

FLEX AI: Zero-to-one experience and interface design of security camera company's cloud-based AI model creation tool

Company: Hanwha Vision America

Project Summary

I led and launched a product with a focus on ease of use, despite not being able to conduct any user research.

Timeline

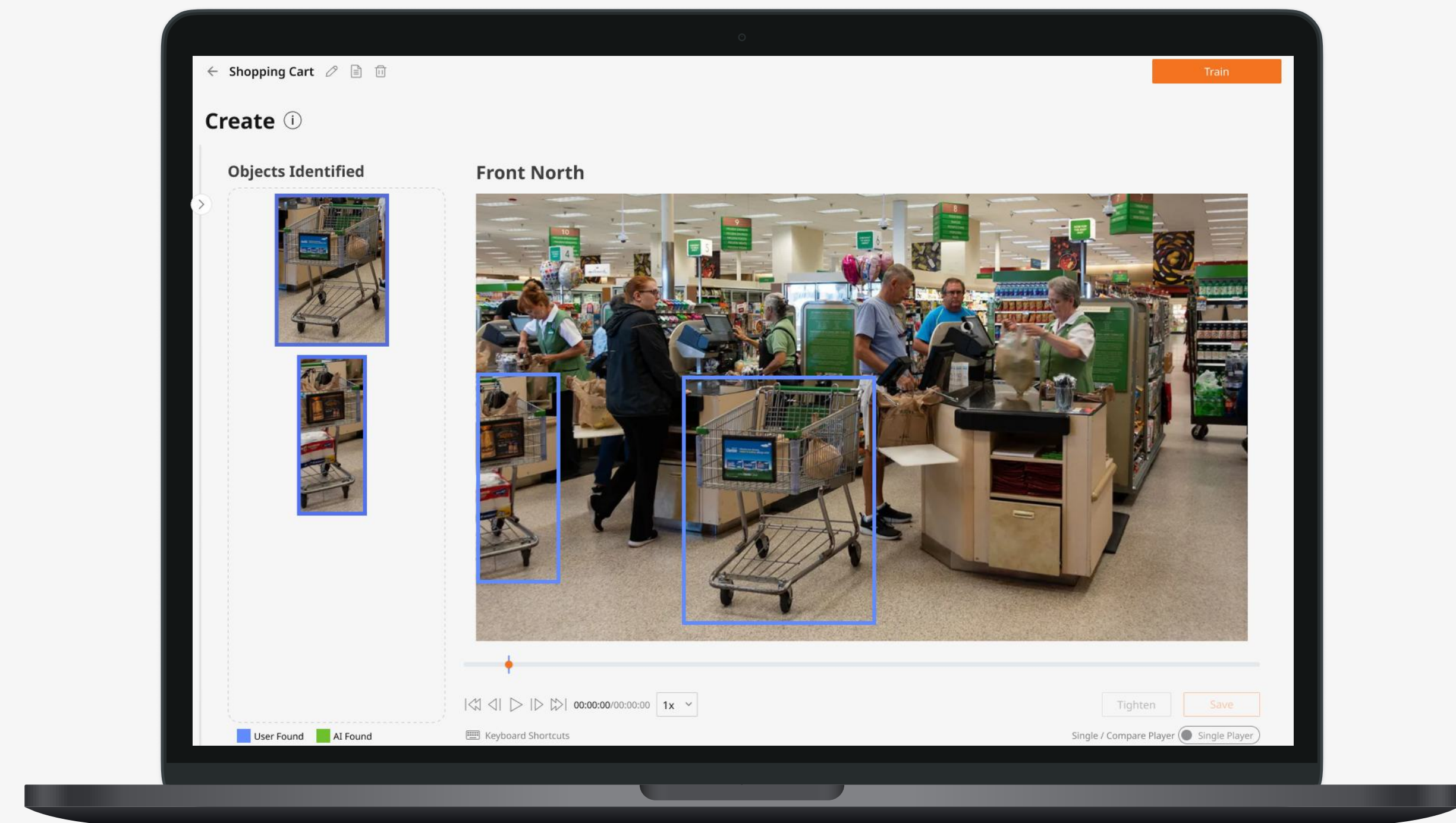
9 months

Responsibilities

- Experience Design
- Visual Design
- Clickable prototype
- Adapting to technical limitations
- Ensuring a cohesive experience and look and feel

Results

- First of 4 teams to be ready for official deployment
- Beta client purchased \$600,000 worth of cameras to implement FLEX AI in their security system



Hanwha Vision is a B2B video surveillance company headquartered in Korea, and one of the top surveillance solutions in the United States.

They provide high-quality security cameras and smart software that helps businesses monitor their properties. Their products help prevent theft, improve safety, and offer peace of mind by allowing users to keep an eye on their premises in real-time or review recorded footage later.

Hoping to **pivot from hardware manufacturer to software solutions provider**, Hanwha Vision wanted to create a portfolio of cloud-based tools that their customers can subscribe to.



Hanwha building in squid games

[Sang-woo] Yeouido.

FLEX AI is an enhanced, cloud-based version of Hanwha's existing custom object detection model creator that will be part of their tool suite.

Customers looking to solve their unique business problems via AI object detection require custom models not provided by the camera manufacturers by default.

Hanwha released Machine Learning based Wise Detector; however, its adoption has been slow due to the low accuracy nature of Machine Learning.

As opposed to the ML-based Wise Detector which ran on-prem via Device Manager, FLEX AI (previously also known as "Wise Detector - Deep Learning") is to be operated in the cloud to leverage the power of cloud computing, specifically its GPU resources for Deep Learning.

Use Cases from Customers (current and potential)



Owned by [Fred Leung](#) ···

Last updated: Sep 15, 2023 · 3 min read · 10 people viewed · [Legacy editor](#)

(work in progress, more context and details are being added)

1. Warehouses

a. Forklifts being the wrong places

- i. Forklifts should be moving in authorized right areas to prevent accidents with walking paths (or areas where forklift traffic should not be allowed)
- ii. Because this was our diorama, this idea really took hold with a lot of potential customers.
 1. We may want to consider how we can have forklifts as part of the 'vehicle' models that we can provide to users "off-the-shelf" from WiseAI

b. Doors

- i. Doors that should be closed are left open so customers would want their surveillance systems to signal an event instead of having security manually and physically check.
- ii. Damaged doors from vehicles or equipment running into them where the result is that the door can no longer operate properly.

2. Hospitals (Mayo Clinic, Ohio Hospital)

a. Wheelchairs

- i. hospitals that have blocked entrances and/or blocked emergency equipment
- ii. Counts of equipment in storage areas to understand if redistribution is required

b. Hospital beds

- i. Same as above

c. For both cases, enough violations received over time can cause a hospital to lose accreditation and

This project spanned 9 months, with the product scope increasing in each milestone.

Research

- Stakeholder interviews
- Understanding competitors

Milestone 1: Proof of concept

- Happy path of creating a single model

Milestone 2: MVP

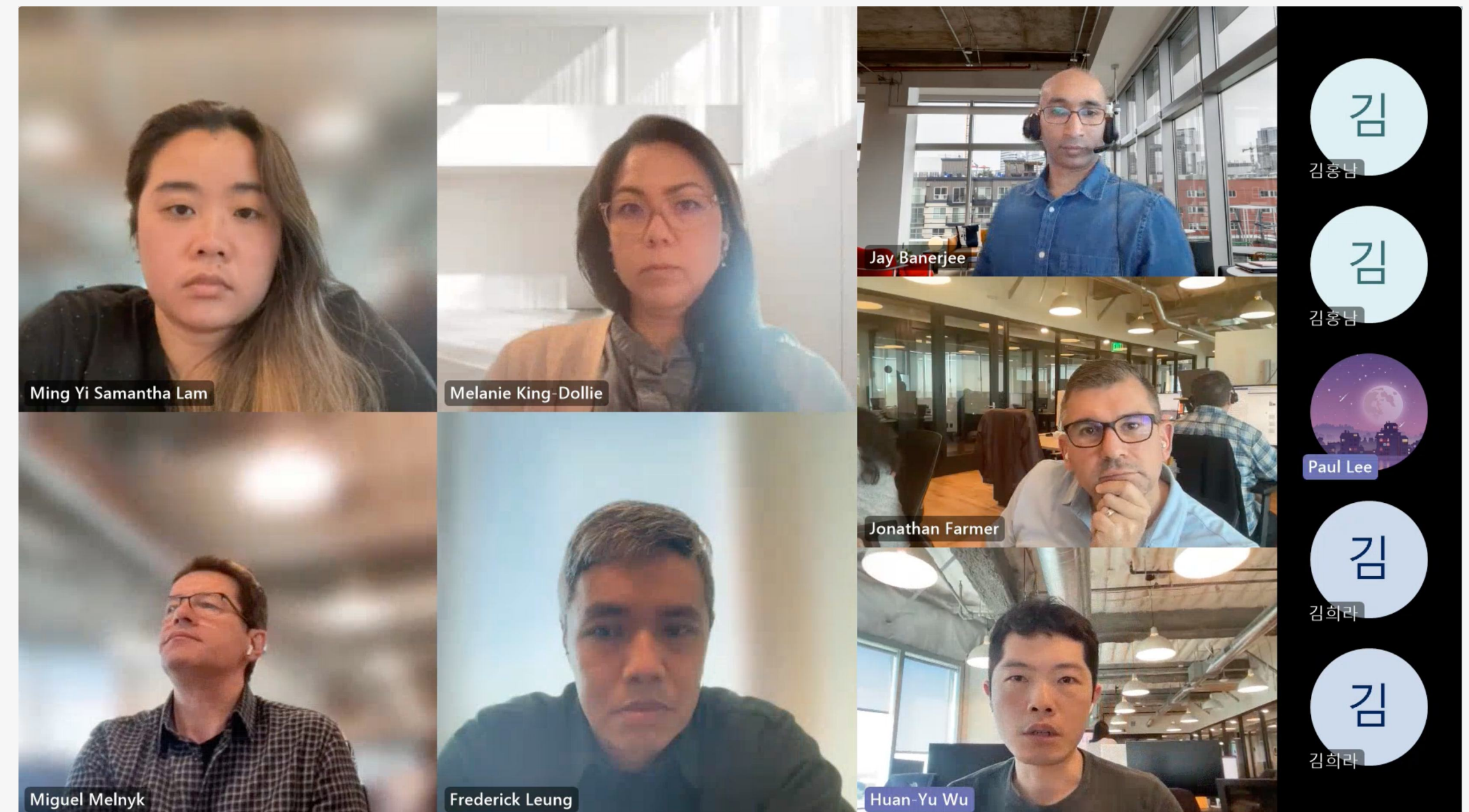
- Retrain and compare models
- Adopting HQ's Design System

Milestone 3: MMP

- Integration with other Hanwha products
- Product licensing
- Ease of use

Understanding the concept behind Wisenet Detector

- Stakeholder interviews with our AI team, led by Paul Lee and Huan-Yu Wu
- Covered questions like:
 - What information does the AI team need from the user to create a model?
 - What is needed to create a more accurate model?
 - How does footage from day vs night affect the model?

