytics  
and AI Services PEAK  
Matrix® **2024, 2022**



America's fastest  
growing companies  
**2023, 2022, 2021**



A minority-owned-  
enterprise certified by  
**USPAACC**



India's Great Place to  
Work **2023, 2022**



America's fastest  
growing companies  
**2023, 2022, 2021**



Best Workplaces for  
Women in India  
**2023**



AIM's Top GenAI  
Service Providers  
**2023**



Brandon Hall Award -  
Learning and  
Development **2023**



Deloitte Technology  
Fast 50 India  
**2023**



# AWS Partnership & Relevant Engagements



- Global Advanced Tier Services Partner
- Global ProServe MSA
- Machine Learning Competency
- CPG Competency
- SDP EMR specialization
- SDP Redshift specialization
- SDP Glue specialization
- SDP Quicksight Specialization
- SDP Lambda Specialization



- 170+ AWS Certifications
- AWS Certified Associate, Professional & Specialty Level
- 35+ Strategic engagements globally



## Innovations

- Content Ingestion Solution
- AWS Data Fabric
- Data Quality & Profiling Framework
- DataHub – Metadata platform
- Automating IaaS using Terraform
- MLCore
- Tiger Data Observability Solution



## Global Manufacturer

Assisted in creating an end-to-end Data Platform in order to implement a solution for predicting maintenance of assets.



## Healthcare Provider

Built robust Data and Analytics (D&A) platform that can act as an Enterprise Data Hub to host structured, semi structured and unstructured data and support various analytics and reporting.



## Retailer

Developed a scientific approach to measure and analyze the impact of various marketing activities on Sales, to support Marketing spend decisions for the financial year.

# Our Capabilities

Optional

## Related Offering Examples

### Data/ML Engineering

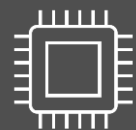


- Data Pipelines
- Agile Data Ops
- Platform Engineering
- Future State Architecture
- Cloud Data Lake
- Modern Data Platforms
- Cloud Data Migration
- Lean Data Governance



**Tiger's Data Fabric** helps cut-down the time it takes for setting up new Data Pipelines in Cloud from days & weeks to few minutes

### AI and Data Science



- Machine Learning
- Predictive Analytics
- Statistical Modeling
- Optimization Methods
- Streaming Analytics
- Generative AI
- Computer Vision
- Natural Language Processing
- Reinforcement Learning
- Deep Learning

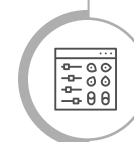


Our **CV Framework** leveraging state of the art algorithms helped a Fortune 50 company with in-store shelf intelligence, stock-outs, foot-fall, SKU rotation

