

Machine Learning on AWS

Putting ML in the hands of every developer

Jason Wang
Partner Solutions Architect
AWS Taiwan

Boy Lee Marketing Sales Manager
Kelly Chen AI Engine Team Director
Beseye

Sponsor



Agenda

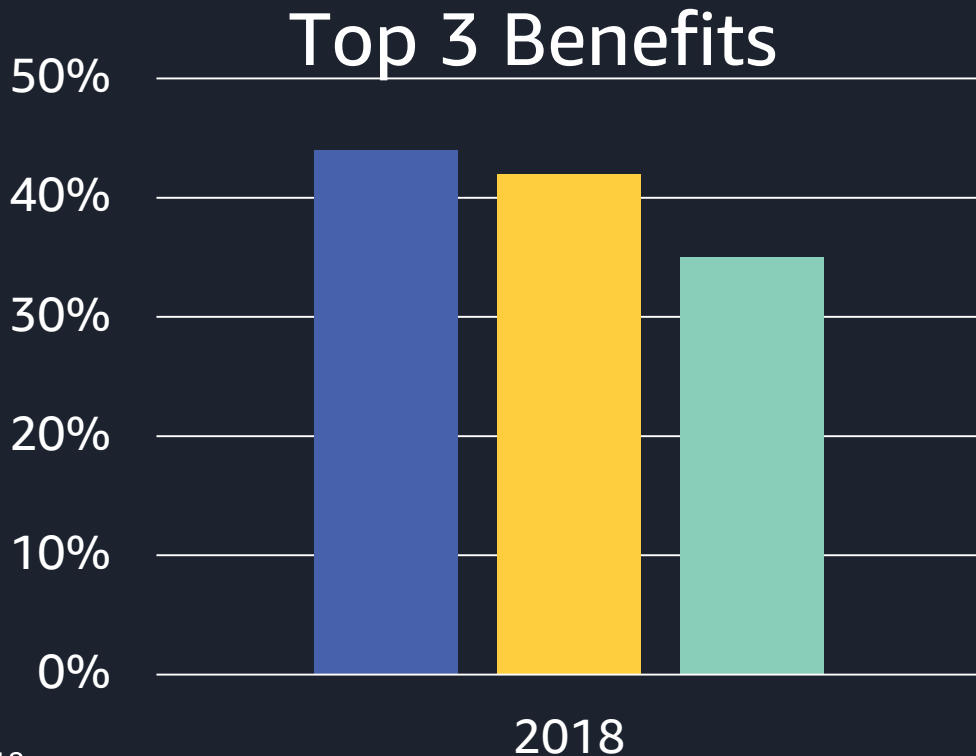
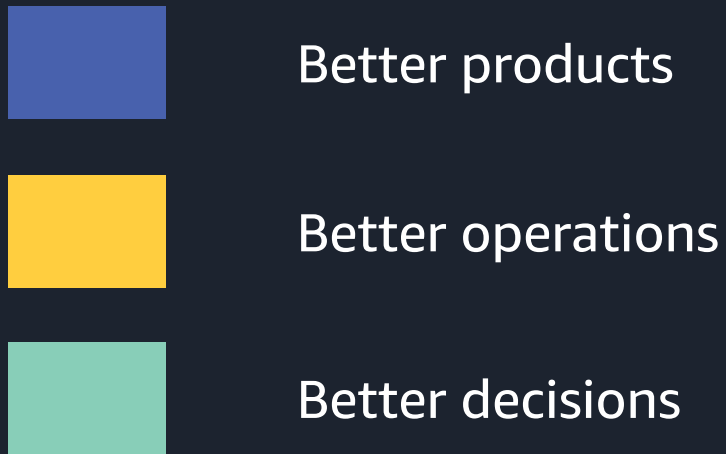
Why machine learning