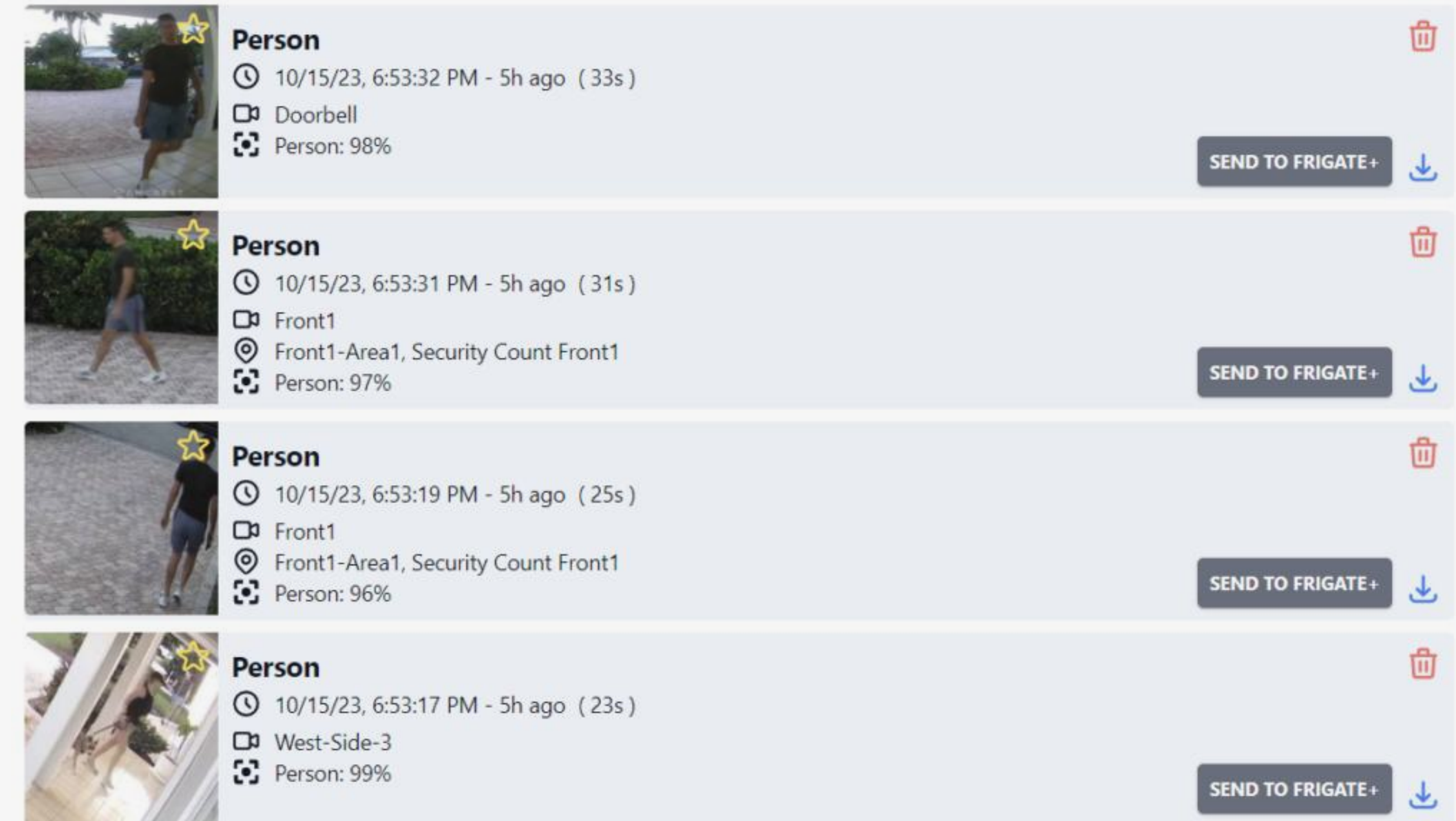


Understanding our competitors



WiseDetector

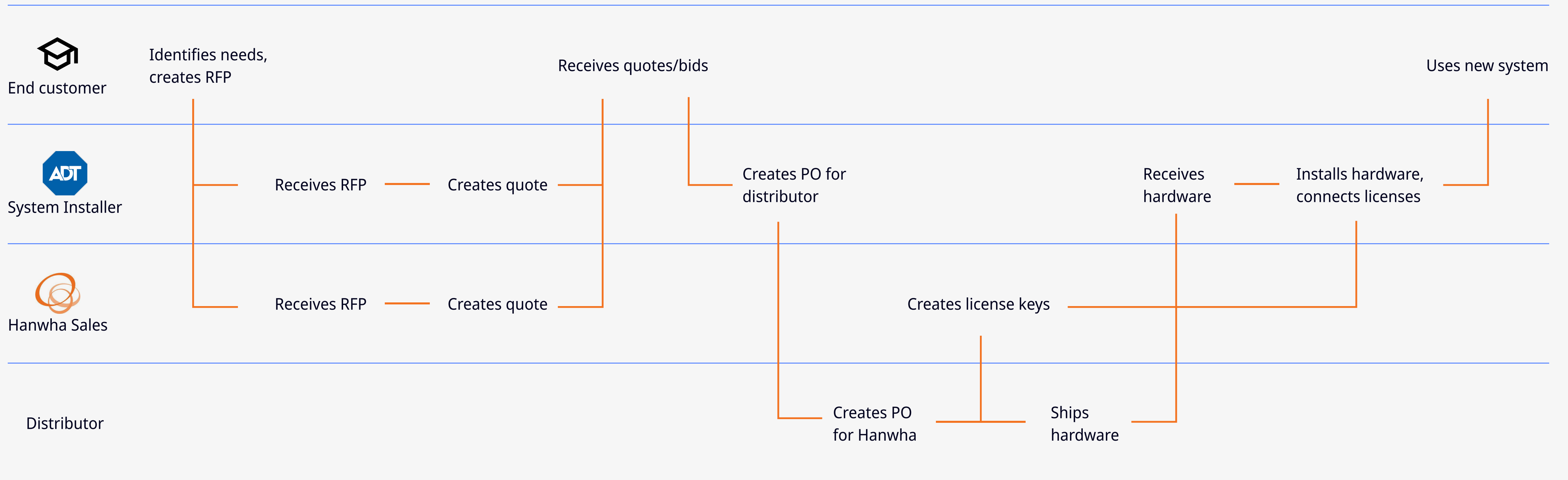
- Hidden within Device Manager
- Old UI
- Uses videos directly from cameras in the users' systems



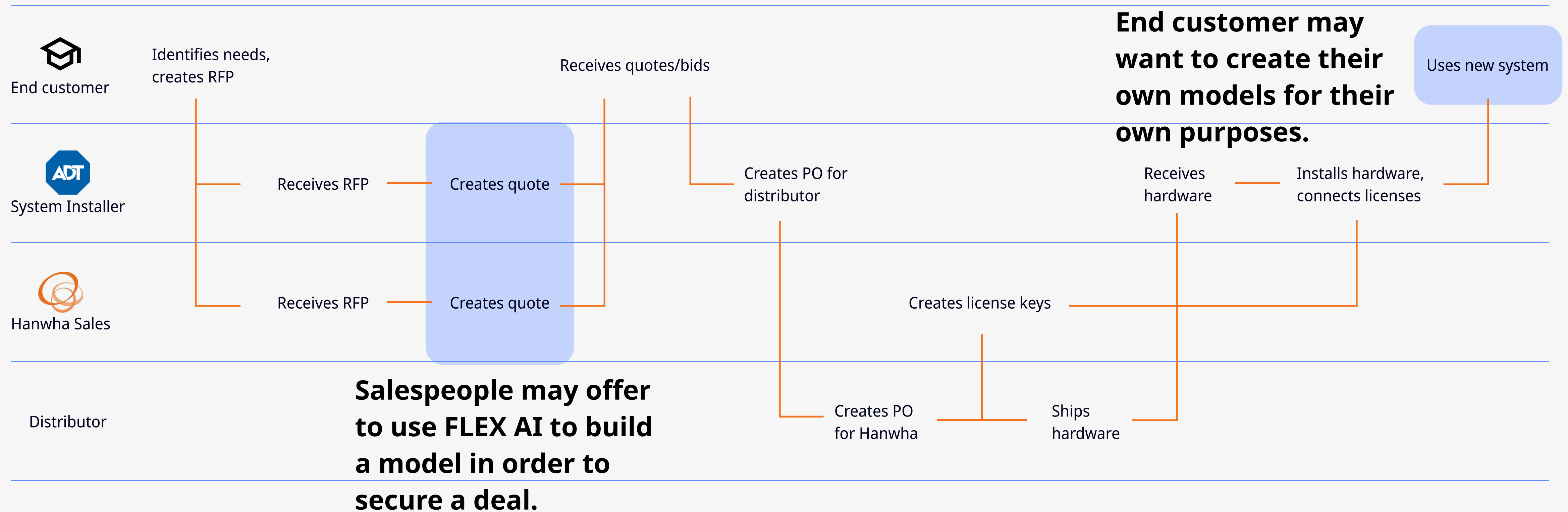
Frigate

- Uses videos directly from cameras in the users' systems
- Not a fully custom model – Frigate comes with preset models, and the users' annotations help improve the official models

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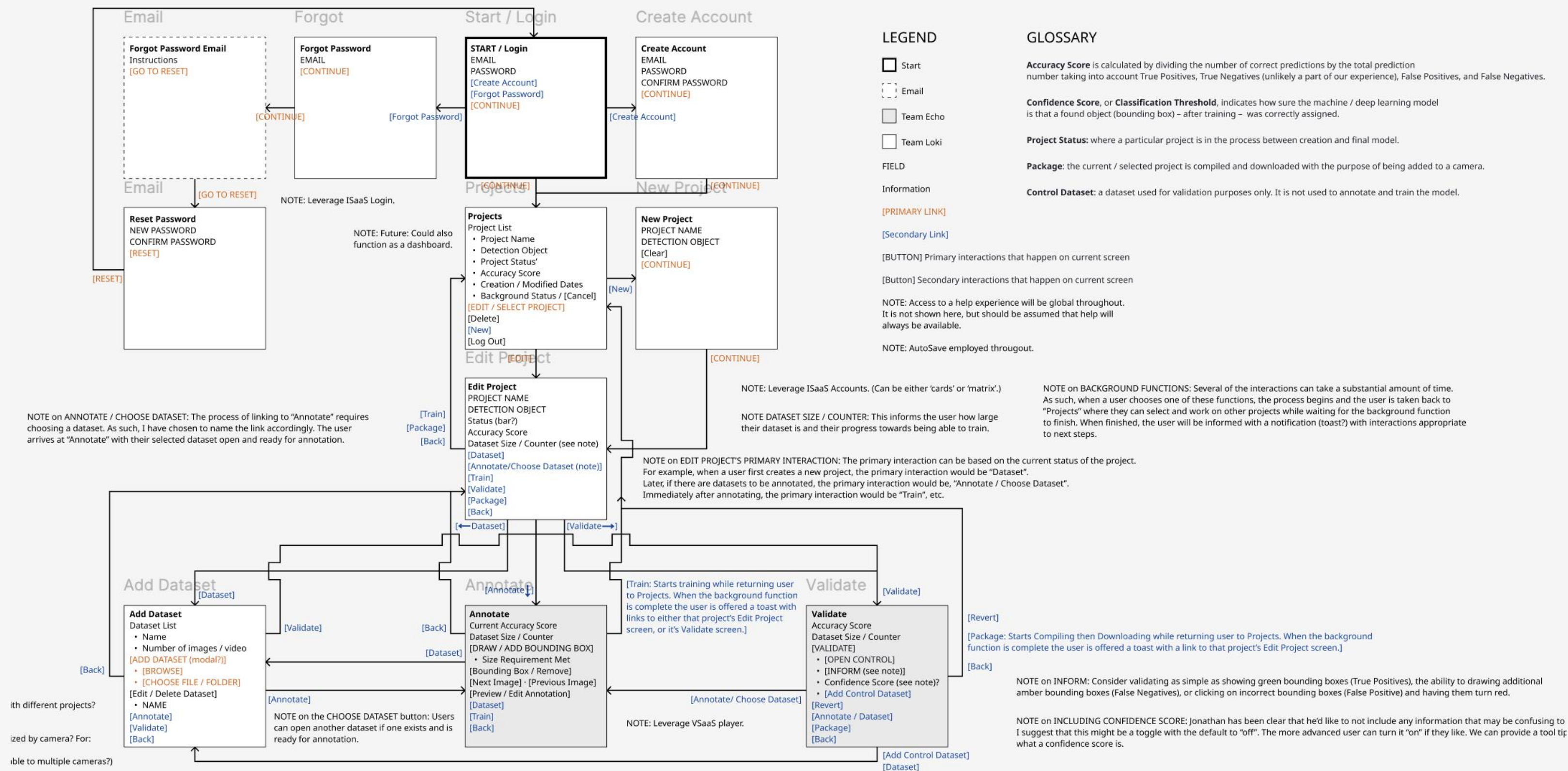
Our first goal was to launch a Proof of Concept at GSX, one of the biggest trade shows for the security industry.