### ML Engineering and Consumption



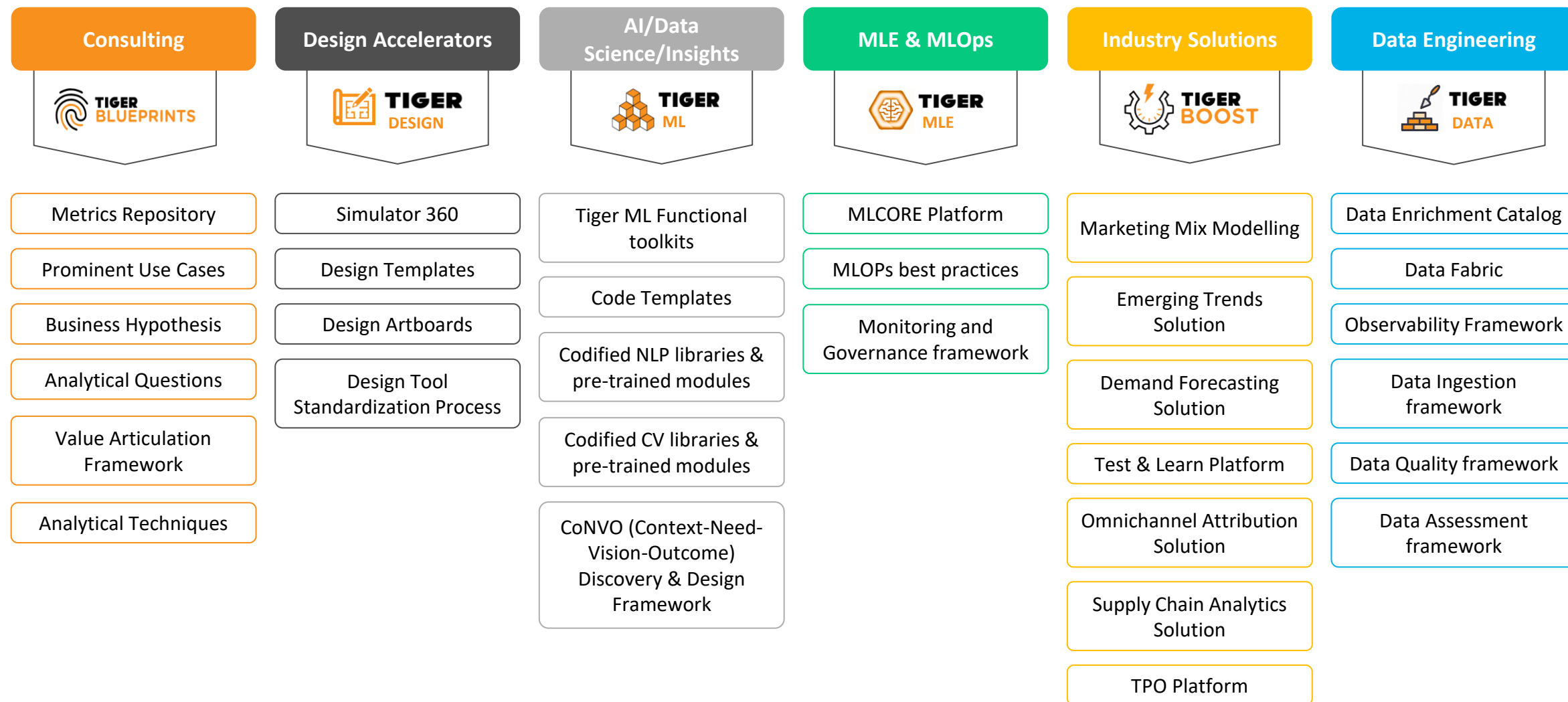
- ML Operationalization
- Scaling AI/ML solutions
- AI/ML Application Engineering
- APIfication
- Business Insights
- Analytics Story Telling
- Visual Analytics
- Value Realization



**ML Core**, a low code ML Platform with ready to use data models, features, ML models, dashboards streamlined production operations for a PE firm



# Supplemented with a wide array of Reusable Tools, Methodologies and Frameworks



A thick, curved orange line that starts from the top right corner and curves downwards and to the left, ending near the center of the right edge of the slide.

