



Standard AI

How AI is Transforming Loss
Prevention and the Way
Stores Work

Foundational AI for an industry should serve as a
platform for many solutions

What should an AI-powered platform for retail
solve?

US retail had \$100B+ in loss in 2022



National Retail Security Survey 2023

This year's study found that the average shrink rate in FY 2022 increased to 1.6%, up from 1.4% in FY 2021. When taken as a percentage of total retail sales in 2022, that shrink represents \$112.1 billion in losses. The report also examines drivers of shrink, the increased threat of violence associated with retail crime and other priorities.

Hard solution requirements

- Non-intervention: must ensure shopper and employee safety
- No facial recognition: must ensure privacy
- Easy implementation and cost effective (must be cameras only, retrofit, no behavior changes, no gates, etc)

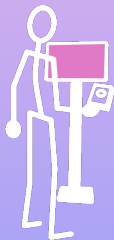
Let's solve this problem with an **AI platform** and
then see what other solutions it enables

A digital twin for retail

- A digital twin is a digital copy of everything happening in your store...
- Updated automatically with AI
- Where are your shoppers? Your employees? What are they doing? Where is your merchandise?

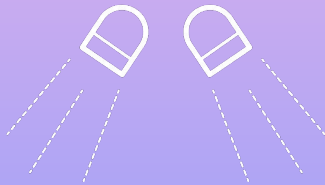
A digital twin of your entire store

Standard Vision Platform



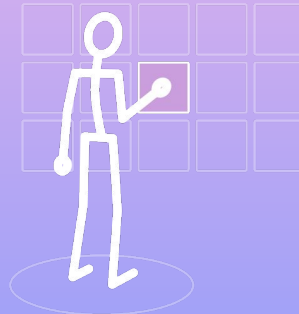
People

For understanding
customers and
employees



Items

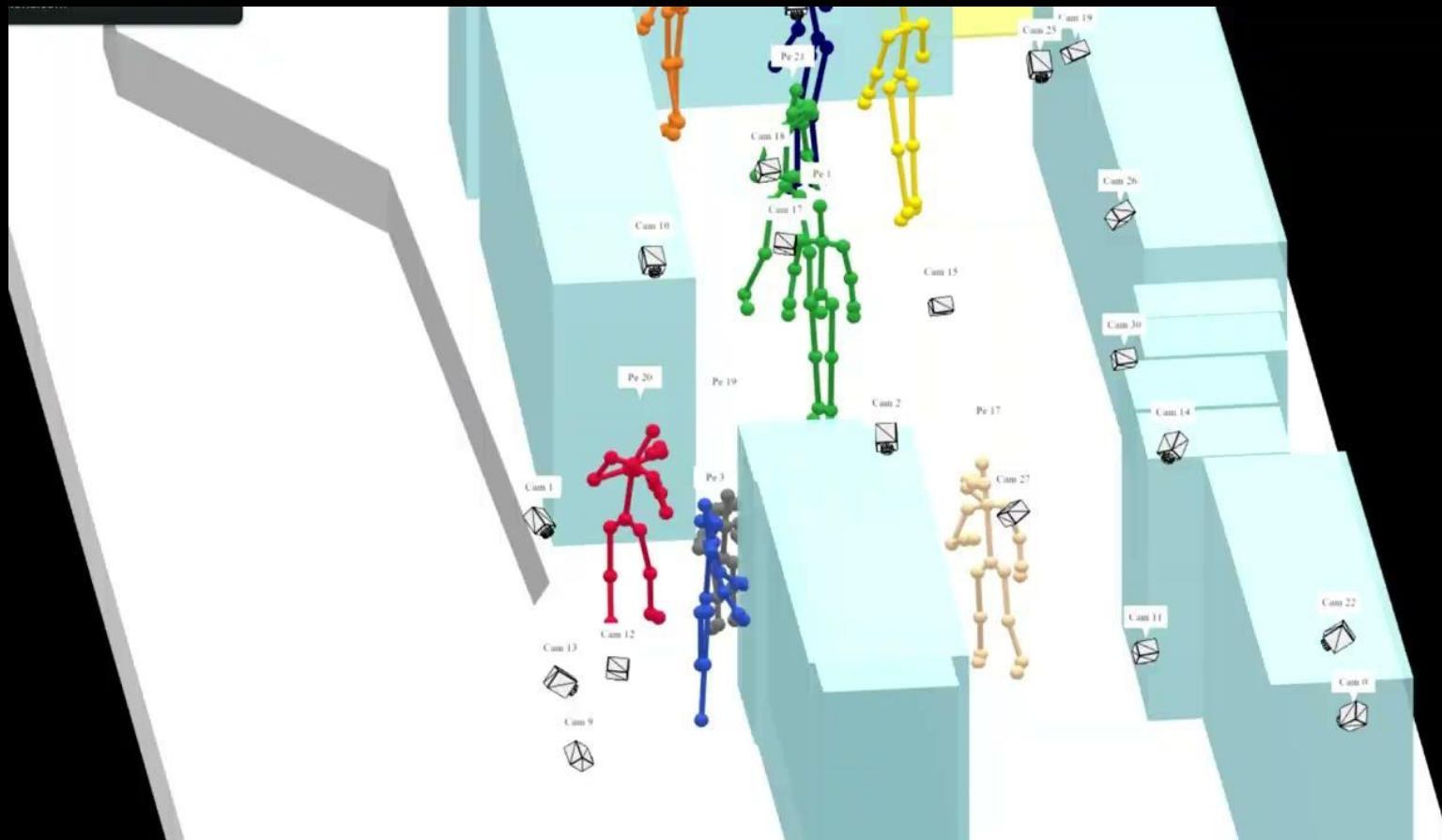
For tracking your
most valuable assets



Actions

For how it all comes
together

A Real-Time Understanding of **Every** Shopper



Multi-View **Anonymous** People Tracking



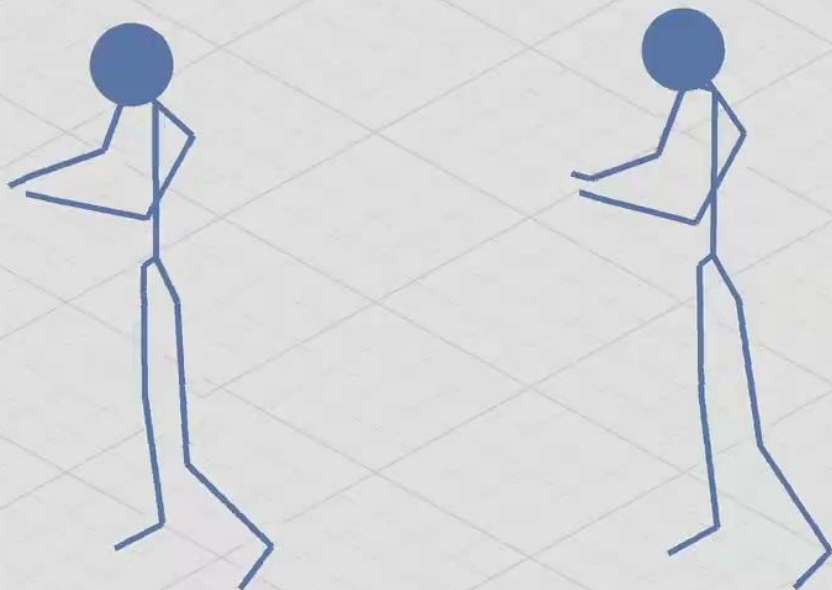
Critical for applications that require tracking many people across a large space

Maintains consistent anonymous IDs as people move in and out of camera views

Industry leading multi-view tracker

Scales to 50+ cameras

Precise Understanding of 3D Interactions



Some applications that require more precise 3D positions

We add additional physically realistic constraints and jointly optimize the pose across all detections and perspectives

Left: Naive approach
Right: Ours

Detailed Map of All Merchandising

Map out the location and identity of all high value things in a space

For applications that require fine-grained classification of items

A typical c-store can have 3,000+ unique SKUs, many that are visually similar. Our platform can solve this degree of complexity