Goal of GSX:

- **Show potential customers what FLEX AI could do**
- **Pique potential customers' interest**
- **(Internally) prove to Hanwha HQ that this is a project we can handle, and is worth working on**

We mapped out a flowchart of our user journey

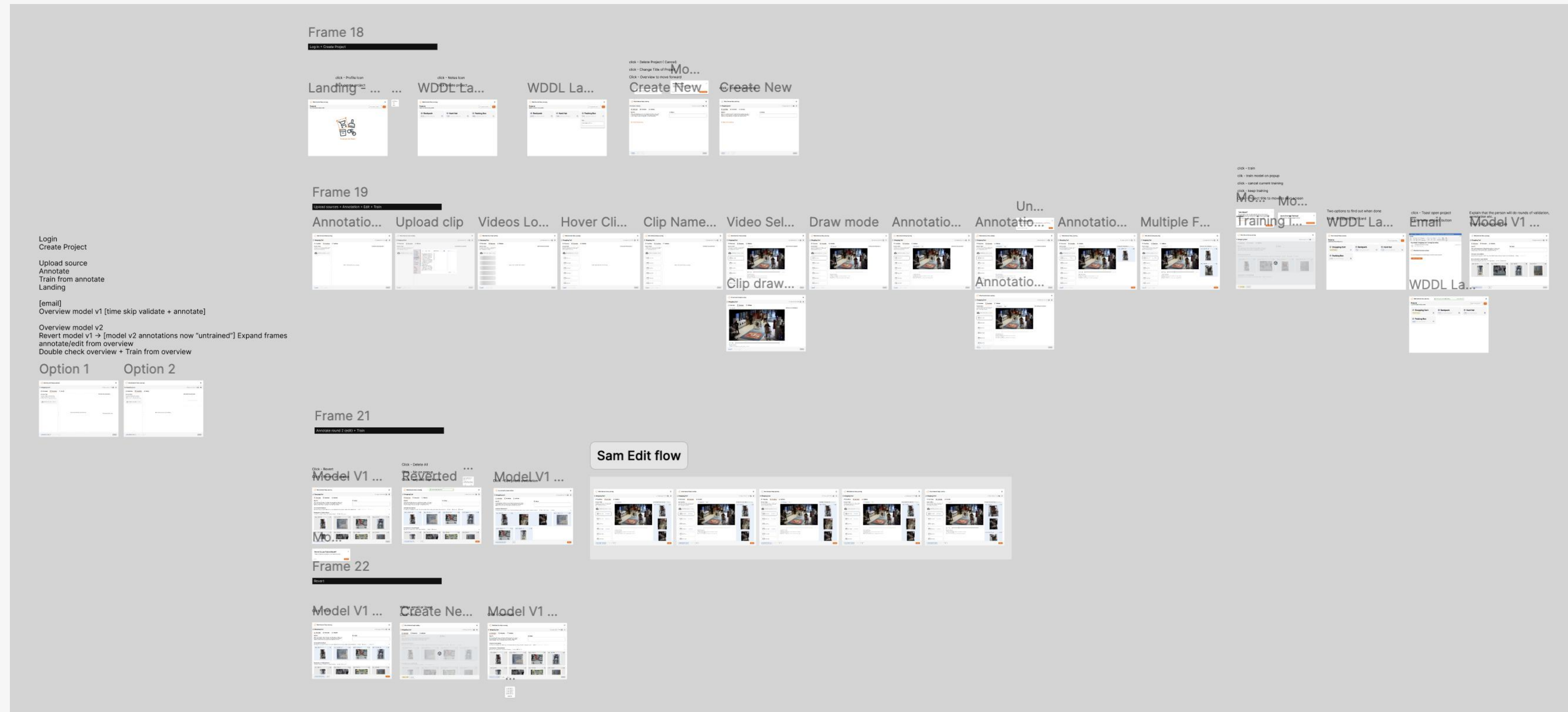
Wisenet Detector Deep Learning Demo Flow Chart



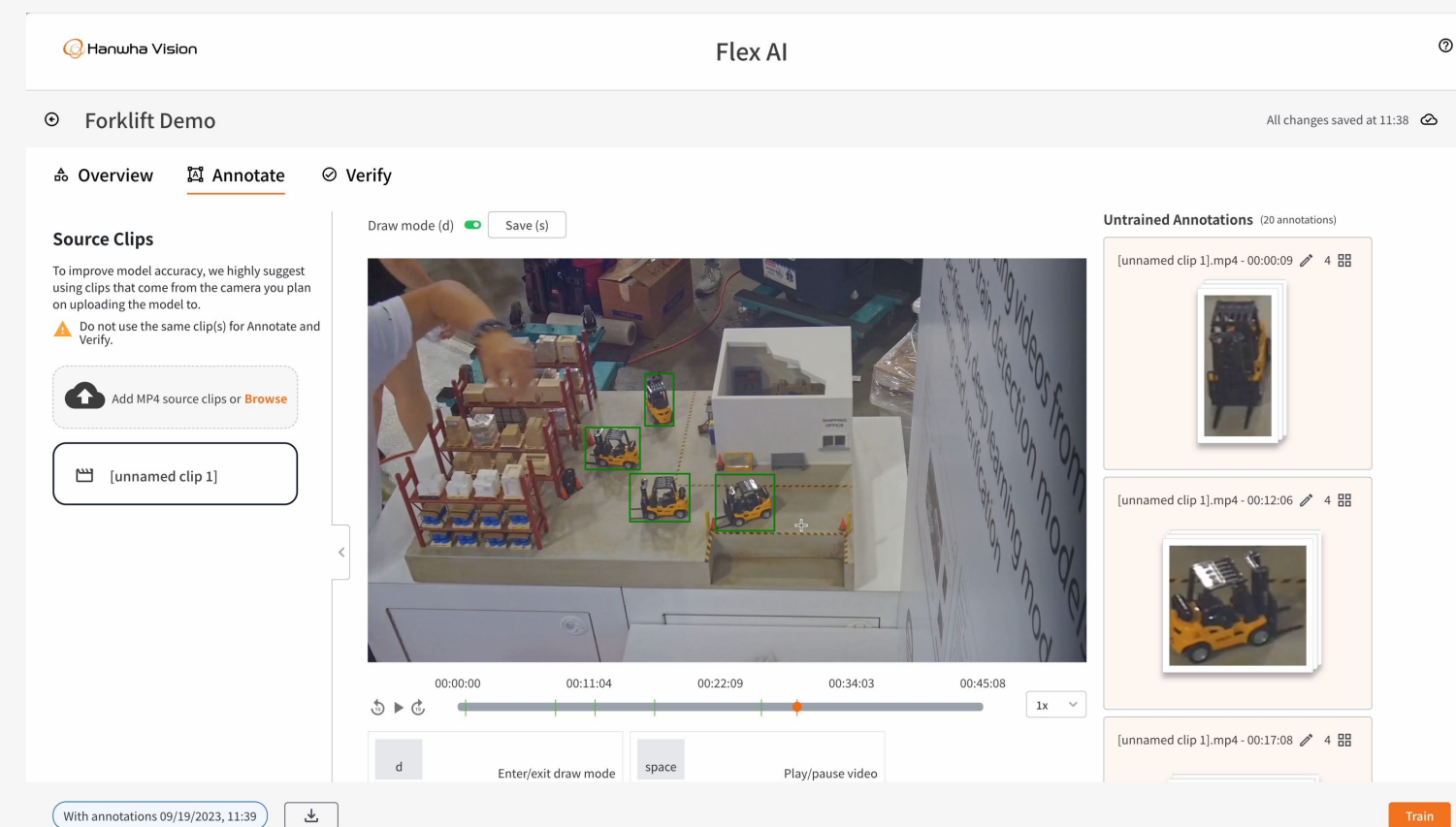
- Create Annotation Task
- Annotation with Polygons
- Manual Drawing

We brought the wireframes to the AI team for alignment.