02

Tiger CV Capabilities

# CV Practice Overview



## CV Expertise

100+

Data scientists experienced at solving complex CV based problems

Dedicated CV R&D Lab



## Client Projects

30+

Developed and successfully productized



## Vision Language (Gen AI)

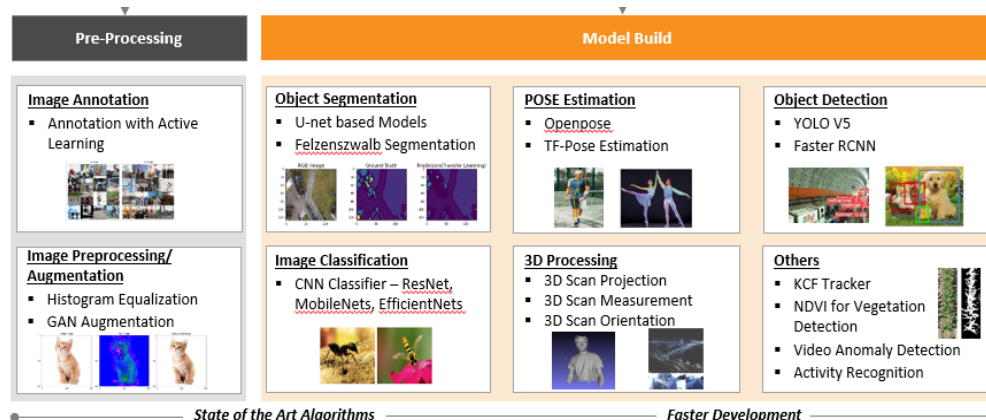
5+

Live POC'S on CV-Gen AI use cases

Dedicated research on Gen AI –CV

### Tiger's Computer vision accelerator

Component libraries developed and evaluated on public datasets in usable format for training/inference



### CV Framework for Video and Image Analytics

Comprehensive framework to build and deploy complex CV use cases



## DE & Cloud Experience

- Preferred partnership with Cloud providers
- Proficient in GPU computing, model deployment, real-time inference and other related areas that allow us deploy our solutions on any cloud platform
- 900+ Data Engineers, Solution and Data Architects

## MLOps Experience

- CI/CD pipelines to automate build, test & deployment of models into production
- Automation of pipeline workflows (data, training) and infra-provisioning
- Model monitoring framework (Model, Data drift) with automated retraining trigger

# Tiger's Computer Vision Accelerator Components

**Component libraries** developed and evaluated on public datasets in usable format for training/inference with new data which provide us access to labelled images and pre-trained modules

## Pre-Processing

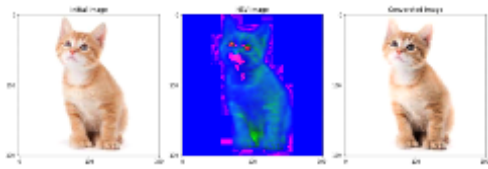
### Image Annotation

- Annotation with Active Learning



### Image Preprocessing/ Augmentation

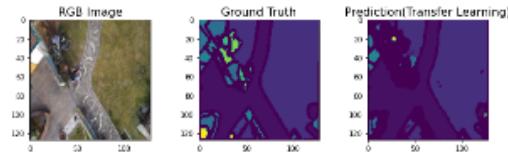
- Histogram Equalization
- GAN Augmentation



## Model Build

### Object Segmentation

- U-net based Models
- Felzenszwalb Segmentation



### Image Classification

- CNN Classifier – ResNet, MobileNets, EfficientNets



### POSE Estimation

- Openpose
- TF-Pose Estimation



### 3D Processing

- 3D Scan Projection
- 3D Scan Measurement
- 3D Scan Orientation



### Object Detection

- YOLO V5
- Faster RCNN



### Others

- KCF Tracker
- NDVI for Vegetation Detection
- Video Anomaly Detection
- Activity Recognition



# Our Framework for Video and Image Analytics



## 1. Data Consolidation

### a. Upstream/Downstream Integration

- Bot service Integration
- Webapps integration
- API endpoints & Edge devices

### b. Data I/O

- Organizing data from multiple sources
- Policy for access control
- Data ingestion
- Orchestrating data pipelines and saving data



## 2. Data Processing

### a. Data viz and labelling workflows

- Interactive tools for labeling and creating training datasets
- Semi-automated labeling tools with active learning
- Well defined schemas for labels and annotations, their management

### b. Data Catalogue / Feature Store

- Version, metadata and data dictionary
- Efficient access for training and inference
- Data QC metrics
- Best practices around managing features across teams, feature lifecycle management, provenance/lineage



## 3. Model Development & Deployment

### a. Model Development

- Pre-packaged environments and Curated frameworks
- Model evaluation utility library & Model Interpretation
- Tools/workflows for faster iteration & feedback
- Tools for Experimentation tracking

### b. Model Deployment

- Multiple deployment targets: web/mobile/edge
- Optimizations for resource requirement SLAs
- Deployment strategies: shadow/canary/champion-challenger etc.