Automatically Detect Where Changes Happen



We compare and contrast images over time

Meaningful changes are automatically detected

Irrelevant changes like lighting are ignored

Enables tools for managing inventory, driving sales, detecting theft, and optimizing layout design

And finally... understanding how shoppers
interact with products

Multi-view Transformers for Action Detection



We fuse a single Transformer across multiple video streams, yielding high accuracy

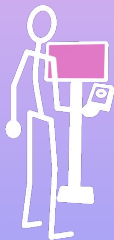
We use self-supervised pre-training to leverage a client's full historical video dataset

Critical for applications that require high accuracy



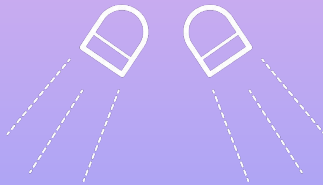
Combined, we understand every interaction in the store

Standard Vision Platform



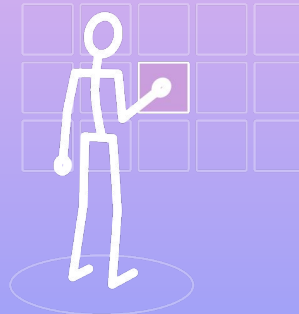
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How Does this Address Loss?

- LP teams today are looking for needles in a haystack – in one day, they generate 100's of hours of video in each store
- EXAMPLE: One Standard customer generated more than **45M hours** of surveillance footage last year for a team of 6 LP specialists to review

At 8 hours a day, they could only review **0.002%** of that video

Finding that Needle in the Haystack

- With Standard's Vision Platform, we are able to flag unmatched product takes in store to transaction logs, signaling **potential loss**
- We flag these for LP teams to review
- This can make LP teams ~100x more efficient

Finding that Needle in the Haystack



vision.appstandard.ai/event/TTE_wRmfZZ_sg10F?sort_by=event_start_datetime_asc&limit=20&event_start_datetime_gte=2024-02-02T08%3...
Gmail Calendar CamogramViz Pre-prod Camogra... Looker S yira Catalog Camogram Roadmaps Tobacco Tracker SCO Theft Vision Lite 1Password for Sta... Relaunch to update

VISION TT Internal Test User United Pacific

Needs Review Unpublished Published All Events


9 Published All Clean No Transaction Anomalous Sort By: Oldest First Feb 2, 2024 - Feb 3, 2024

No Transaction
2/2/2024 9:26 PM · Store 238 Event #TTE_wRmfZZ_sg10F
No Transaction
2/2/2024 10:04 PM · Store 238 Event #TTE_nD7S4Kn107ip
No Transaction
2/3/2024 4:46 AM · Store 238 Event #TTE_jah9-nu9d18Q
No Transaction
2/3/2024 7:16 AM · Store 238 Event #TTE_6E1UWX10bj...
No Transaction
2/3/2024 7:16 AM · Store 238 Event #TTE_dYjSnIwYib0K
No Transaction
2/3/2024 11:29 AM · Store 238 Event #TTE_LVzfuHyJ9cP
No Transaction