[Link to prototype](#)



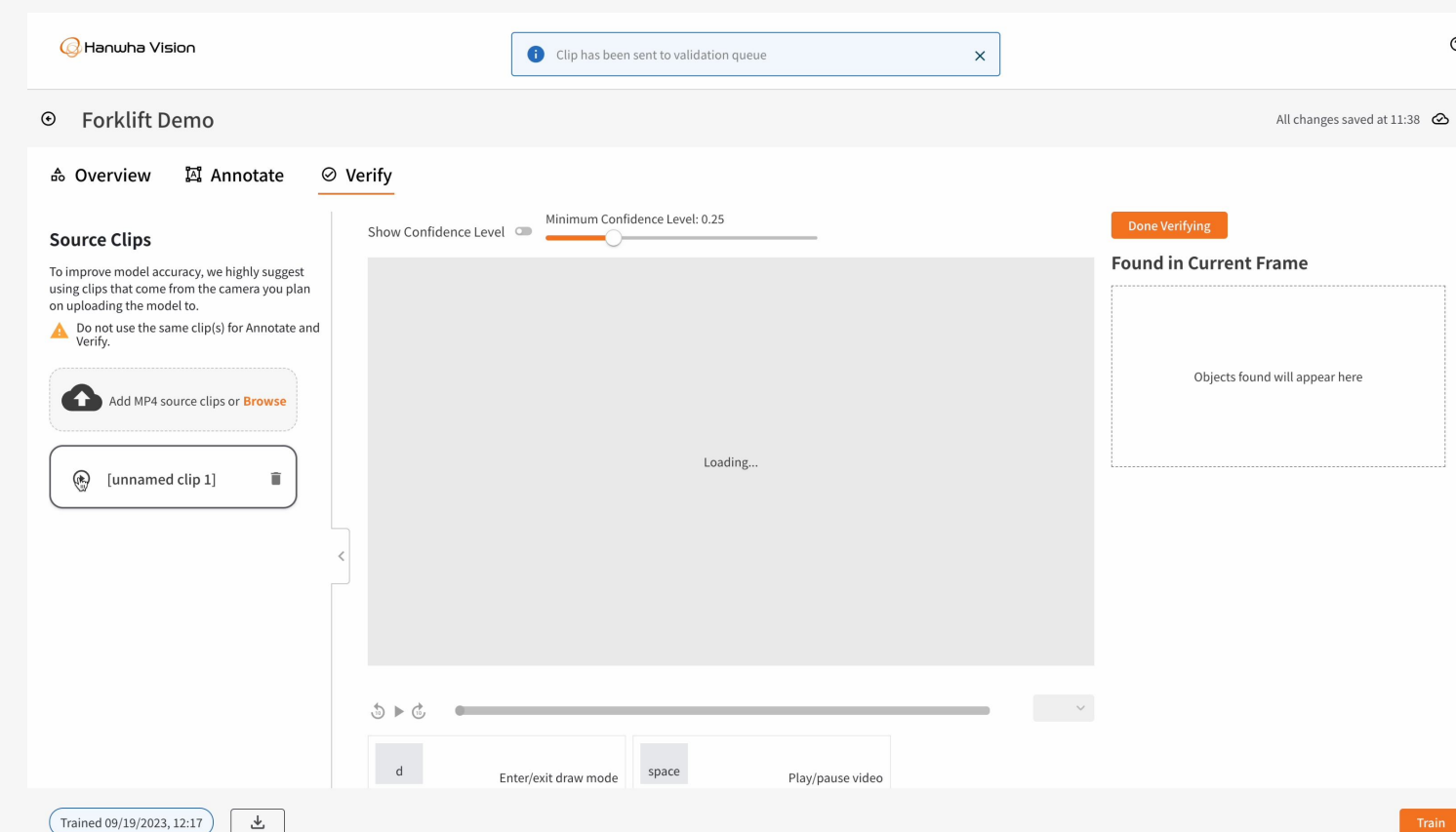
Our Dev team turned our prototype into reality.



[Link to see Part 1 video](#)

Part 1: Annotate

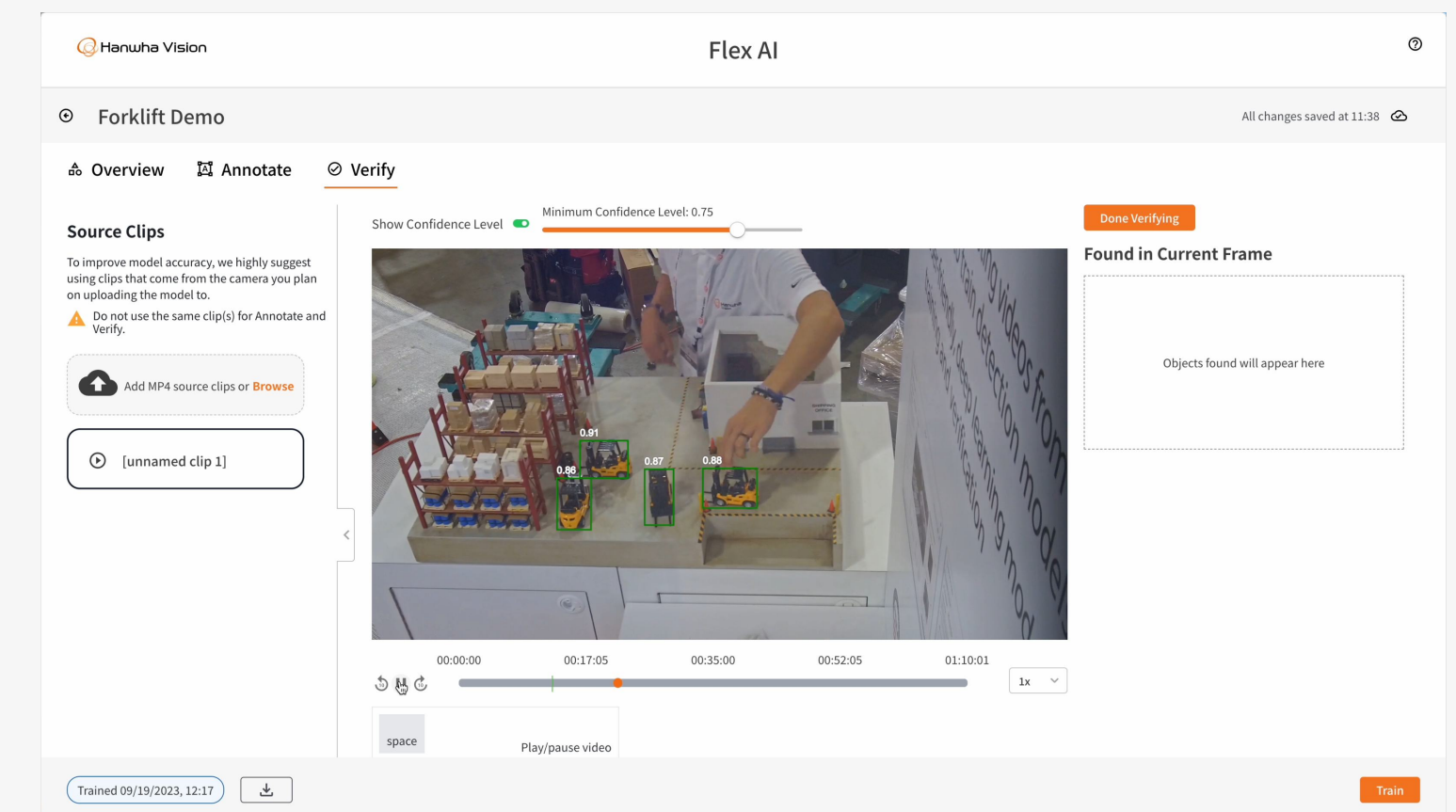
1. Go to the Annotate tab
2. Upload a video
3. Draw bounding boxes
4. Repeat for multiple frames
5. Train model



[Link to see Part 2 video](#)

Part 2: Upload video for Verify

1. Go to the Verify tab
2. Upload a video



[Link to see Part 3 video](#)

Part 3: Verify results

1. Play a video on the Verify tab
2. Watch bounding boxes appear
3. Use the Confidence Level slider to filter out bounding boxes of low confidence scores

Fred, our PM, talked to over 100 salespersons and potential customers, giving us more insight of who wants to use FLEX AI, and what they're trying to detect.

We had a very small corner of Hanwha Vision's booth, but there was a lot of foot traffic and interest in FLEX AI. The **audience loved the slick interface and ease of use**, they were amazed at what could be done with such little steps.

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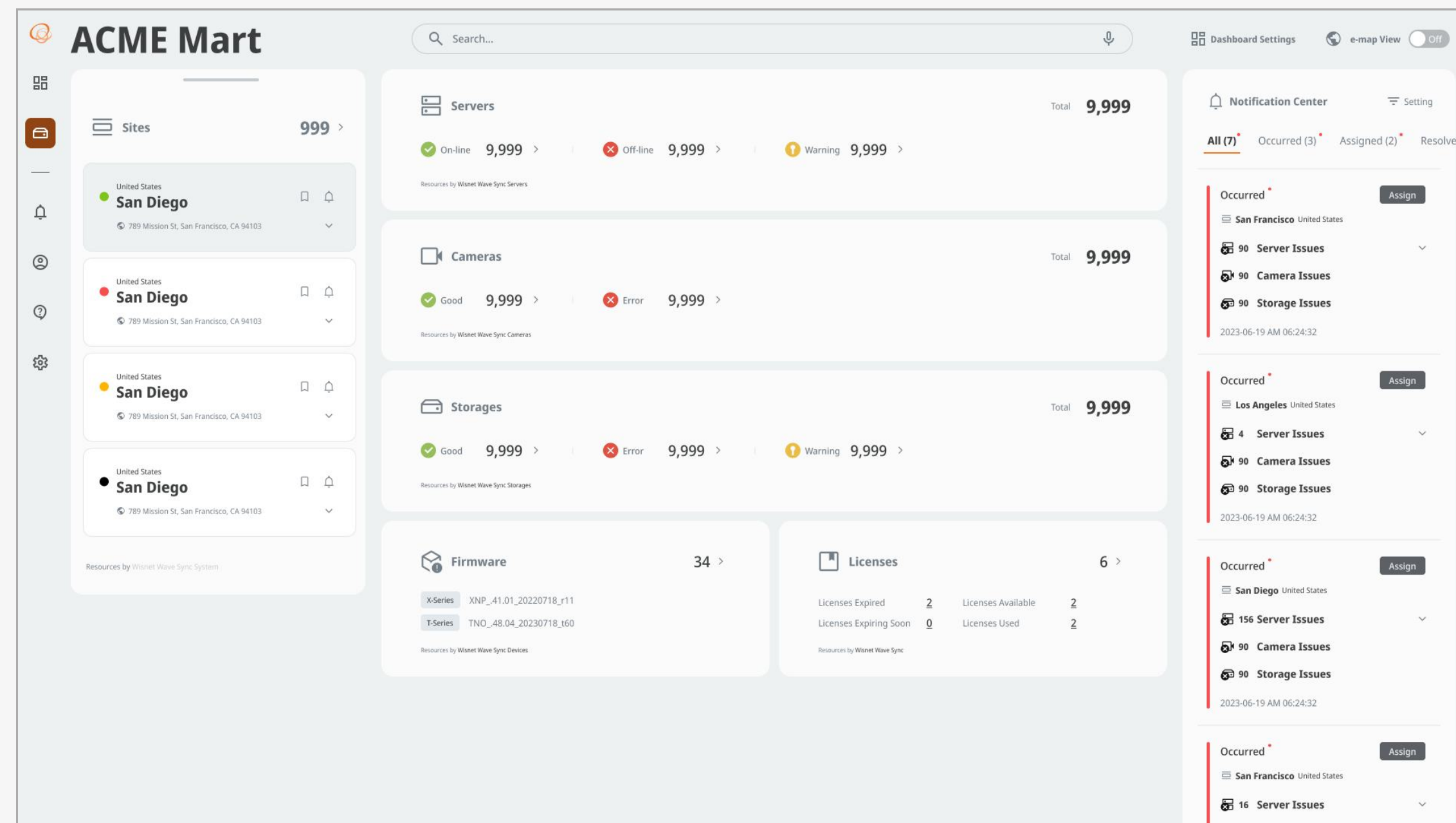
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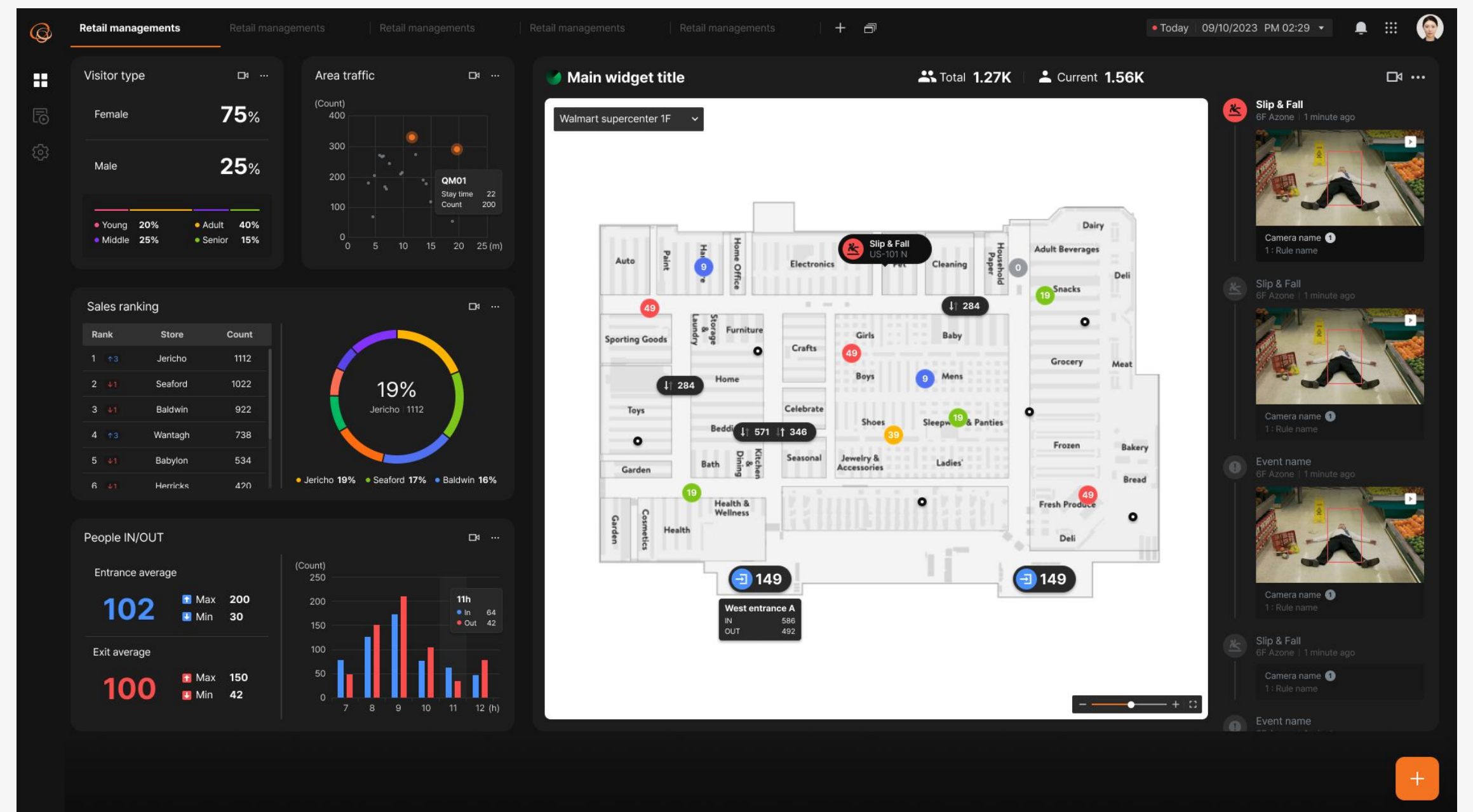
Milestone 2: MVP