## Ongoing Processes



## System Governance

### a. Metadata Management

- Metadata about pipeline runs, models, metrics
- Provenance and lineage queries

### b. Workflow Utilities

- Quick onboarding and Templates to automate infrastructure
- CI/CD pipelines and governance process

### c. Security/Access, Billing, Monitoring



## Monitoring

### a. Model Inference

- Batch, Hosted, Edge devices (mobiles, tablets, H/W devices)
- Optimizations for performance SLAs

### b. Model Monitoring

- Pipeline/workflow, Active monitoring and retraining
- Alibi.detect / Alibi.explain / LIME etc.
- Dashboards and Alerts/notifications



03

CV for Retail



# Solution Approach

## Requirement Gathering

- Collaborate with business teams to identify the scope & granularity of key use cases
- Define key metrics associated with each use case
- Collect the input video data from CCTV cameras for preprocessing and analysis

## Data Pre-Processing

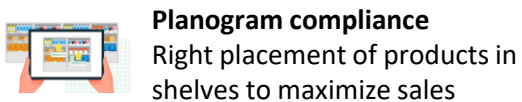
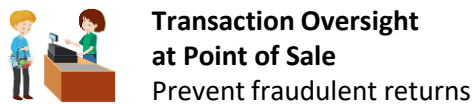
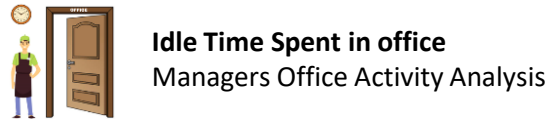
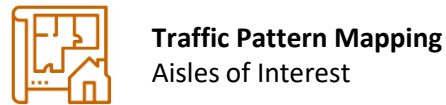
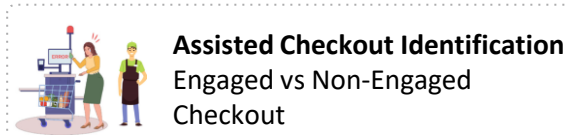
### File Decoding

Convert encoded video files to mp4 format and prepare them for modeling

- Frame Extraction
- Zone definition
- Noise Reduction
- Image Enhancement
- Normalization

## Model Development

Custom model development for each use case:



### Model Techniques

- **Yolov8 & BoT-SORT** models to detect and track people in the frame
- Multi-Person tracking to differentiate between employees and customers
- **Re-identification of individuals** across non-overlapping camera views using models like **DeepReID & Fast ReID**
- **Yolo-Pose v8** for key point detection