Introducing AWS machine learning stack

Partner Solutions – Beseye

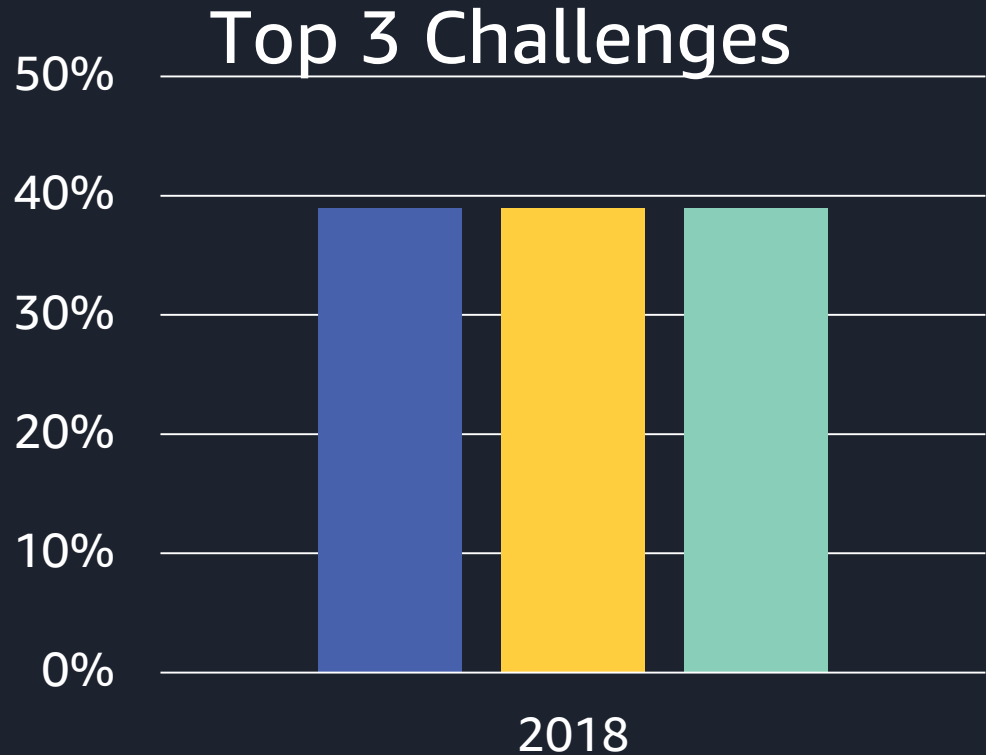
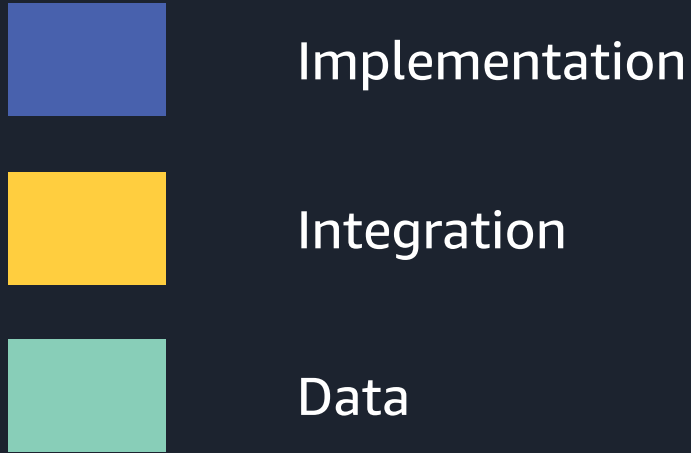
Q/A

Why machine learning



Source: Deloitte State of AI in the Enterprise, 2nd Edition, 2018

Why machine learning is hard



Source: Deloitte State of AI in the Enterprise, 2nd Edition, 2018

What is AI/ML/DL?



Artificial intelligence

Any technique that enables computers to mimic human intelligence using logic, if-then statements, and ML (including deep learning)



Machine learning

Subset of AI that uses machines to search for patterns in data to build logic models automatically



Deep learning

Subset of ML composed of deeply multi-layered neural networks that perform tasks like speech and image recognition

The reach of ML is growing



Our mission at AWS

Put machine learning in the
hands of every developer

WHY AWS FOR ML?



Broadest and deepest set of AI and ML services

200+ new features and services launched this last year alone

Solutions for everyone from ML scientists to application developers

Support all three of the major frameworks



Accelerate your adoption of ML with SageMaker

Single IDE for the entire ML workflow

At least 54% lower TCO

Up to 70% cost reduction in data-labeling

Up to 90% cost reduction with managed spot training



Built on the most comprehensive cloud platform

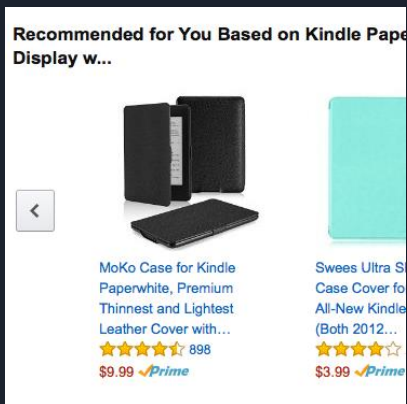
Highly secure, reliable, fully featured data store

The strongest set of compute, storage, security, database, and analytics capabilities to build upon

85% TensorFlow in the cloud runs on AWS

AMAZON'S MACHINE LEARNING INNOVATION

Recommended for You Based on Kindle Paperwhite Display w...



MoKo Case for Kindle Paperwhite, Premium Thinnest and Lightest Leather Cover with...
★★★★☆ 898
\$9.99 ✓ Prime

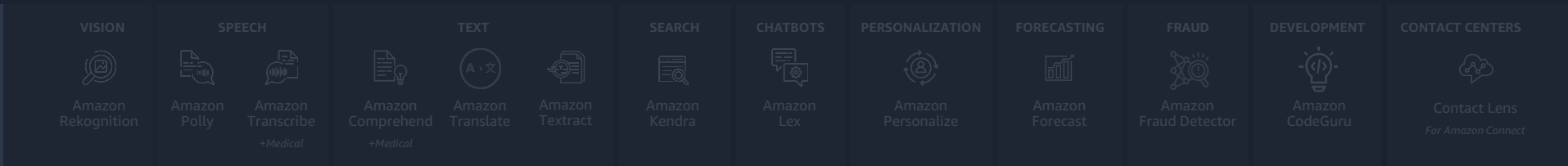
Swees Ultra S Case Cover for All-New Kindle (Both 2012...
★★★★☆
\$3.99 ✓ Prime



