ATLAS (Advanced Tech Labs @ Sam's) - Our Journey

July, 2020

Our Team

Talent with mix of experience from AI/ML, AR, IOT, Software Development

Innovation Portfolio

E-com SC Innovations – ML/AI Driven Insights

Cartonization and Visualization

FC/SFC Network Planner

One time and Seasonal items

Allocation

Batch Optimization

Order consolidation to improve shipment & transport costs

Taaza Insights

Produce quality visibility & insights

AR Experiences

See in your space

AR experience for Furniture (>100 models launched)

In-Club & DC - Computer Vision Solutions

SnG Image Recognition

Scale image recognition capability to multiple clubs

IRAS

Inventory Location using Computer Vision (BrainCorp Robots)

TrueSpace

Scalable Data collection and Labelling with Automation Focus

Meat Cutting QC

Vision based App – POC Completed

Quality and Freshness

Strawberry quality & freshness inspections – Vision based

Watermelon NDT Inspection

IOT and Vision based experiments – Revisit (Univ/Startup Engagement

IOT – Auto Replenishment Services

Detergent Auto Replenishment

Samsung Washing Machine

Auto Replenish Towels

Kimberly Clark

Legends

Launched

Completed/Delivered

WIP/POC Testing

Stopped/Halted

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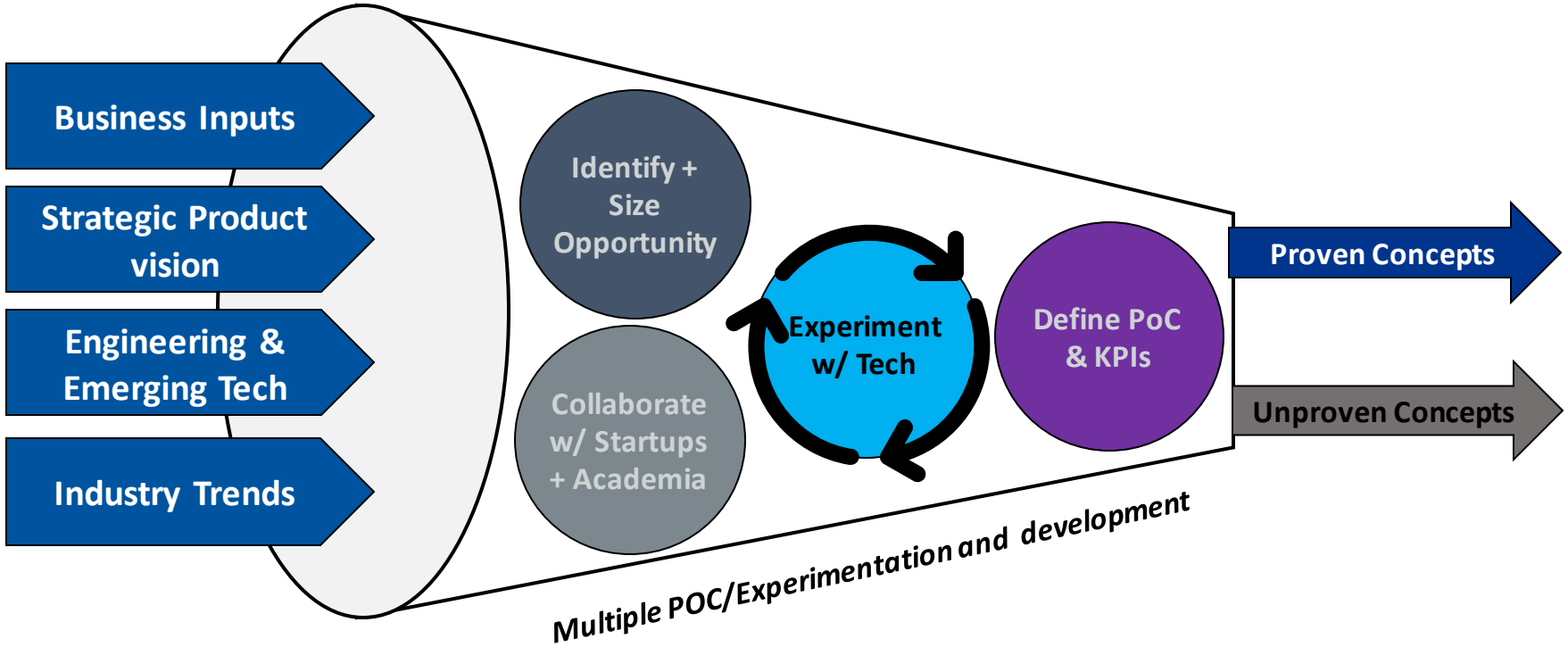
How we work?