**Refine models with additional client data**



**Metrics Computation**

## Output

### Model Results

Output data for each use case;  
Annotated videos with bounding boxes



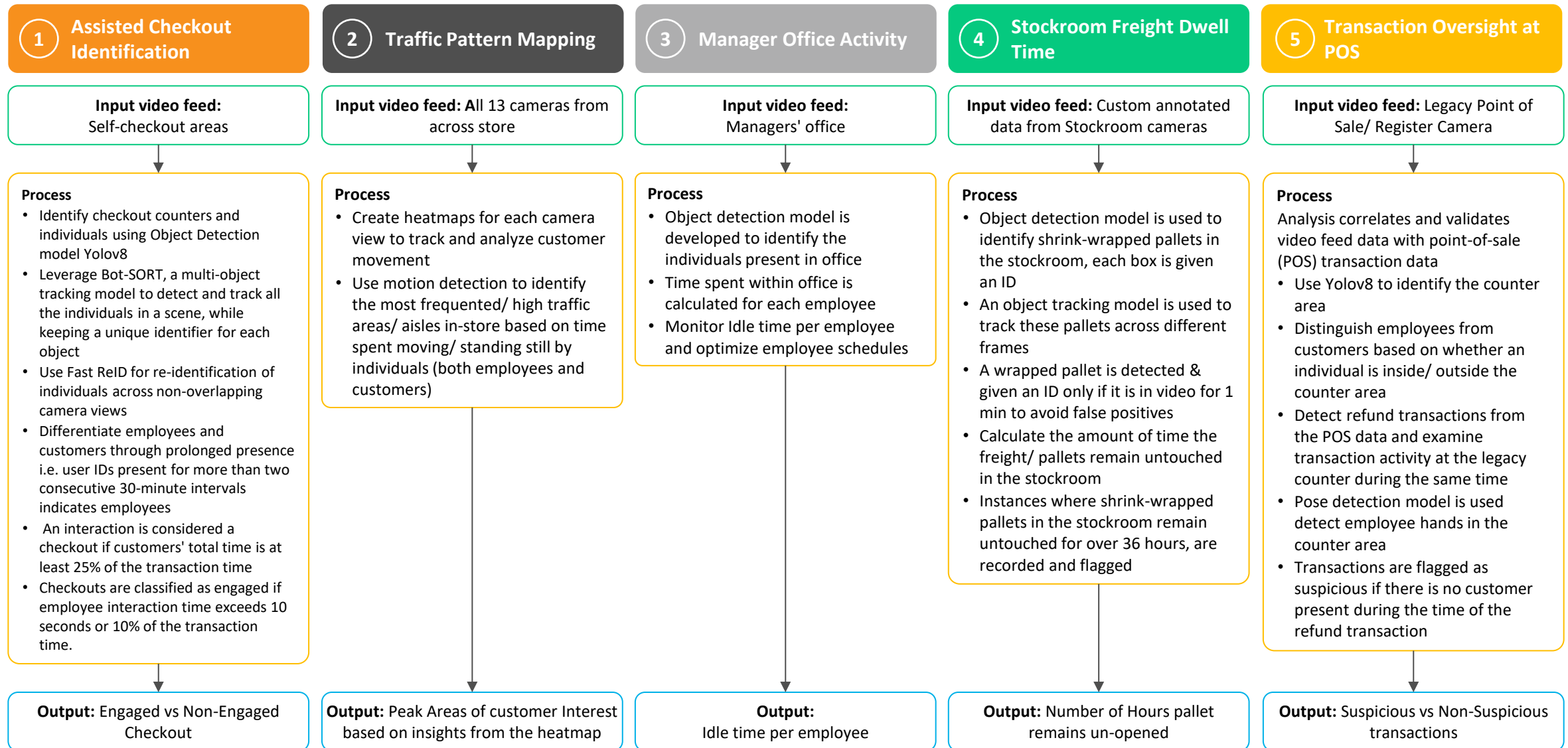
### Dashboards for Visualization

Web based user interface for easy access to monitor metrics across different use cases

- Count of Customers
- Staff Idle time
- Average Waiting time
- Staff Interaction time
- Suspicious refund %
- Assisted checkout %