< Previous Next >

No Transaction

Event #TTE_wRmfZZ_sg10F 2/2/2024 9:26 PM Store 238



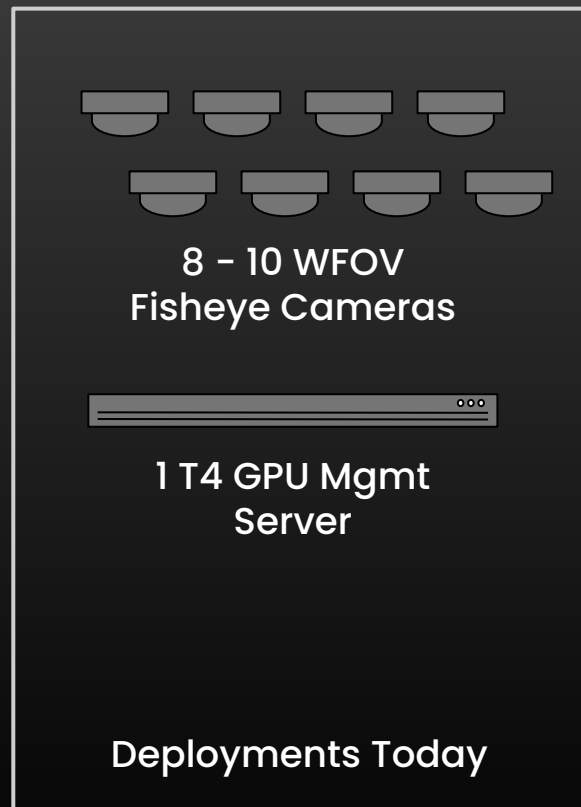
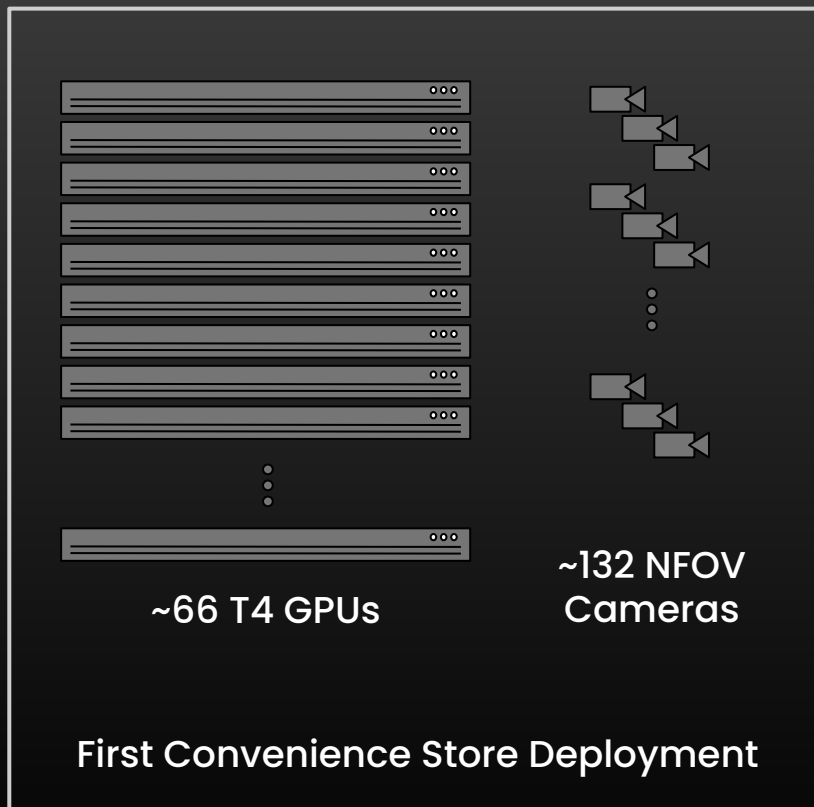
Camera 2 Camera 1 Camera 3 Camera 4