- Combining FLEX AI, DM Pro, Sightmind, and OnCloud into one overarching Cloud Platform**
- Broaden scope: ability to improve on a model**

In order to understand other products' look and feel, I reached out to the Korean HQ Design team for a demo of their products, as well as to get feedback on FLEX AI.

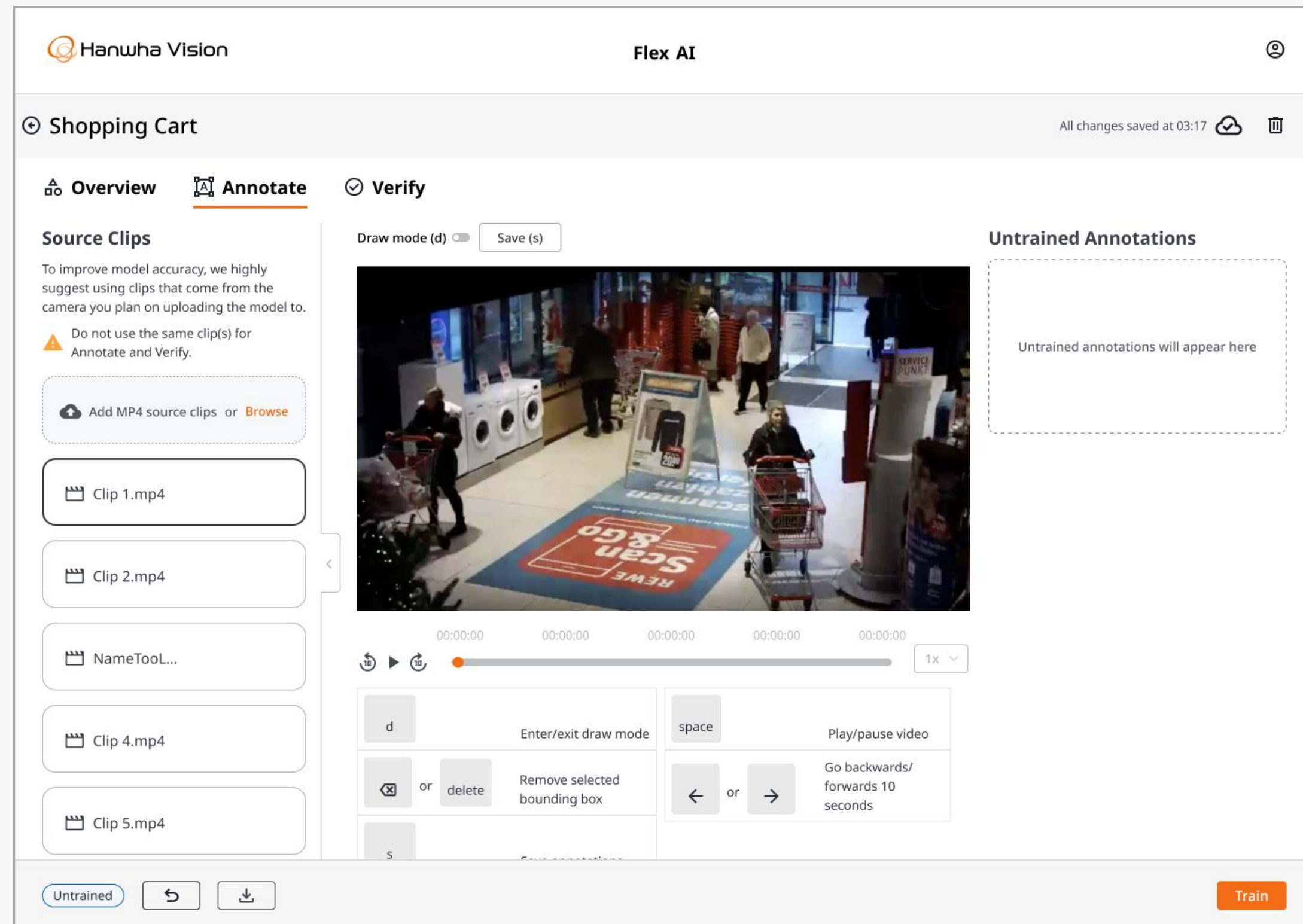


DM Pro: Cloud-based device manager, used to check on health of hardware and maintenance

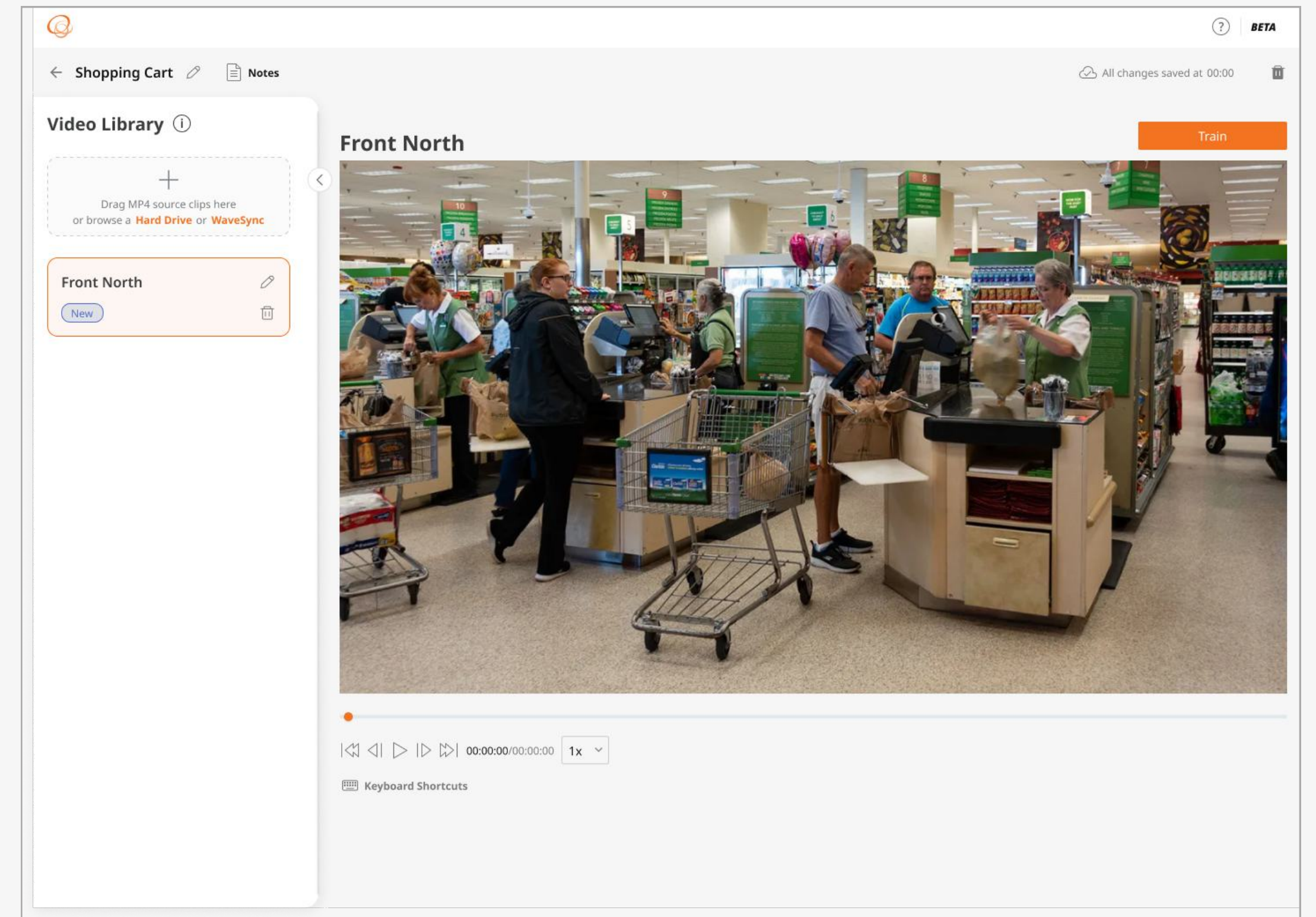


Sightmind: Business analytics platform

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Before



After

What is an “improved” model to the user?