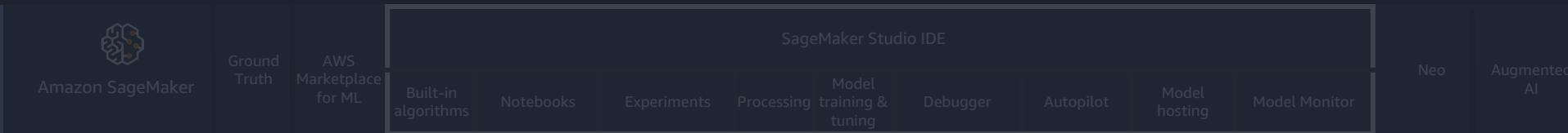
The AWS ML Stack

Broadest and most complete set of Machine Learning capabilities

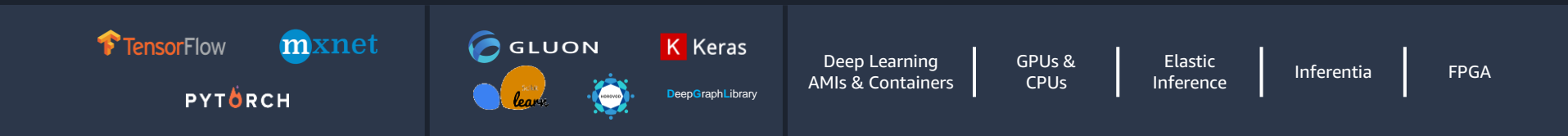
AI SERVICES



ML SERVICES



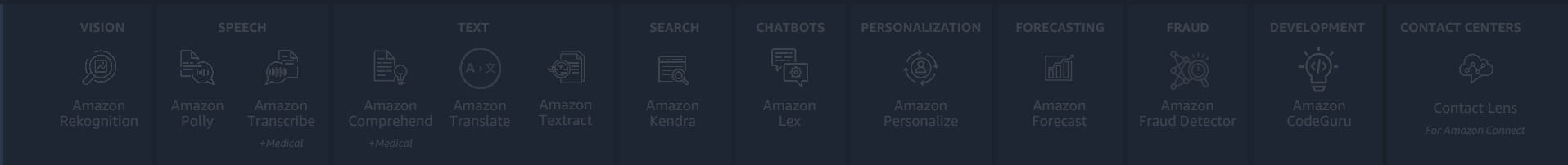
ML FRAMEWORKS & INFRASTRUCTURE



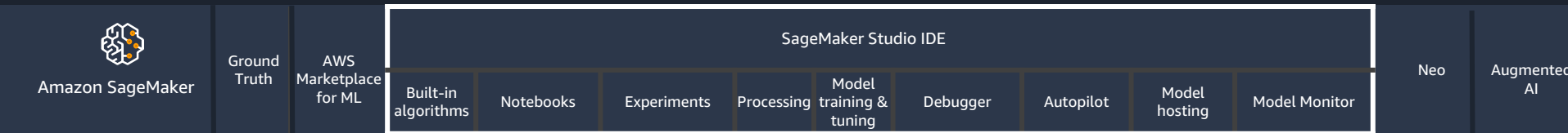
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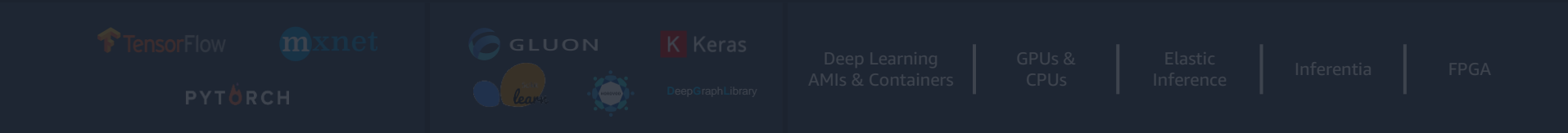
AI SERVICES