# Use Case wise Detailed Approach





# Video Stream Processing leveraging Nvidia Deepstream

## Streaming video framework

- GStreamer
- Nvidia Deepstream
- Low latency framework for video processing

## Edge Inference machines/servers

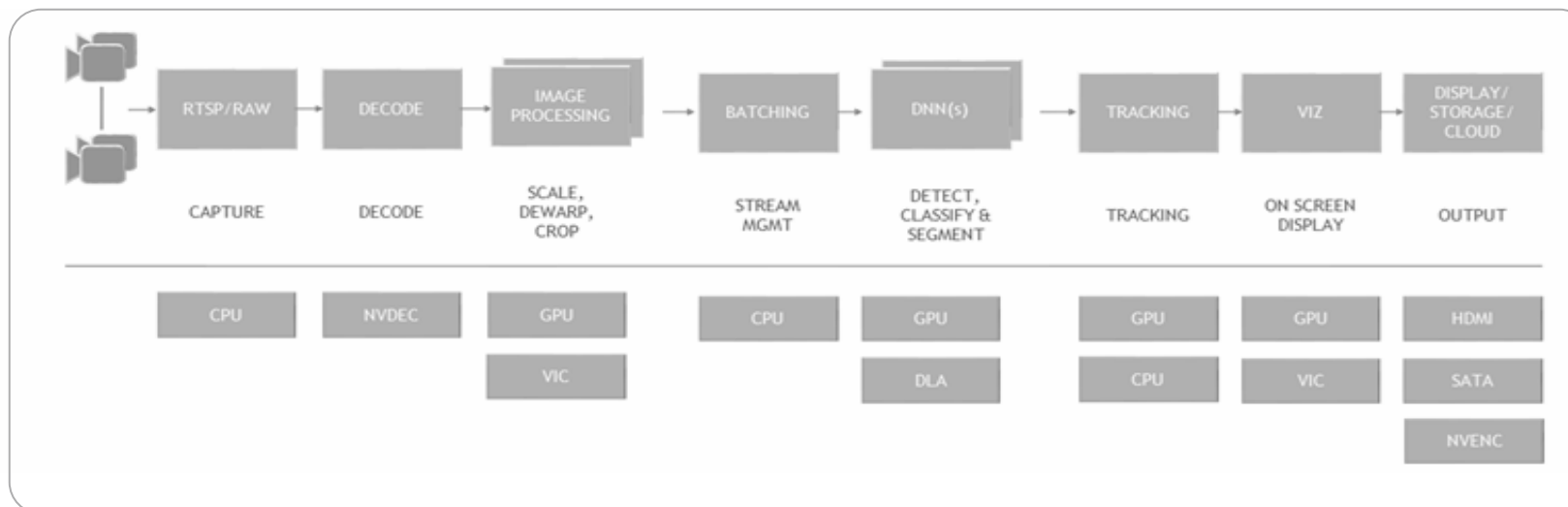
- Nvidia Jetson Orin AGX
- Real-time simultaneous model inference from multiple streams in single GPU

## Model runtime

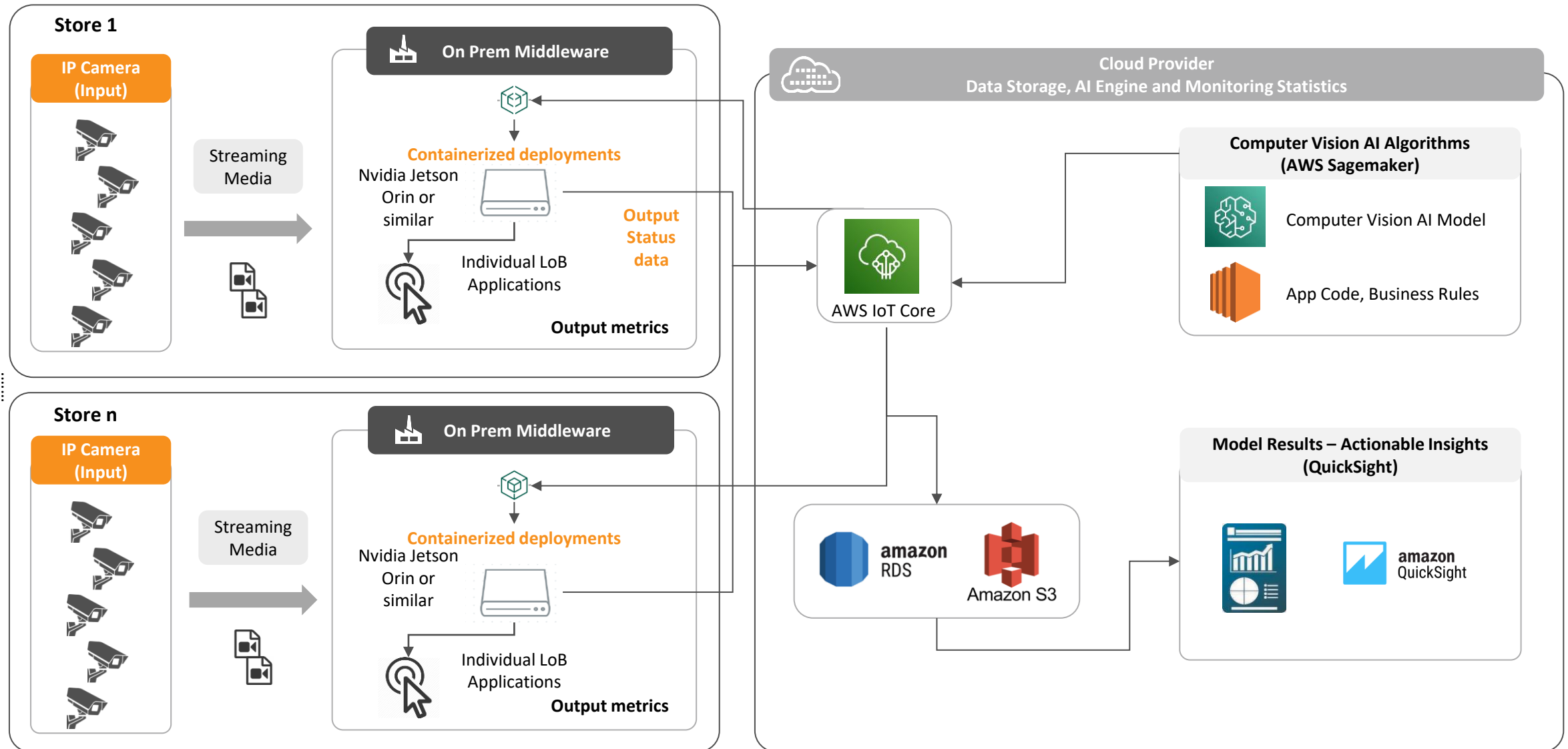
- ONNX runtime
- Framework for model optimization for low latency inference