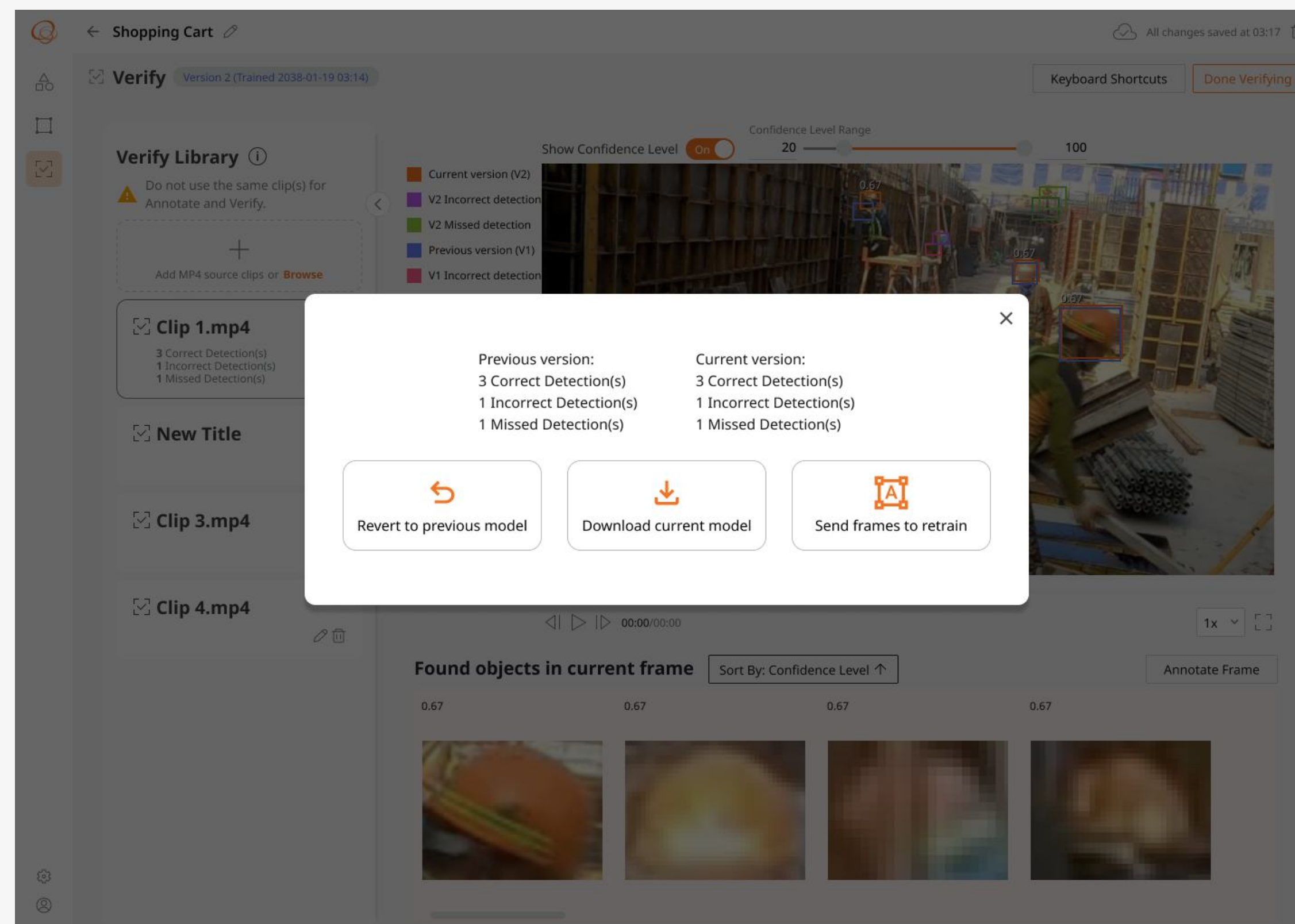
One way to show improvement, is through **quantitative metrics**:

- “Accuracy score”
- Number of correct detections (True positives)
- Number of incorrect detections (False positives)
- Number of missed detections (False negatives)

Metrics would be **ideal for the salesperson** to prove increase in accuracy.

The trade-off is that **a lot more work is needed to set this up correctly**:

1. Upload a video that is not used for training
2. User annotates frames that contain the object to create a score sheet
3. After the latest version of model is applied, user goes through all annotated frames to grade the version.

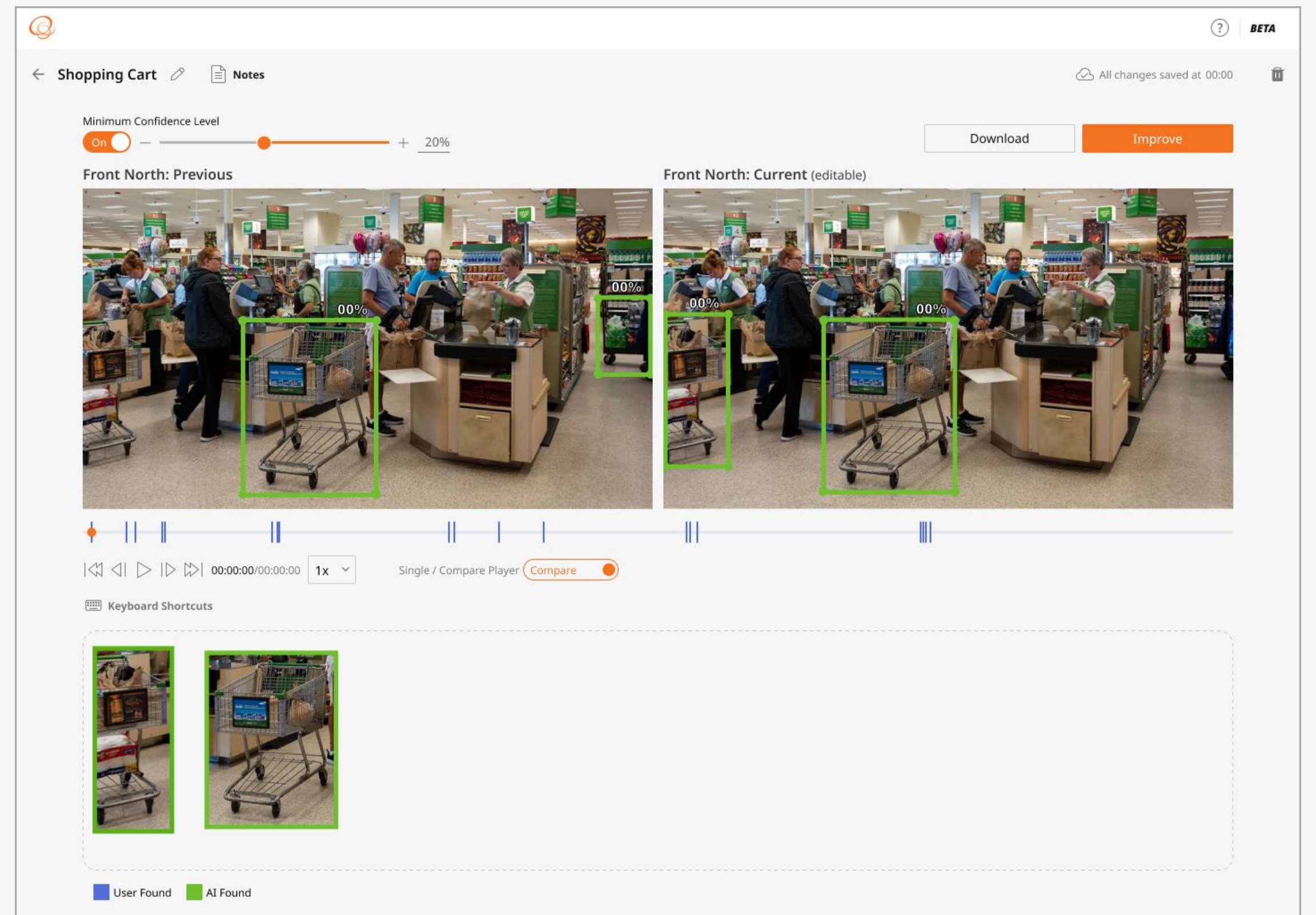


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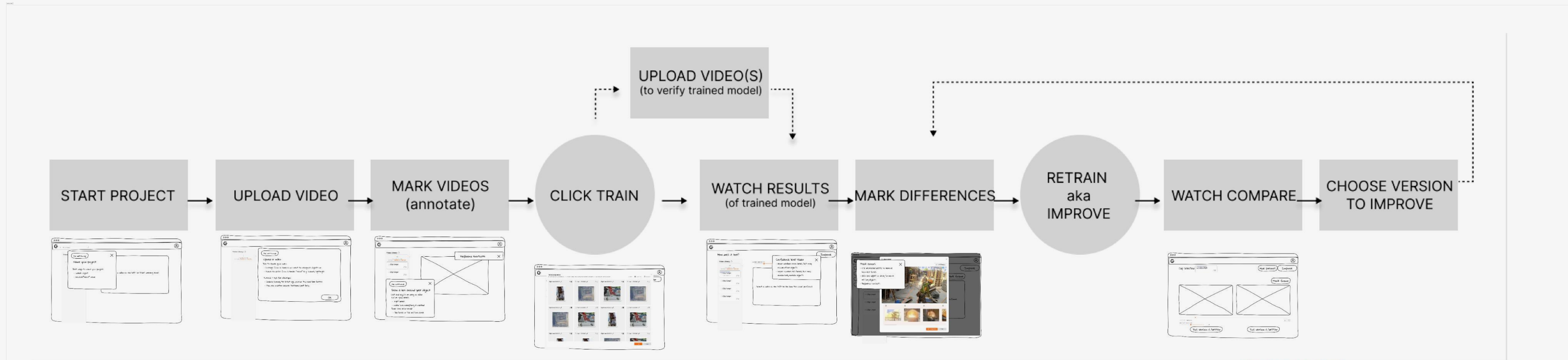
Alternatively we take a more **qualitative** approach:

By showing the two versions of the model side-by-side, the user can visually compare the difference in the older and newer versions. This also allows for more nuanced comparisons of accuracy, like if the **boxes are tighter** or if there are **more correct boxes**.

This is more ideal for the **end customer**, as the output mimics what they will actually see on their VMS, meaning that they can easily tell if the model is good enough for them.



What happens when a model is improved? What information is needed to be sent?



Learnings:

- Model doesn't actually learn from false positives, so focus on encouraging user to mark true positives
- Removed the idea of allowing model reversion – user can delete individual incorrect annotations, or start the project over.