ML SERVICES



ML FRAMEWORKS & INFRASTRUCTURE



Machine learning workflow



Collect and
prepare training
data



Choose and
optimize your
ML algorithm



Set up and
manage
environments
for training



Train and
tune ML models



Deploy models
in production



Scale and manage
the production
environment

Build, train, and deploy models with Amazon SageMaker

Build

Fast, accurate labeling
Fully managed notebooks

Collect and prepare
training data

Choose and
optimize algorithm

Train

One-click training
Automatic model tuning

Manage training
environments

Train and tune ML
models

Deploy

One-click deployment
Fully managed Auto Scaling

Deploy models in
production

Scale production
environment

Amazon SageMaker is fully managed

One click model deployment



Auto-scaling



Low latency and
high throughput



Bring your
own model



Python SDK



Deploy multiple
models on an
endpoint

Train your model with one click using Amazon SageMaker



Train with your own algorithms



Distributed by default



Train on a data stream



Single pass training



Not memory bound



Checkpoint for re-training

Amazon SageMaker has built-in algorithms or bring your own

Classification

- Linear Learner
- XGBoost
- KNN

Working with Text

- BlazingText
- Supervised
- Unsupervised

Sequence Translation

- Seq2Seq

Computer Vision

- Image Classification
- Object Detection
- Semantic Segmentation

Recommendation

- Factorization Machines

Anomaly Detection

- Random Cut Forests
- IP Insights

Regression

- Linear Learner
- XGBoost
- KNN

Topic Modeling

- LDA
- NTM

Forecasting

- DeepAR

Clustering

- KMeans

Feature Reduction

- PCA
- Object2Vec

AWS Marketplace for Machine Learning