## Over the air updates / Cloud integration

- Azure IOT hub
- Containerized deployments
- Device health monitoring, containerized deployments and model updates



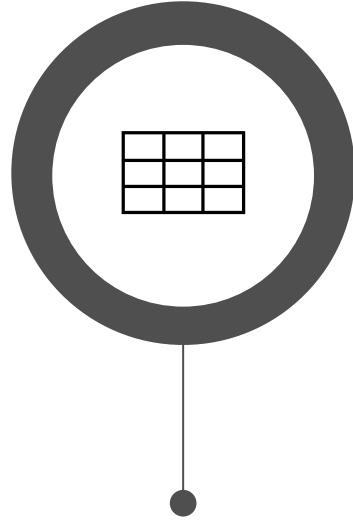
# High-Level Architecture on AWS – Edge Deployment



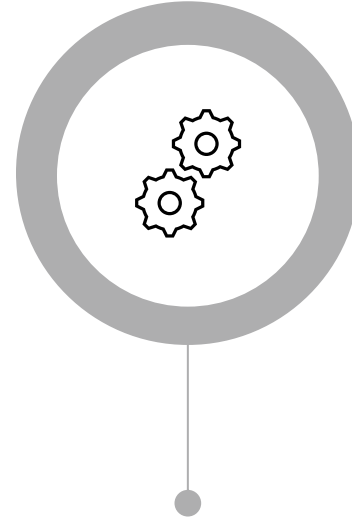
# Business Outcome



**AI-based solution using computer vision models** to enable data-driven insights



**Heatmaps** that offer a clear visual representation of the most and least visited aisles and/or areas within the store



Compute various metrics for monitoring employee dwell time, assisted checkout engagement %, suspicious transactions% along with list of all void transactions