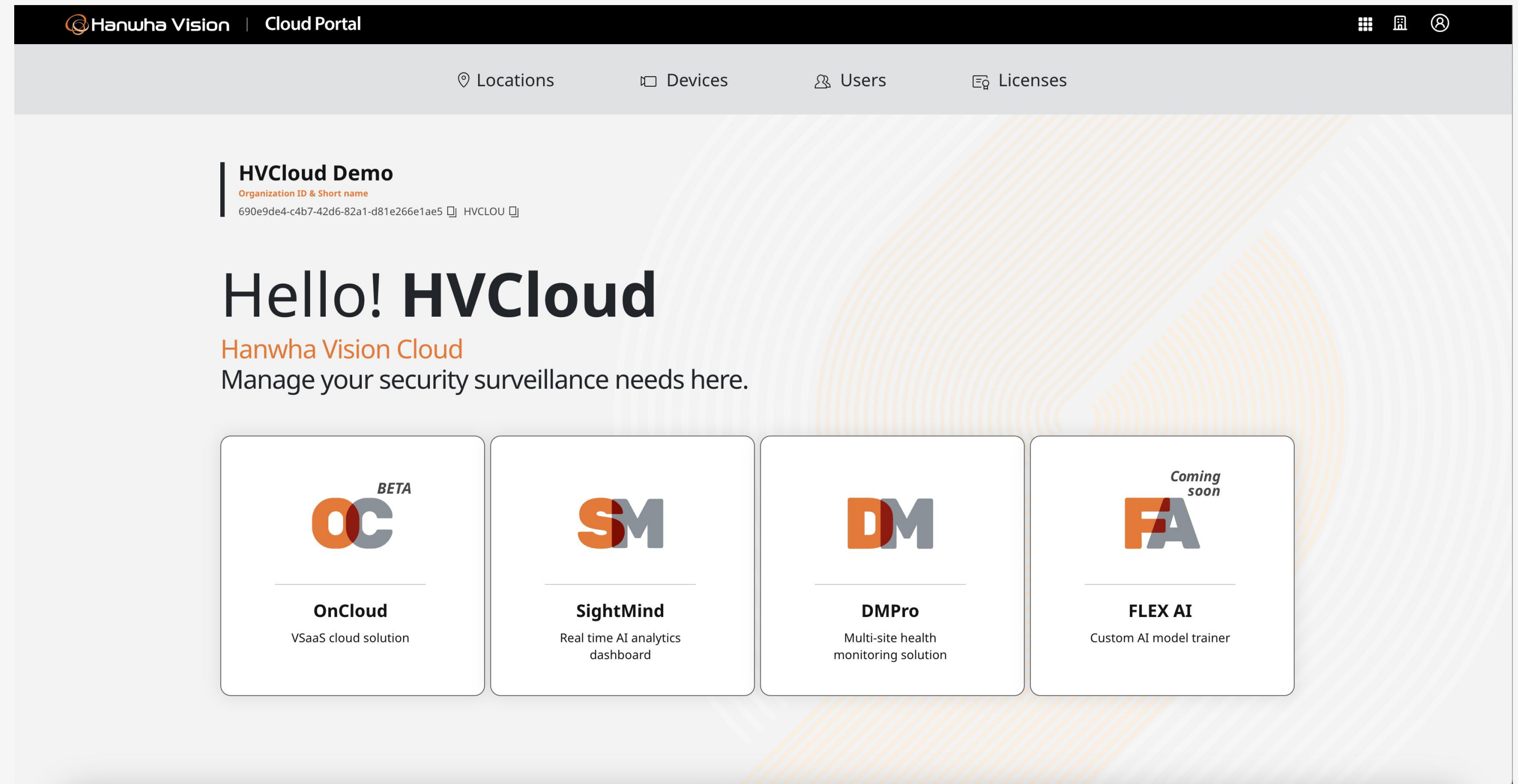
MVP Goals:

- ✓ Combining FLEX AI, DM Pro, Sightmind, and OnCloud into 1 overarching Cloud Platform**
- ✓ Broaden scope: ability to improve on a model**

At ISC West 2024, we started finding companies that were starting to work on custom object detection models as well.

Home stretch goals:

- Focus on making it easy
- Matching other Cloud Products



With the help of the AI team, we added 3 features to make model creation easier:

1. Suggested frames to improve
2. AI tightening of boxes
3. Reference points

Suggested frames to improve

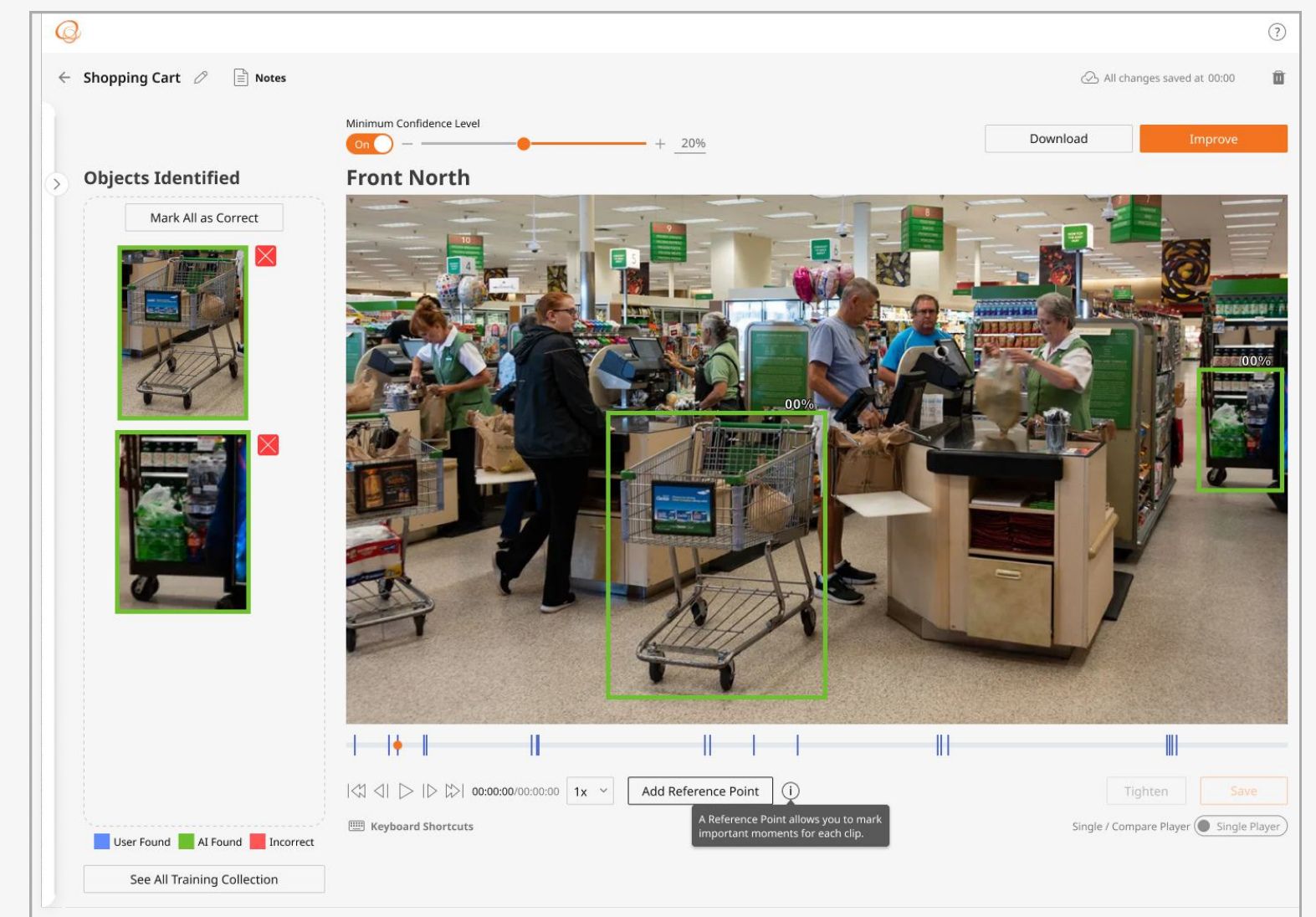
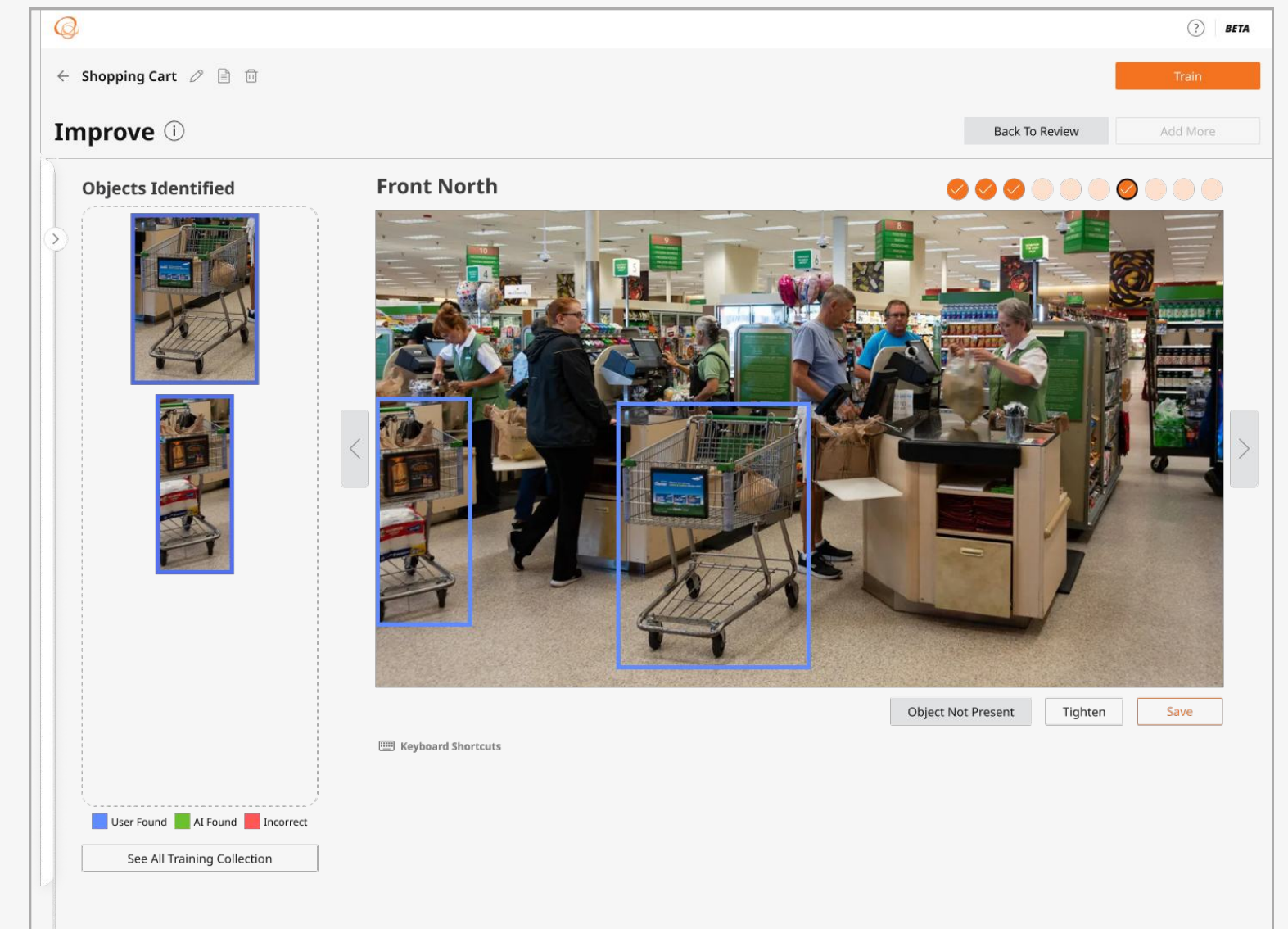
When improving the model, we use AI to generate a list of frames that it thinks will be the most beneficial in creating the next version. We then pick the top 10 of these frames for the user to draw bounding boxes again.