You can shop for algorithms, models, and data in AWS Marketplace for ML



Browse or search
AWS Marketplace



Subscribe in a
single click



Available in
Amazon SageMaker

Hundreds of algorithms, models, and data

DIMENSIONALMECHANICS®

Open for Innovation
KNIME

DEEPCISION

H₂O.ai



Knowledgegent

figure eight



TIBCO™

SELLERS

Automatic labeling via machine learning

IP protection

Automated billing and metering

BUYERS

Broad selection of paid, free, and open-source algorithms and models

Data protection

Discoverable on your AWS bill

Natural language processing

Ranking

Text OCR

Computer vision

Named entity recognition

Video classification

Speech recognition

Text-to-speech

3D images

Text classification

Speaker identification

Anomaly detection

Text generation

Object detection

Regression

Text clustering

Handwriting recognition

Grammar and parsing

Successful models require high-quality data



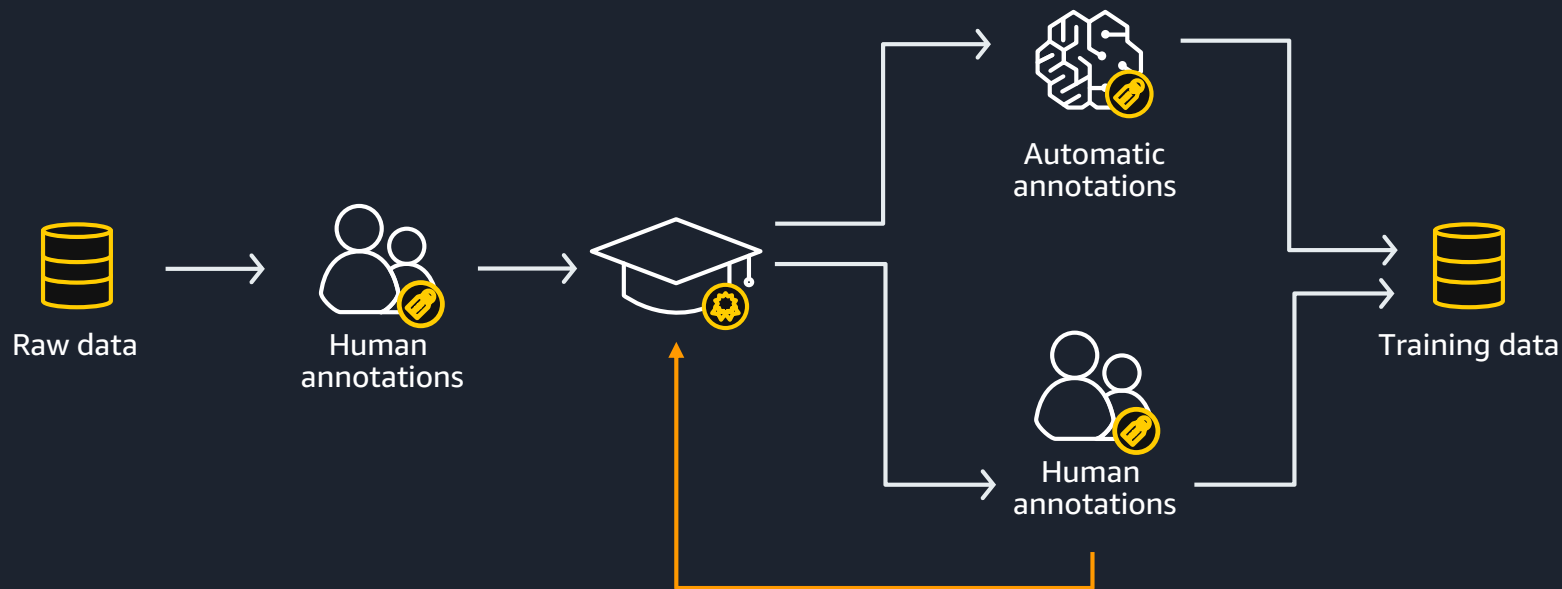
Amazon SageMaker Ground Truth

Build highly accurate training datasets using machine learning

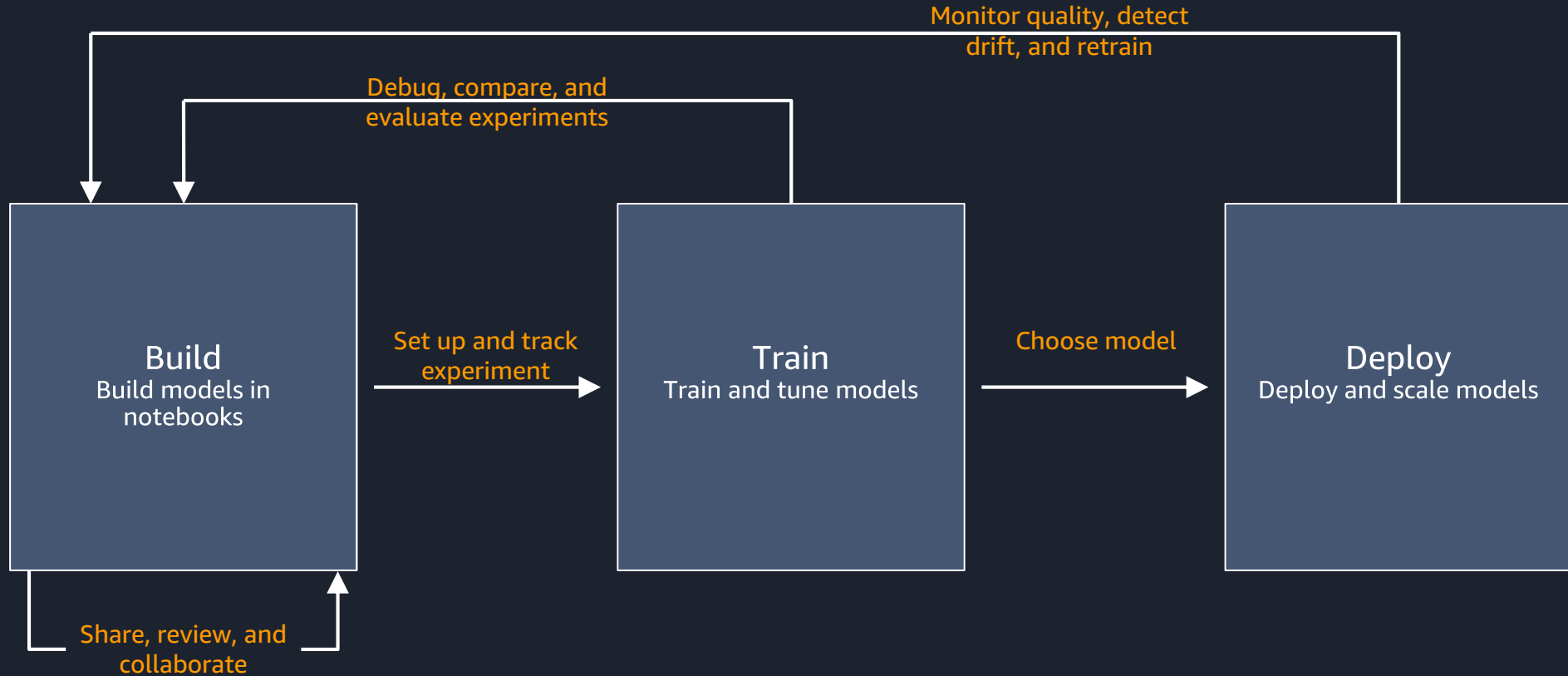


- Reduce data labeling costs by up to 70%
- Access labelers through Amazon Mechanical Turk, Amazon approved vendors, or use private human labelers
- Achieve accurate results quickly

How Amazon SageMaker Ground Truth Works



Machine learning is iterative



Introducing Amazon SageMaker Studio



Amazon SageMaker Notebooks

Quick start collaborative notebooks



Amazon SageMaker Experiments

Organize, track, and compare ML experiments



Amazon SageMaker Debugger

Debug models with real-time, automated alerts



Amazon SageMaker Model Monitor

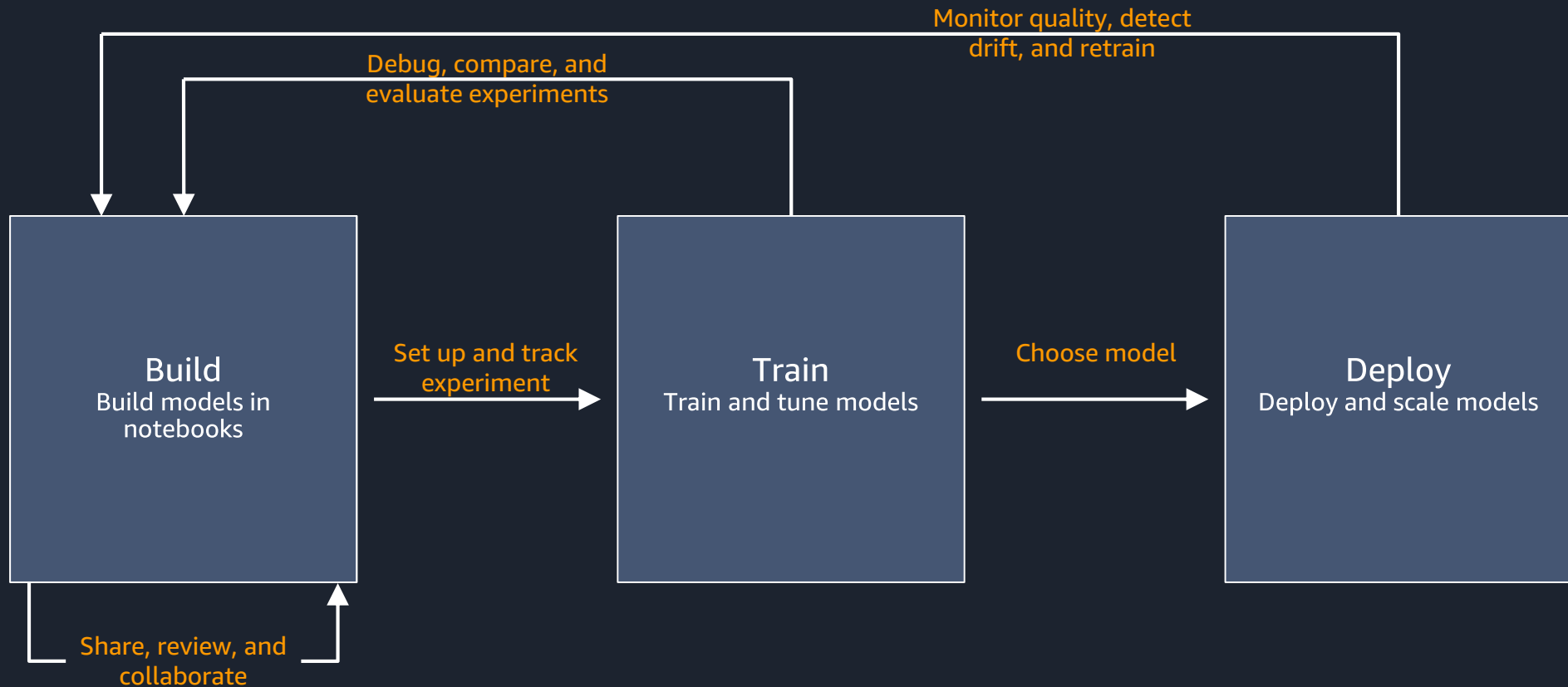
Monitor models in production and detect drift