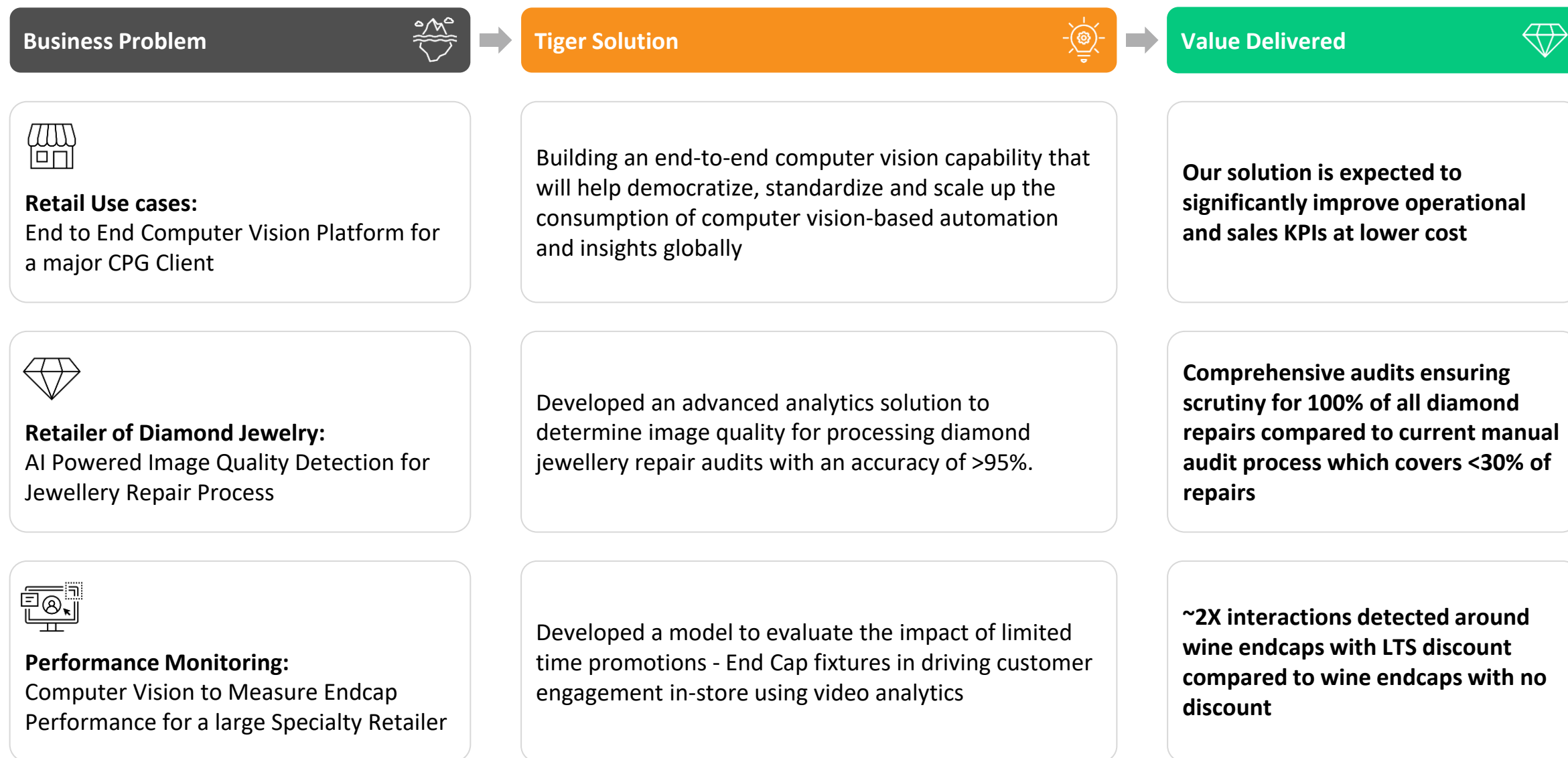
**User-friendly dashboards** that enables retail stores to improve their operational efficiency and reduce likelihood of theft



03

Select Use Cases – Retail CV

# Select Examples of Our Experience in Computer Vision based Solutions



# Thank You

Do you have any questions?

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www.tigeranalytics.com