< Previous Page Next Page > Items shown per page 20

Requirements Review

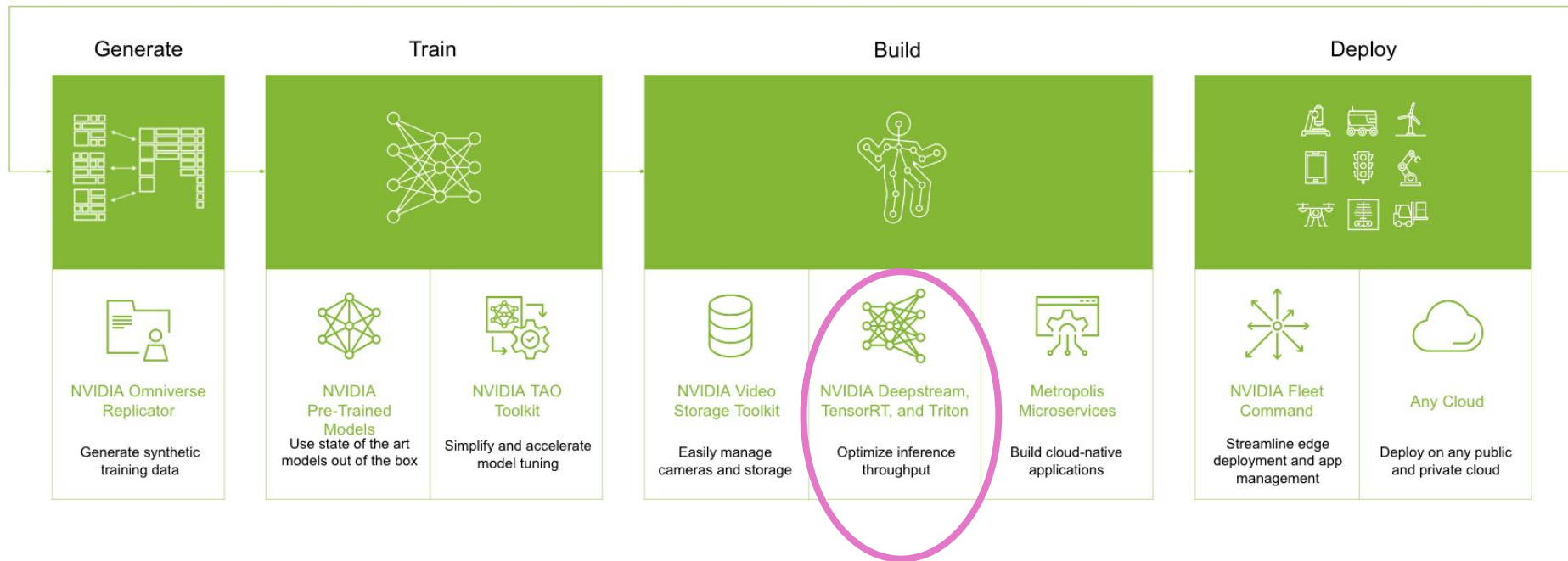
- ✓ ☒ Non-intervention: must ensure shopper and employee safety
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Hardware/Software Progression

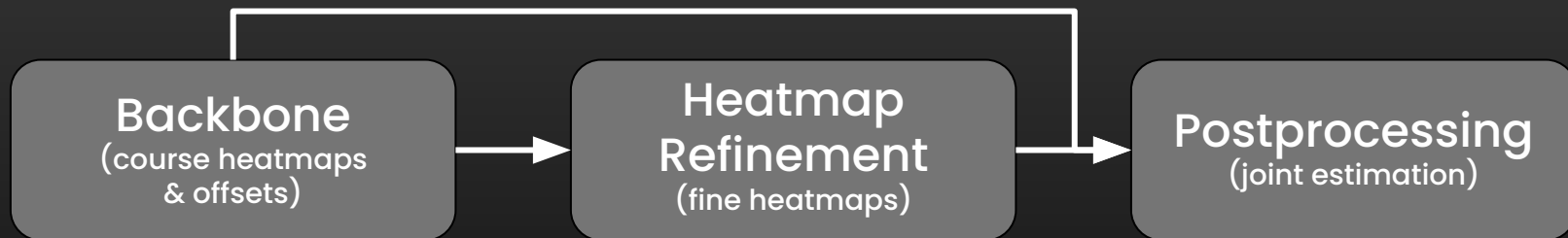


How did **NVIDIA** technologies help get us here?

Tech Stack Progression



Pose Model Optimization - Case Study



Pose Model Optimization – Baseline



	Nvidia T4	Nvidia AGX
Preprocess (Python)	~ 1.50 ms	~ 2.25 ms
Partial preprocess + Backbone + Heatmap (TF FP16 + FP32)	~ 15.25 ms	~ 55.75 ms
<i>Partial preprocess + Backbone only (TF FP16)</i>	~ 9.50 ms	~ 35.25 ms
<i>Heatmap only (TF FP32)</i>	~ 5.75 ms	~ 20.5 ms
Total	~ 16.75 ms (59.7 FPS)	~ 58 ms (17.25 FPS)

Pose Model Optimization – TensorRT



	Nvidia T4	Nvidia AGX
Preprocess including colorspace conversion (python)	~ 5 ms (3 ms colorspace)	~ 3 ms (1 ms colorspace)
<i>Partial preprocess + Backbone (TRT FP16)</i>	~ 7.75 ms (~2x faster)	~ 16.5 ms (~3.5x faster)
<i>Heatmap refinement (TF FP32)</i>	~ 5.75 ms	~ 20.5 ms
Total	~ 18.5 ms (58 FPS)	~ 37 ms (27 FPS) (1.5x faster)