Amazon SageMaker Autopilot

Get from data to models automatically

Build fast and collaborate



Quick Start collaborative Amazon SageMaker Notebooks



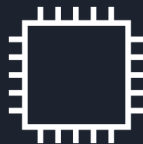
Single sign-on

Integrated with AWS SSO



Secure

Administrators govern access and permissions



Switch compute environments

Switch compute instances on the fly



One-click share

Share URL with a single click



Reproducible notebooks

Easily reproduce and review notebooks

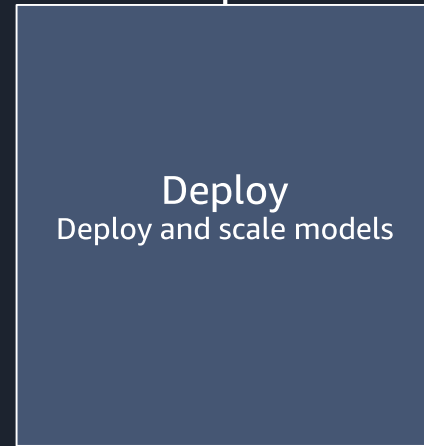
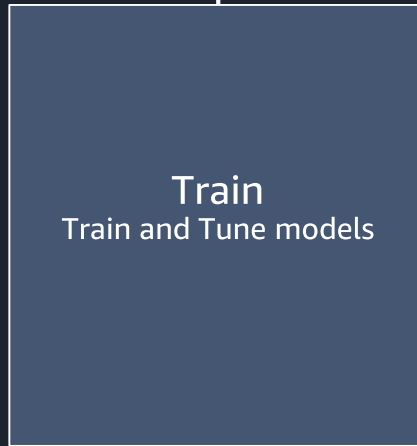
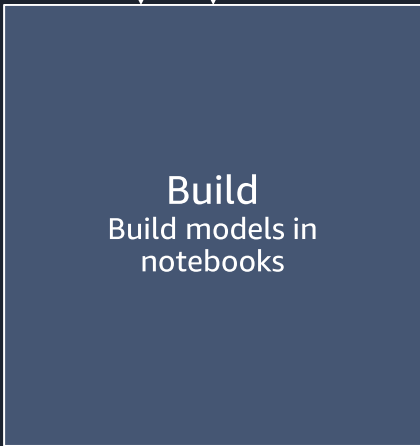
Manage Experiments