Critical to success :

1. *Discover the **right problem** to solve*
2. ***Iterative** experimentation & POC development*
3. *Assess for **Adoption** - Feasibility and Path for Operationalization*
4. ***Pivot** & Reimagine - - it's a matching process*



- *POC tested in operations*
- *Focus on reuse & learnings*
- *Onboard dev/product teams to make PoC production ready*
- *Identify long term ownership/roadmap*

- *Capture & share learnings*
- *Decide on hold/**revisit**/stop*

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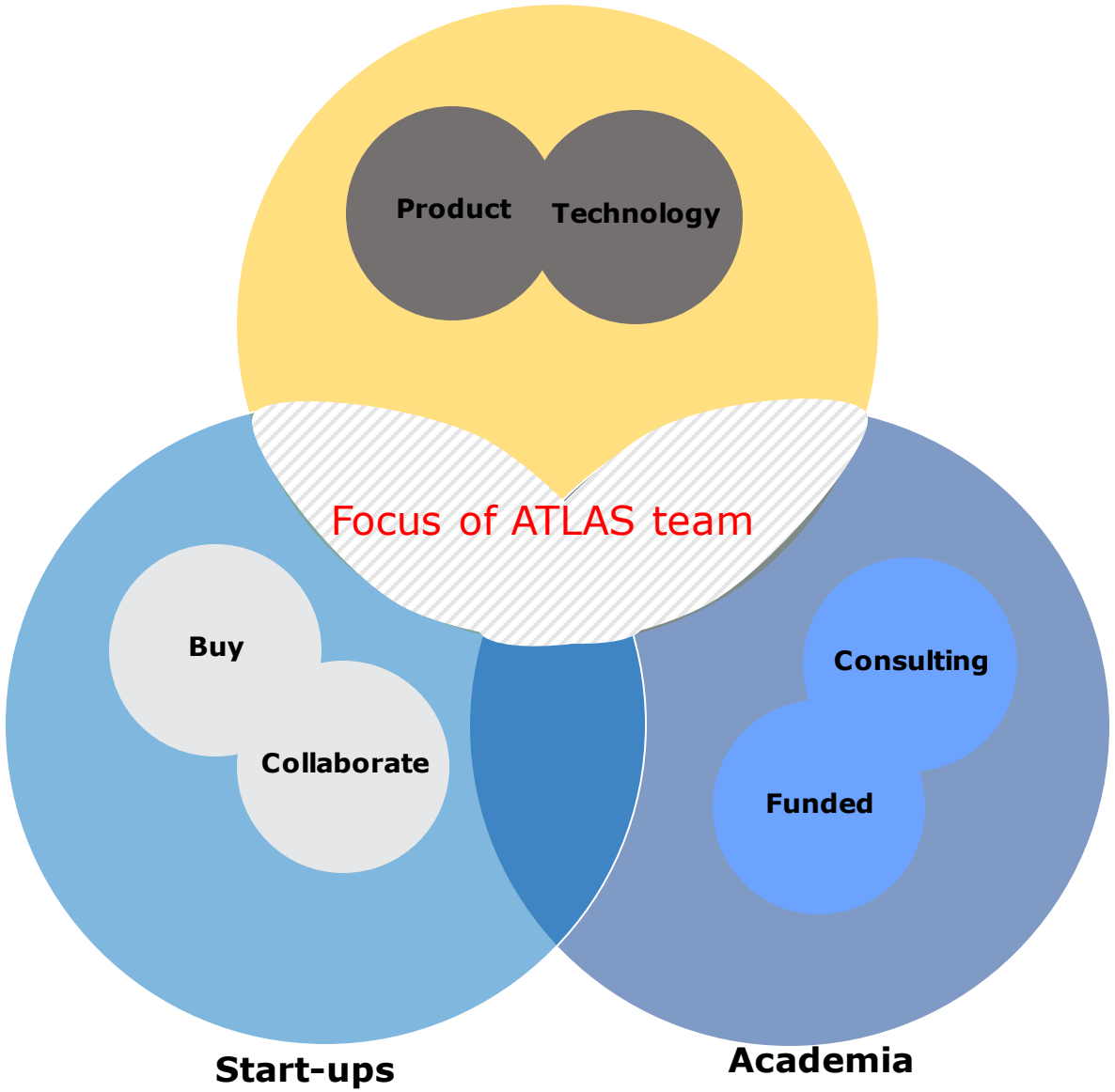
Leverage Ecosystem