Pose Model Optimization – Frame & Batch Sizing

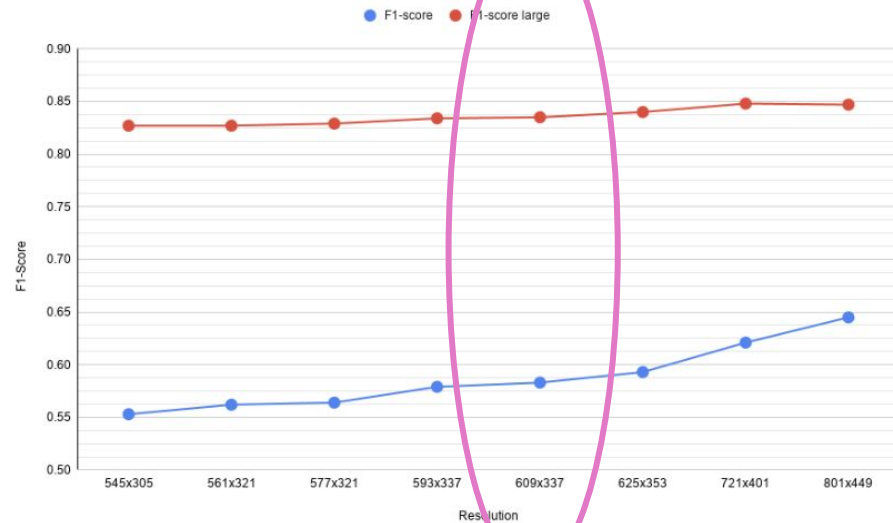
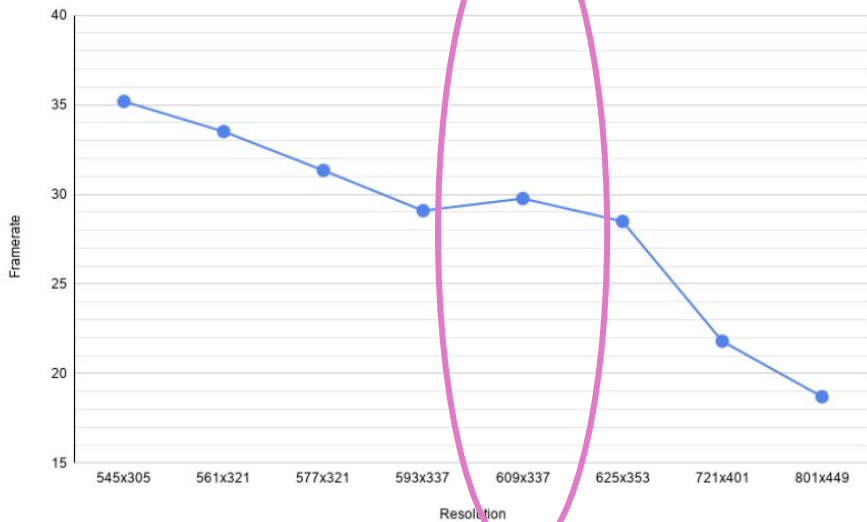


Input resolution WxH	Batch size	Avg batch inference time (ms)	Avg sample inference time (ms)	Framerate (FPS)
801x449	52	2673.0	51.4	19.45
801x449	10	534.7	53.5	18.70
609x337	58	1816.1	31.3	31.94
609x337	10	350.8	35.1	28.51
577x321	61	1729.4	28.4	35.27
577x321	10	306.7	30.7	32.61

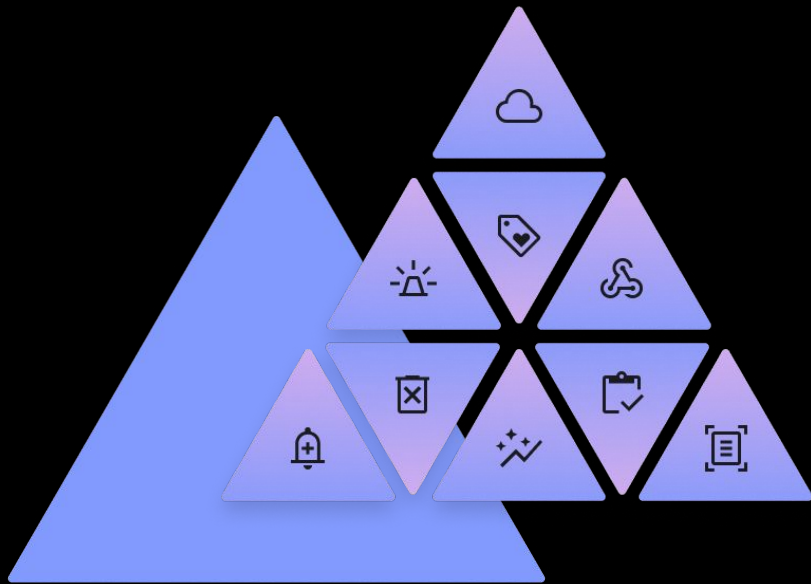
30 FPS target is achievable with 609x337 resolution.

AGX works best with higher batch size: tradeoff between latency, memory footprint and framerate.

Pose Model Optimization – Accuracy



What other problems can Standard's Vision
Platform solve?