Monitor quality, detect drifts, and retrain

Compare and evaluate experiments

Set up and track experiment

Choose model



Share, review, and collaborate

Amazon SageMaker Experiments



Track experiments

Track parameters, metrics, models, and more



Organize

Organize your experiments and trials



Compare experiments

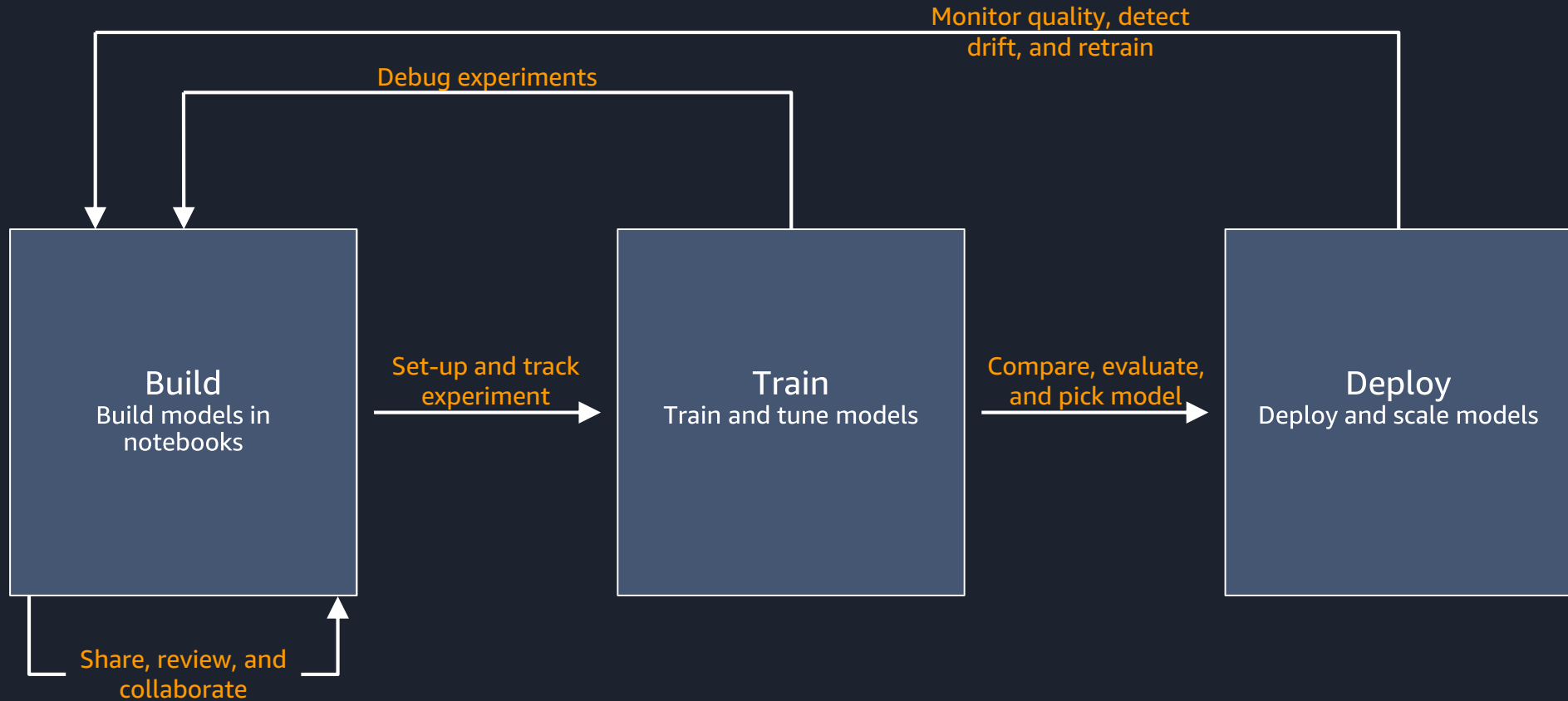
Compare, evaluate, and iterate



Python SDK

Tracking and analytics APIs

Debug training runs



Amazon SageMaker Debugger



Framework support

TensorFlow, Apache MXNet, PyTorch, XGBoost



Introspect models

Introspects, collects and analyzes tensors



Rules and Alerts

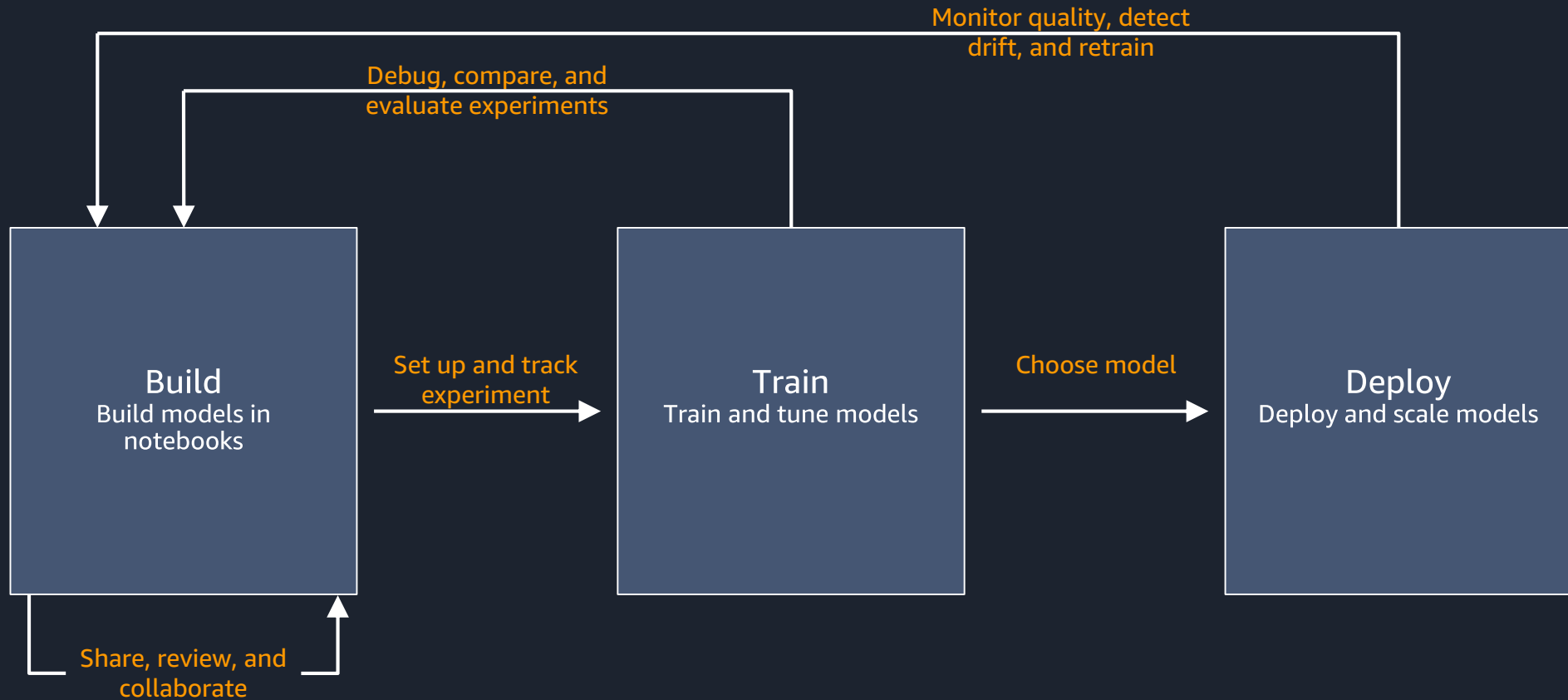
Provides real-time alerts when bottleneck is identified