Representative Start-ups & Accelerators

stylumia
scapic
Infratab
Answering "Is it fresh?"
CrowdANALYTIX
AgShift
Harness Data. Harvest Insights
Fasal
nimble
zinnov
ACYLIC LABS

WM Acquihire



Representative Academia

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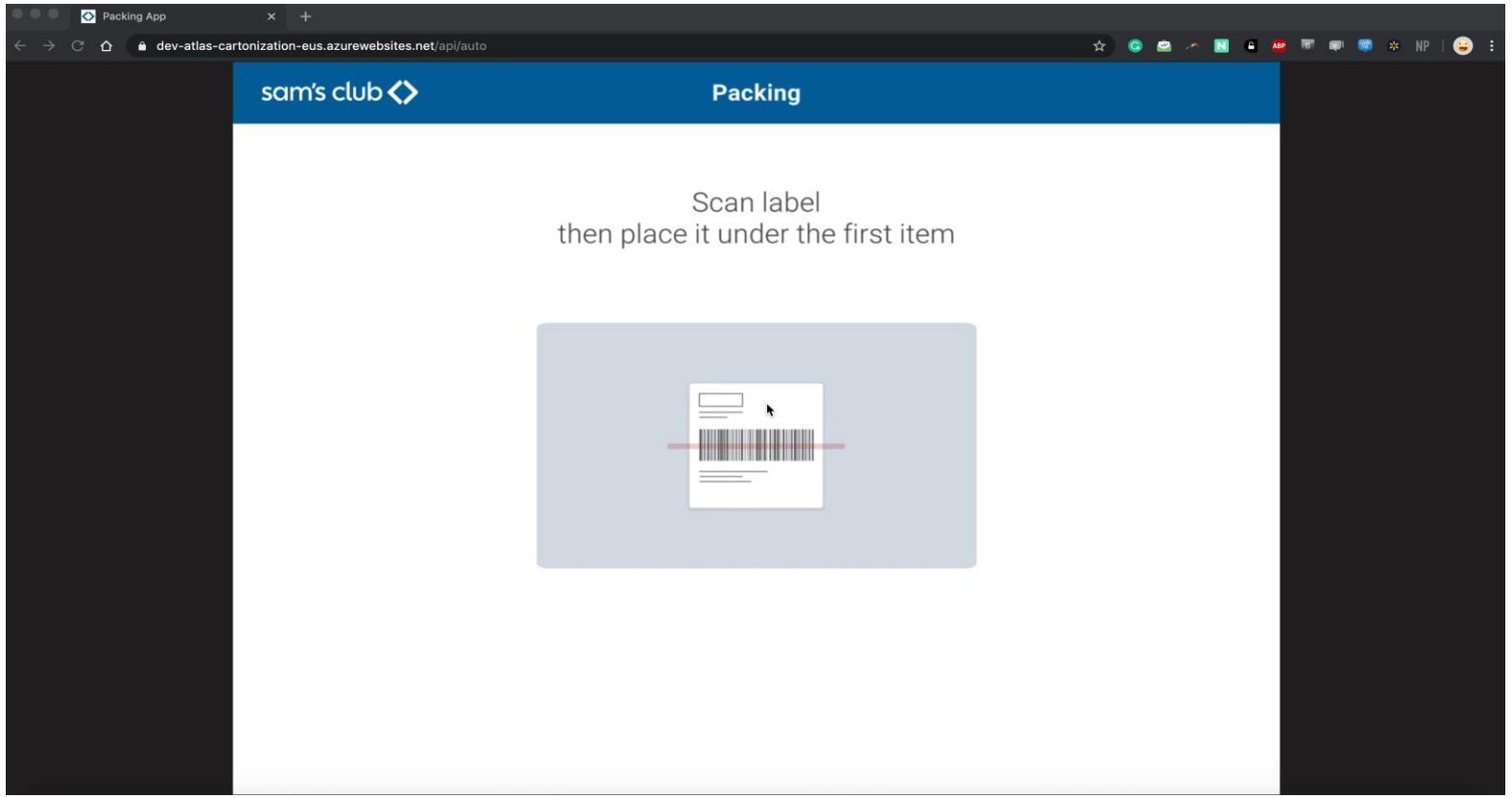
Some of our stories