**Let's jump into a few
retail solutions built
on the Vision Platform**



**Cloud
POS**



**Theft
Detection**



**Ads &
Loyalty**



**Retail Data
APIs**



**Out of
Stock**



**Loss
Prevention**



**Insights &
Analytics**



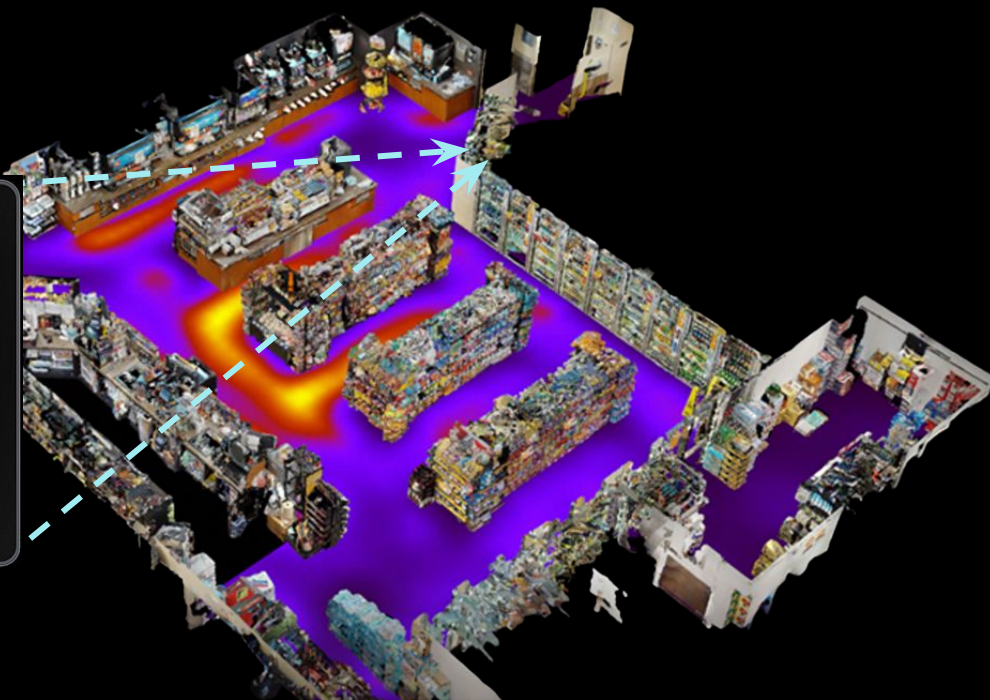
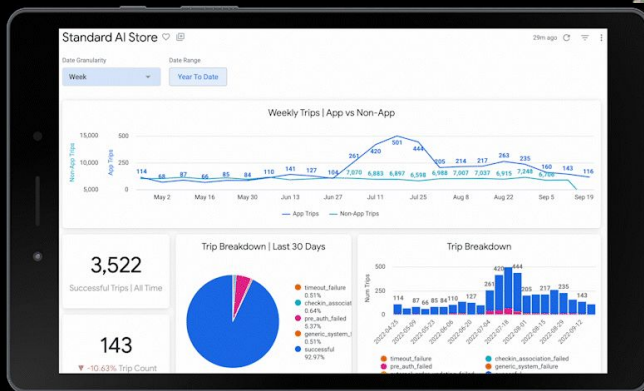
**Inventory
Management**



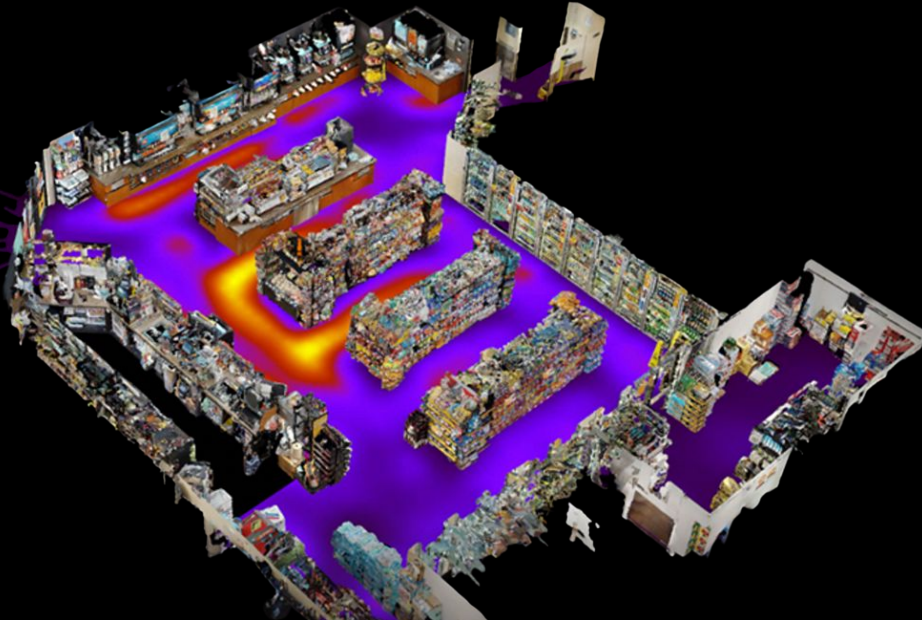
**Mobile
Scan & Go**

Spatial Analytics for Physical Spaces

eCommerce level insights
for physical retail



S[^] Spatial Analytics



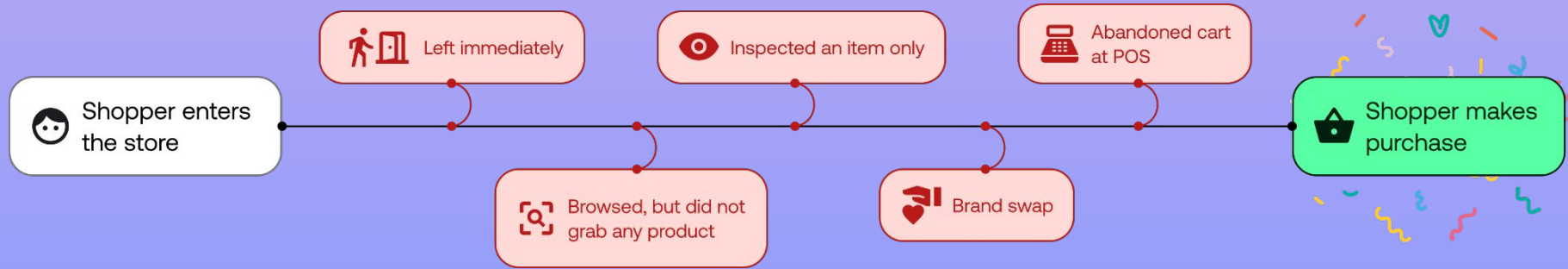
Insights to Increase Sales

- Full in-store conversion funnel analysis
- Predictive modeling on impact of changes to product locations
- Visual and directional impressions
- Actionable suggestions on where to put SKUs to drive sales (store simulator)
- Highlight the most valuable part of your shelves