AI tightening of boxes

With a click, AI will try to recognize the object that the user is trying to draw a box around, and tighten the individual boxes.

Reference points

If there are certain moments the user deem crucial to recognizing an object, e.g. when a forklift first enters the warehouse, they can bookmark these moments on the video to serve as a clear point of comparison.

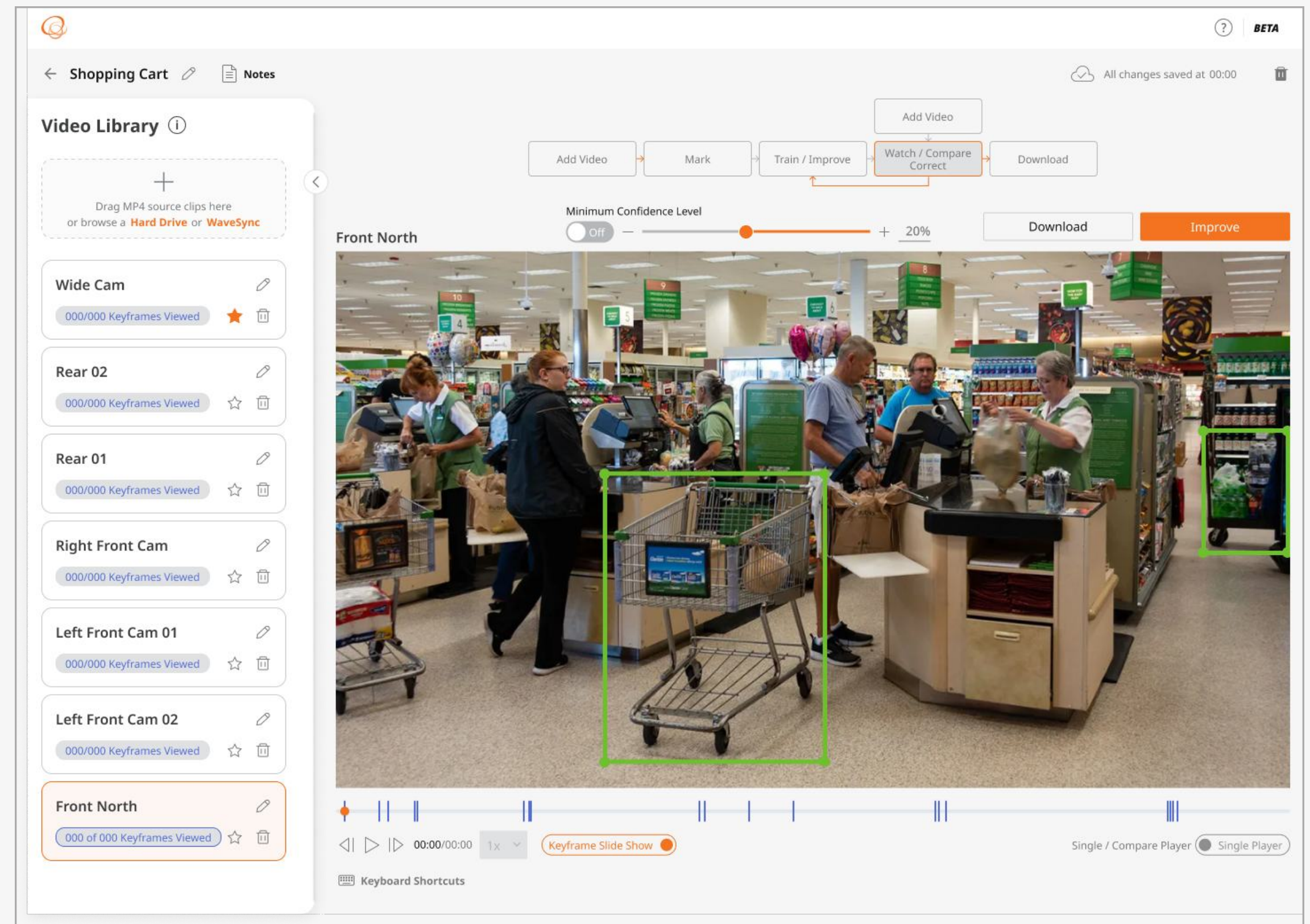


How does the user know what to do at each stage?

During MVP, we considered using **steppers** to show the user which stage they're currently on for the project, as well serve as a navigation.

However, we decided it against it for multiple reasons:

- Since the process is not a straight line, the visual made it look more confusing than it is.
- It took up a lot of visual space and emphasis.
- Technical restrictions: it would be hard to build in the short timeframe.

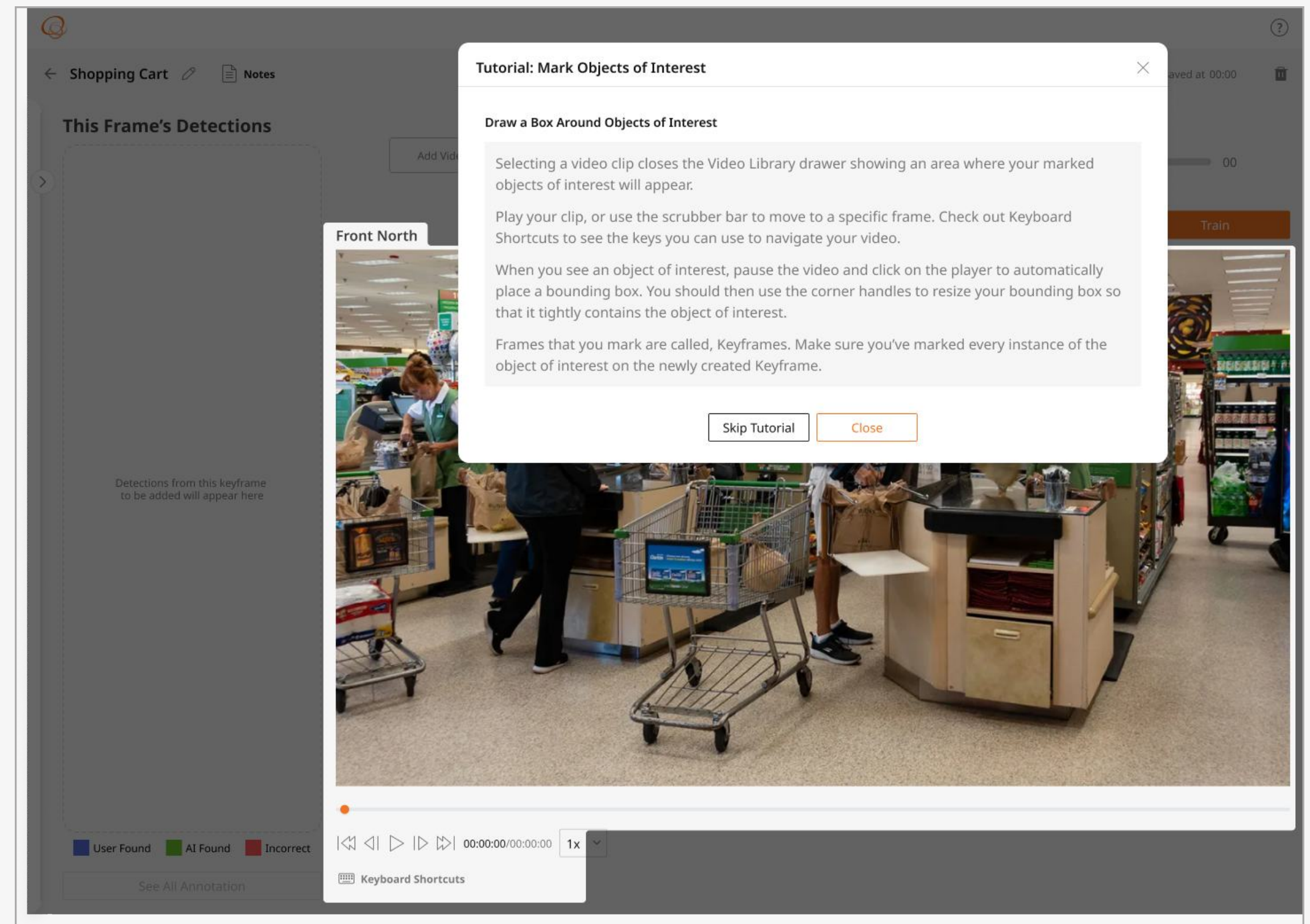


How does the user know what to do at each stage?

We also considered using **tutorials** that would allow a first-time user, or a user who hasn't used FLEX AI in over 3 months, to know about updates.

As much as our whole team liked the idea, it unfortunately had to be scoped out as the dev team needed to focus on building out core functionality.

We started looking to see if Amplitude, the usability metrics platform that we were about to install, had some kind of tutorial tool, but even installing Amplitude was scoped out.



How does the user know what to do at each stage?

We decided to simply use **page titles** with **tooltips** to help the user out if they were lost. This way the scope was doable for the dev team to include, and the user also clearly knows where to go to figure out what to do.

We also had a separate Help page which then evolved into a knowledge base, which had all of our FAQs, and the user could contact the Hanwha Customer Support team from there if needed.

The screenshot shows a video analysis interface for a shopping cart in a supermarket. The interface is titled "Shopping Cart" and includes a "Review" section with a tooltip that says "Use the Confidence Level slider to filter out detection boxes with lower confidence scores." The video player shows a scene with a shopping cart and a person. The cart is highlighted with a green bounding box, and a "00%" confidence level is displayed. The interface also features a "Minimum Confidence Level" slider set to 48%, a "Download" button, and an "Improve" button. A list of camera views is shown on the left, including "Front North", "Wide Cam", "Rear 02", "Rear 01", "Right Front Cam", "Left Front Cam 01", and "Left Front Cam 02". The video player controls at the bottom show a play button, a progress bar, and a "Keyboard Shortcuts" option.

Terminology

Since our goal is to make this tool as easy as possible to understand, we decided to **not use technical terms** even though the jargon may be more accurate.

“annotate”



“draw bounding box”

“inference”



“applying the model” or “processing”

“source clips”



“video clips”

To fully integrate with the Cloud Portal, we added a dark mode theme, and added licensing functions.



As of 6/21/24, we are all set to launch, with no more high- or medium-level bugs.

Through the Sales Team's beta program, Dallas-Fort Worth Airport decided they would like to integrate FLEX AI into their existing system, hence purchasing another 200 cameras to be set up.

Key Outcomes

- Despite lack of research, successfully launched a product that is and will continue to bring revenue to the company
- Adapted quickly to all the frequent scope and style guide changes
- Distilled a complex AI tool into simple steps for users to follow

What I learned

- Sit in technical discussions when possible, to understand feasibility, scope limitations, and alignment
- Be proactive in letting people know what you need

How to measure success?

- % of users successfully creating a model
- Amount of time spent to create a model

- Average number of annotations used to create a model
- % of users improving a model
- Average number of versions a user creates
- % of users renewing the annual subscription

Other things I'd like to know:

- Who is using FLEX AI?
- At which step does most users who don't finish creating a model fall off?
- Average number of projects a user has simultaneously