C

1. In the production pilot since June'20
2. Carton size reduction – **16% average volume reduction** compared to manual packing boxes. This will help reduce damages, transportation costs and material costs.
3. Peak hour we are able to **achieve 399 Cartons/hour and 787 units/hour**
4. Made changes to algo and visualization, over last month, to **further reduced corrugate waste by ~8%**
5. Optimized algorithm for multiple box combinations (tried over 250 combinations and different # of items (5/10 and more) with very low latency (<80 ms)
6. **Patented tech** – Patent filing in progress, Potential commercialization opportunity

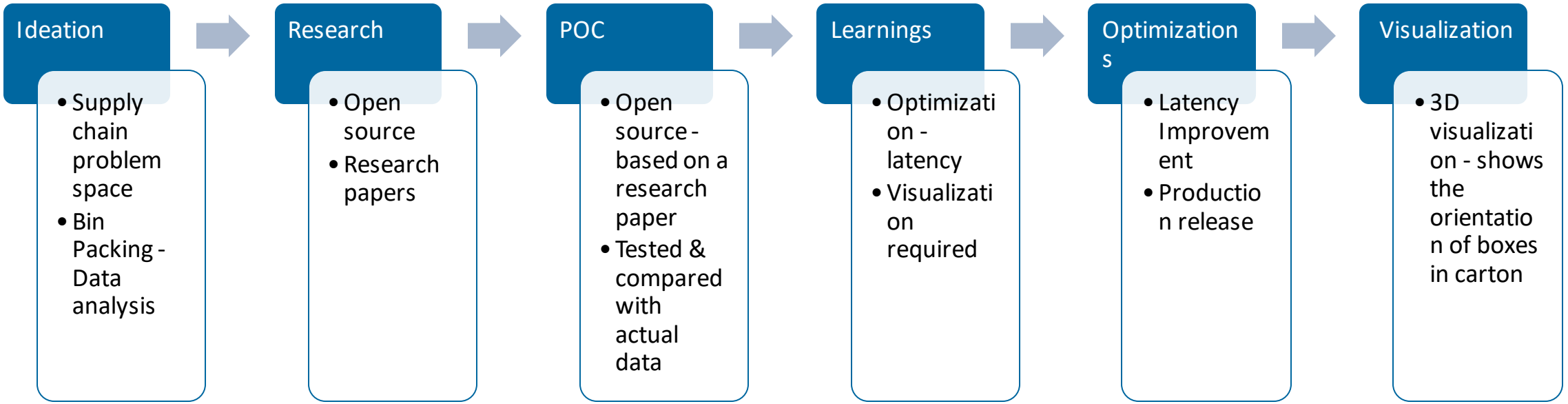
Demo

ATLAS Bin Packing Visualization

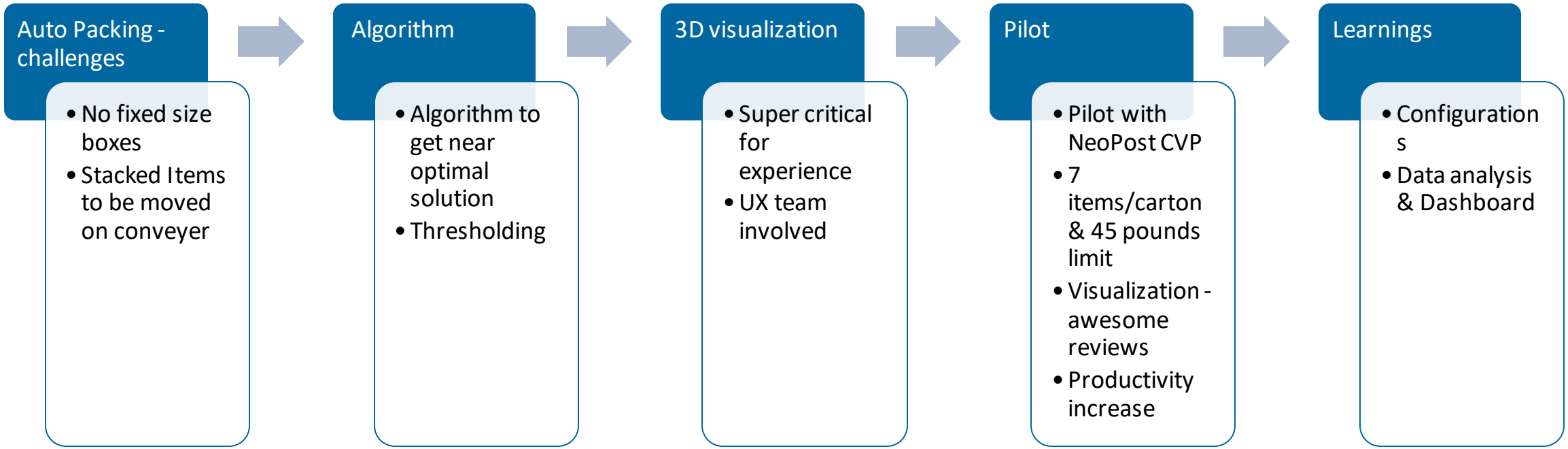


- **Patented tech** – IP owned and filed externally