Full in-store conversion funnel analysis



Understand your physical store the same way
e-commerce does virtually

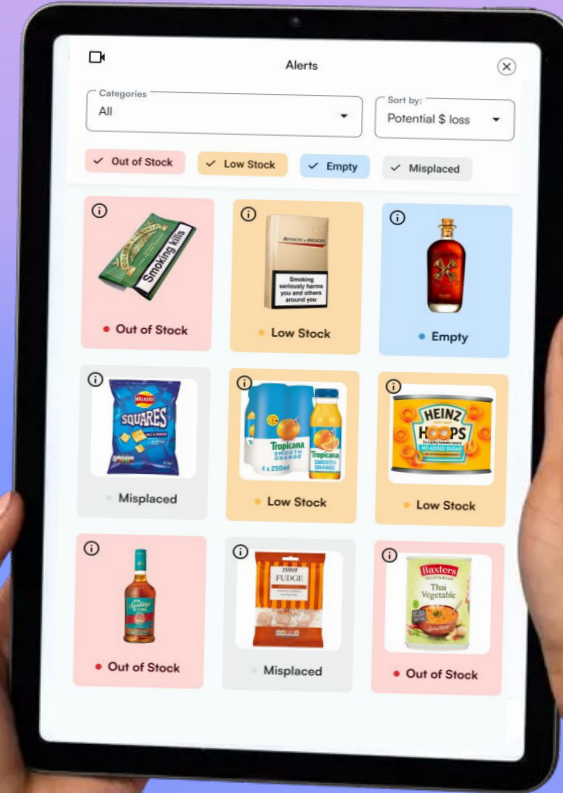


Spatial Analytics – What the Vision Platform can see



MISSION CONTROL

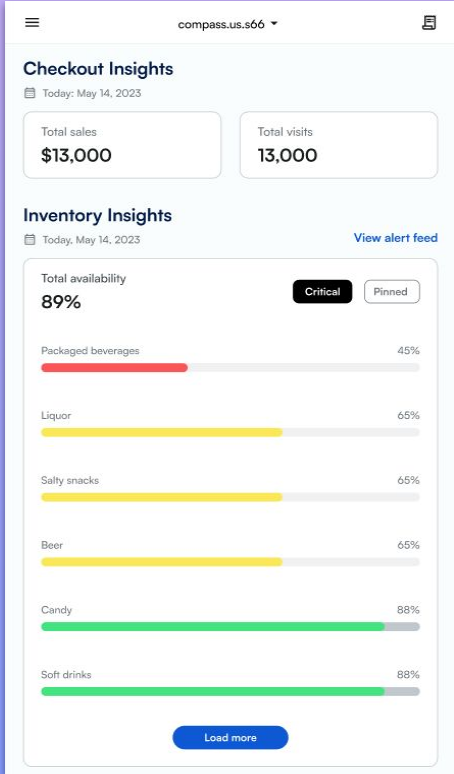
Unlock new workflows and insights to deliver a new standard for store operations and drive immediate ROI



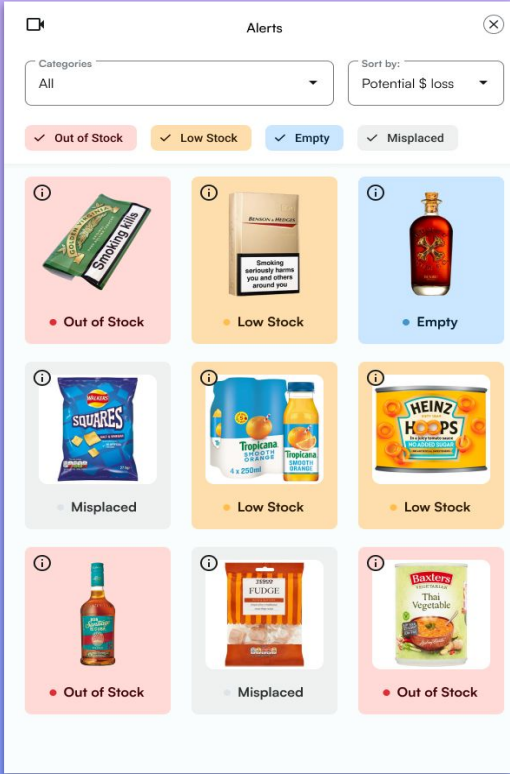
In-Store Operator Tablet



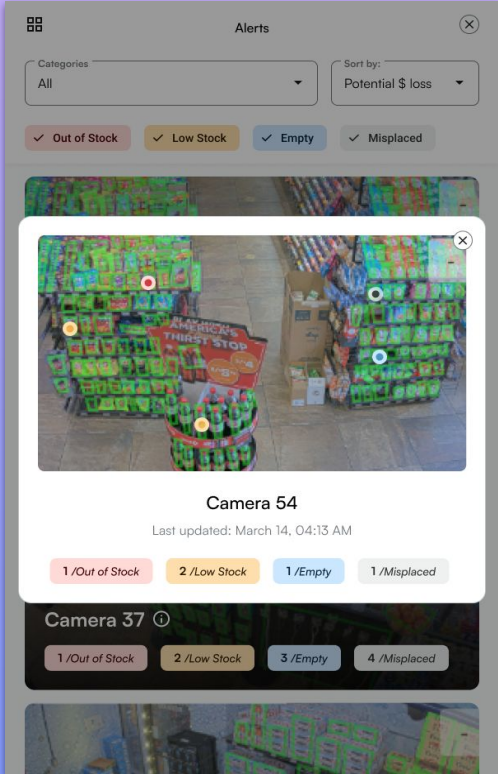
Understand what product categories are most impacted by lack of product availability