- **Unity**(cross platform development platform for 2D and 3D interactive experiences)
- **WebGL** support to run on any browser
- **In Memory cache** – Guava cache for Image URLs
- 3-D Visualization with rendering on client

ATLAS BIN PACKING & VISUALIZATION(CARTONIZATION) – MANUAL PACKING



ATLAS BIN PACKING & VISUALIZATION(CARTONIZATION) – AUTO PACKING



Initial Experiments

Learnings from various experiments | Challenges | Data Labeling Platform (TrueSpace - DataTurk Acquisition)

Strawberry – Defect Classification

Watermelon – Defect Classification

Meat QC App using AI

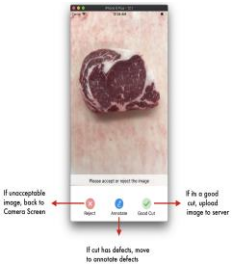
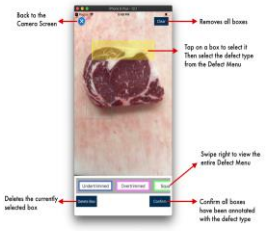
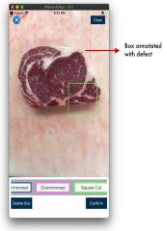


Image Capture



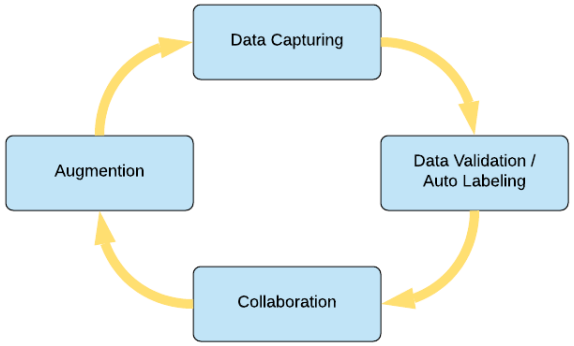
Annotate Defect



Defect Classification

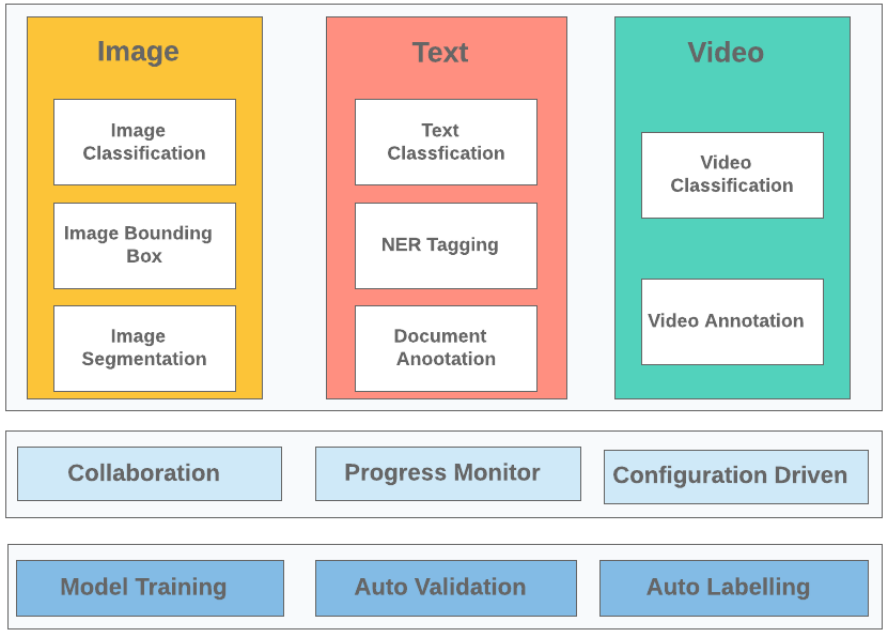
Lack of common process for:

- Image Data collection, Data labeling and Quality check
- Collaboration between human labelers and Quality
- Data management



Design

- Crowd sourced Data labeling product with basic functions
- Added Features in TrueSpace
  - Auto Labeling
  - Data Quality
  - Auto Review
  - Data augmentation and synthesis



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Item Vision - Scan and Go Experience

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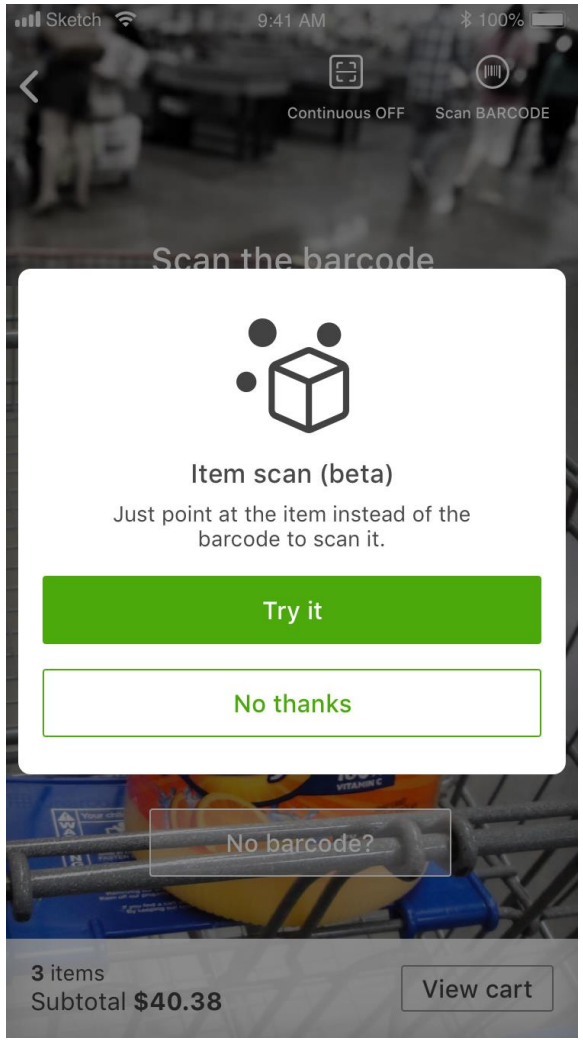
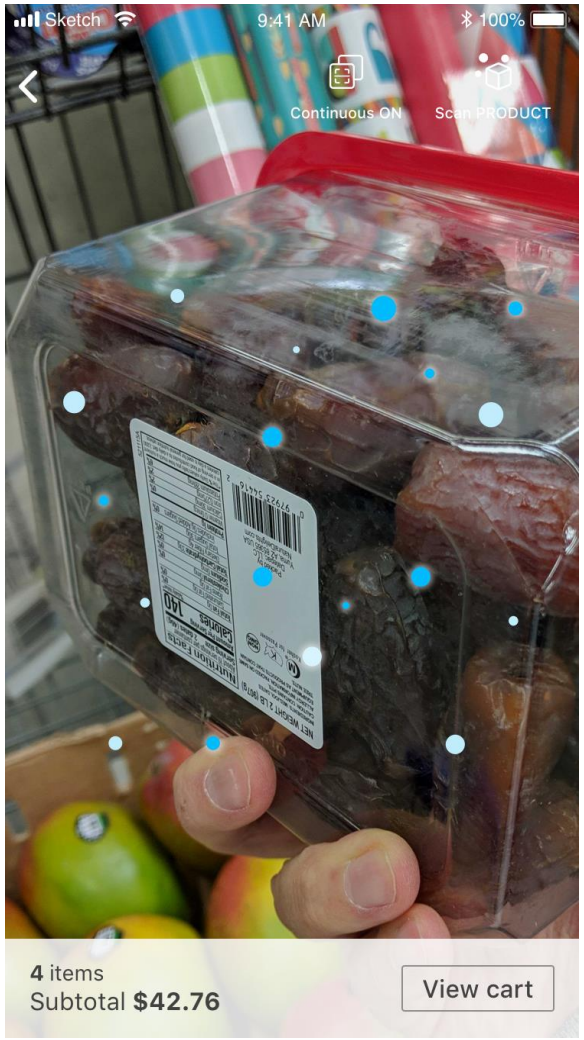
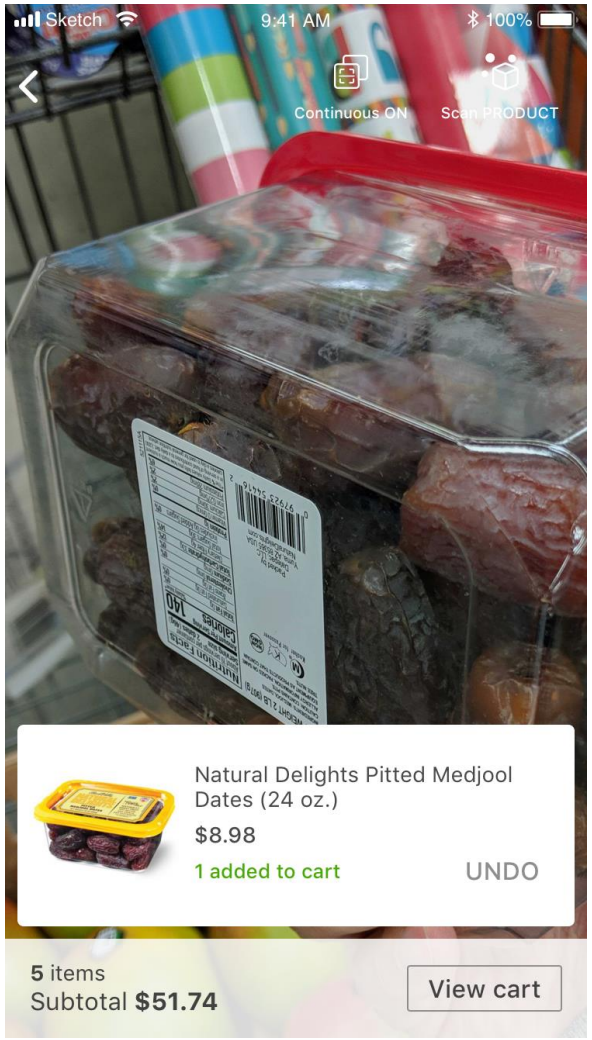






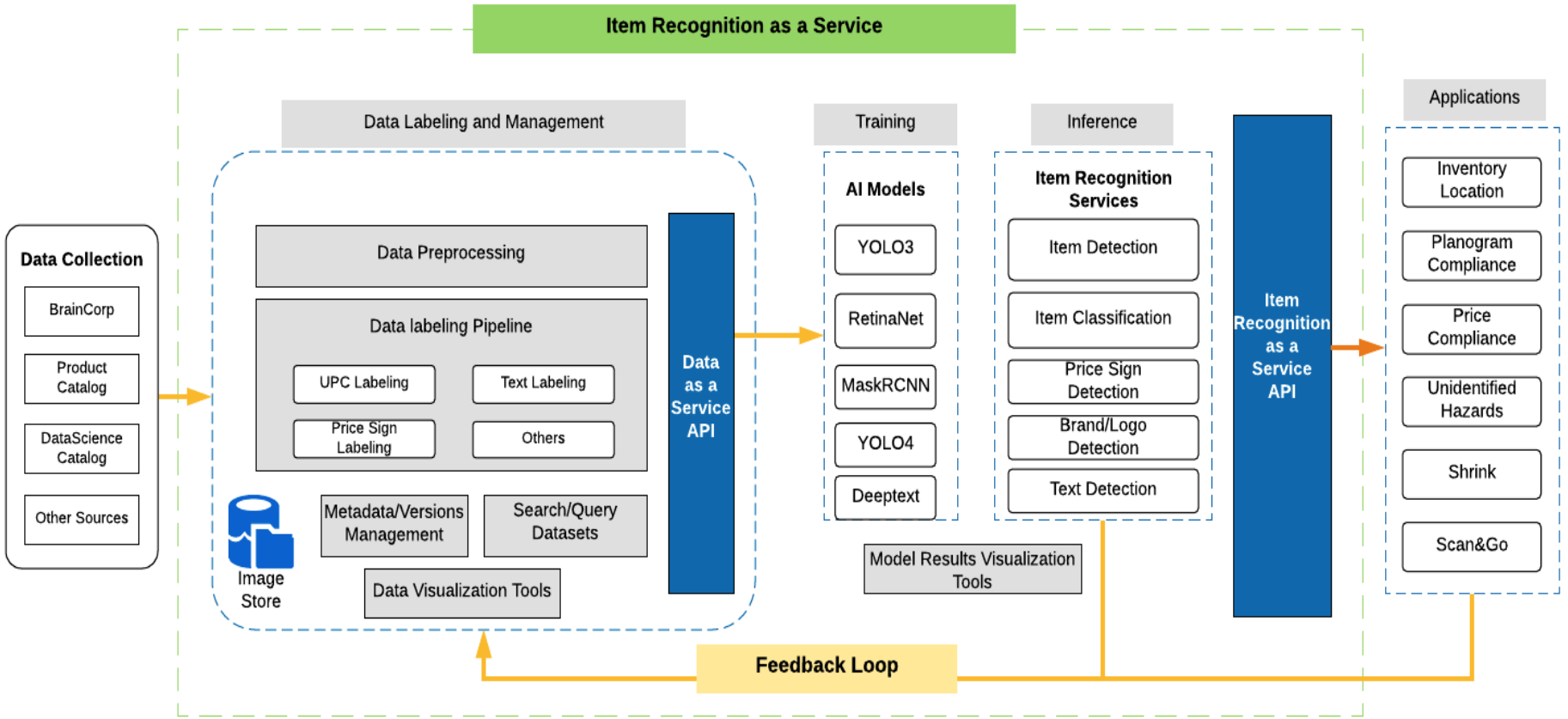
Intelligent Inventory

- Braincorp scrubbers with cameras are automatically routed through Sam's club
- Multiple applications in Clubs/Stores, Wearhouses, FCs need image recognition solutions to quickly and accurately identify and classify items to solve problems like inventory location, inventory count, detect shrink etc

IRAS – Item Recognition As a Service

Solution

1. Build reusable cloud-based 'Item Recognition as a Service' API, using AI Models
2. The API takes any image (with items in it) as an input and returns Top N item names, and corresponding UPCs along with key item attributes as output with very high accuracy
3. Build the solution with a feed-back loop leveraging scalable image labeling & management and AI/Vision Models for training