View all products identified as OOS, Low Stock, Empty, or Misplaced by importance



Visualization of exactly what the camera saw and detected for state of shelf



Shelf Understanding



Stock Alerts

Alerts customized to your preferences

- Empty, low, and OOS notifications
- Store and category OSA
- Identify products for reordering



Inventory Insights

Easy to use dashboard for actionable insights

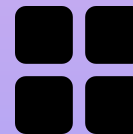
- OSA Trends across multiple stores
- Potential lost revenue
- Time to replenish/resolve



Shelf Compliance

Store wide compliance visibility

- Shelf compliance rate by individual product, shelf section, category, and full store



Shelf Share

Visual understanding of brand presence

- Volume of shelf space by brand
- Visibility on shelf based - where do items physically sit?

Theft Prevention



Theft Investigation

Tool to access video clips of probable theft

- Video of shopper visit with highlighted points of interest
- Tag and Save visits
- Track repeat offenders



Theft Insights

Curated dashboard for insights into theft trends

- Type of theft (full, partial, at SCO)
- Category & Product insights
- Time of day & store location



Probable Theft Alerts

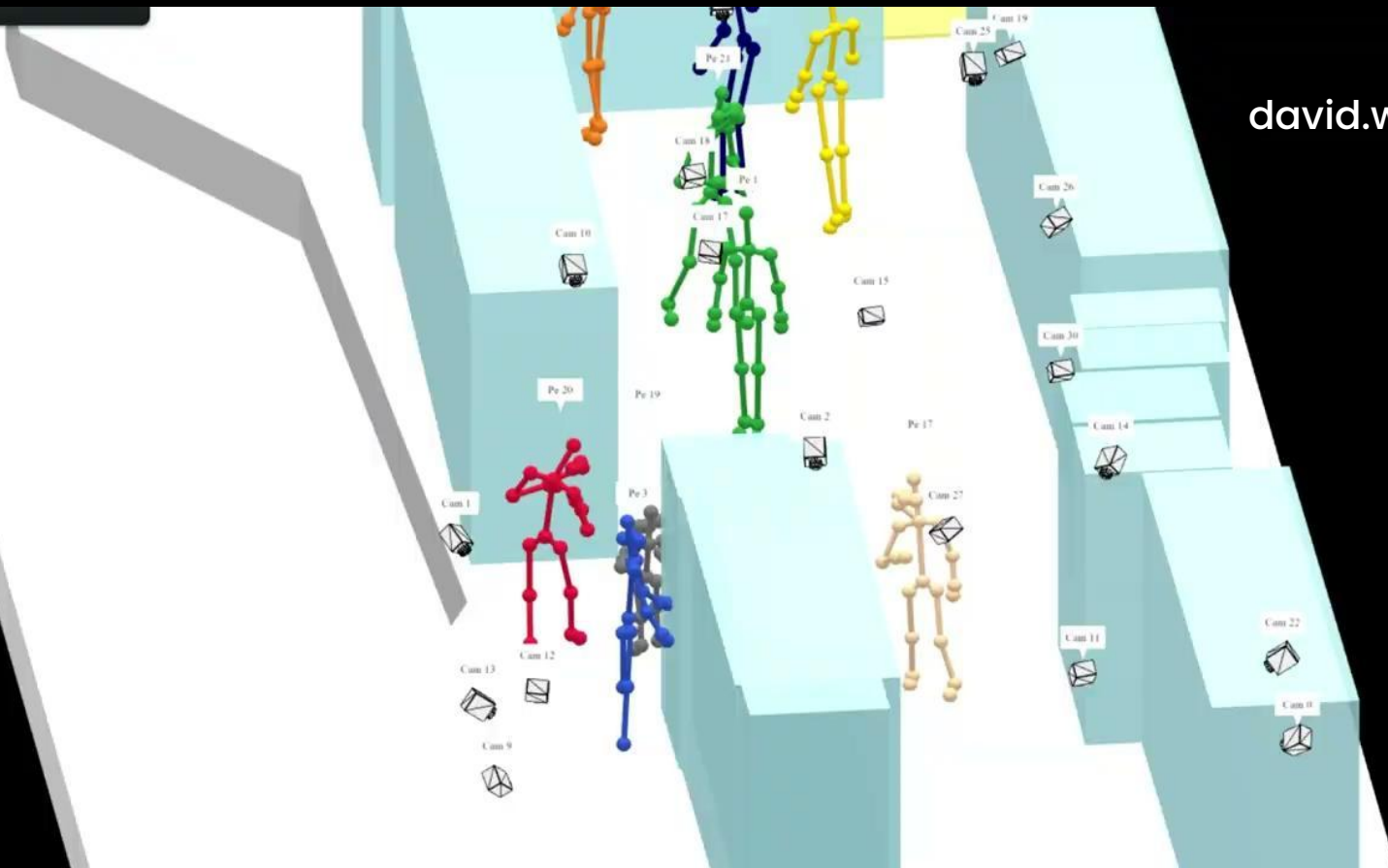
Real-time alerts to notify operators when theft is suspected

- Active shopper suspected theft
- Non checked-in shopper notification
- Suspected theft at SCO

A Real-Time Understanding of **Every** Shopper



Contact us at
david.woollard@standard.ai





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