4. Architect the framework to be reusable by developer and DS community across Sam's and WM



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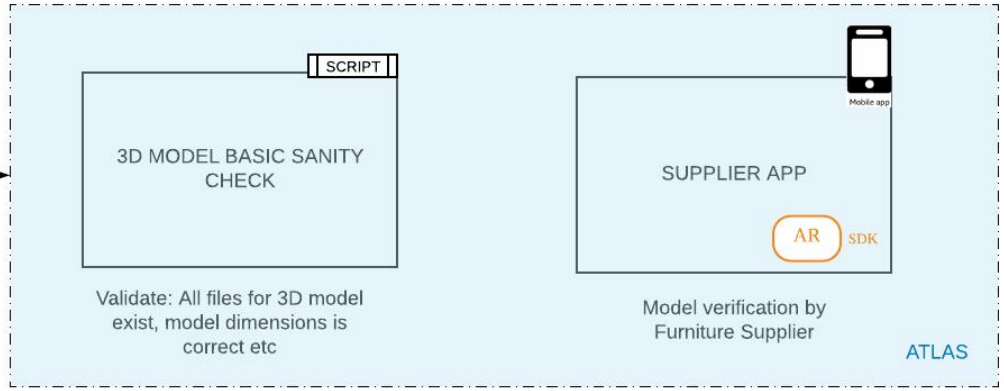
AR – SCAR Framework

SUPPLIER ITEM ONBOARDING EXPERIENCE

3D Model of Item on Azure CDN

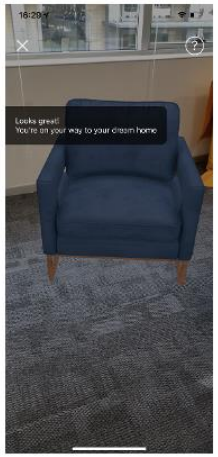
VALIDATE



MEMBER EXPERIENCE

Plane Detection

Model Download and dimensions



Item Placement

AR SDK Features

1. *Plane detection*
2. *Item placement*
3. *Drag and drop, rotation*
4. *Item dimensions*
5. *Lighting– single source*
6. *Shadow*
7. *Built on AR Kit*
8. *3D model download*
9. *Storyboard – Consuming App just passes the path for 3Dmodel*
10. *UI hooks enabling consuming App to add UI elements over AR storyboard*

Demo