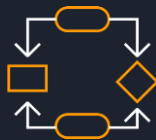
Python SDK

Write your own debug rules

Monitor models



Amazon SageMaker Model Monitor



Collect data

Periodically collects data from endpoints into Amazon S3



Analyze

Computes feature statistics



Monitor

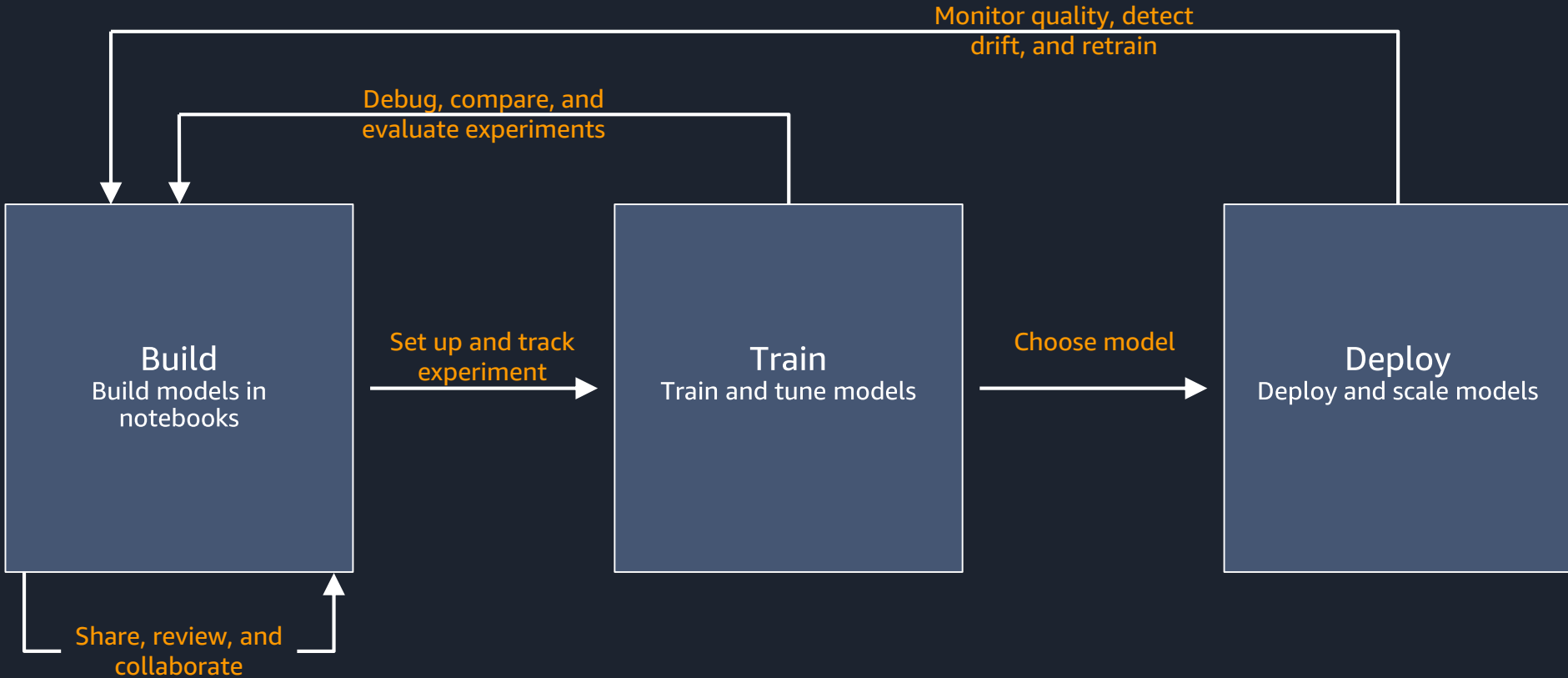
Monitors trends in data and detects drifts



Alerts

Alerts on Amazon CloudWatch and Amazon SageMaker Studio

How else can we accelerate ML workflow?



Amazon SageMaker Autopilot



Provide data

Data in tabular form



Specify column to predict

Support for regression and classification



Create model

Feature generation, algorithm selection, and parameter tuning



Track experiment

Automatically tracked as an experiment
















Transparent

Get notebook with source code


The AWS ML Stack

Broadest and most complete set of Machine Learning capabilities


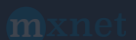



AI SERVICES

VISION  Amazon Rekognition	SPEECH  Amazon Polly	 Amazon Transcribe <small>+Medical NEW</small>	TEXT  Amazon Comprehend <small>+Medical</small>	 Amazon Translate	 Amazon Textract	NEW! SEARCH  Amazon Kendra	CHATBOTS  Amazon Lex	PERSONALIZATION  Amazon Personalize	FORECASTING  Amazon Forecast	NEW! FRAUD  Amazon Fraud Detector	NEW! DEVELOPMENT  Amazon CodeGuru	NEW! CONTACT CENTERS  Contact Lens <small>For Amazon Connect</small>
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ML SERVICES

 Amazon SageMaker	Ground Truth	Augmented AI	ML Marketplace	SageMaker Studio IDE NEW!							Neo	
				Built-in algorithms	NEW! Notebooks	NEW! Experiments	Model training & tuning	NEW! Debugger	NEW! Autopilot	Model hosting	NEW! Model Monitor	

ML FRAMEWORKS & INFRASTRUCTURE

 TensorFlow	 mxnet	 GLUON	 Keras	Deep Learning AMIs & Containers	GPUs & CPUs	Elastic Inference	Inferentia (Inf1 instance)	FPGA
PYTORCH								

Amazon Fraud Detector

Automate online fraud detection



Pre-built fraud
detection model
templates



Automatic
creation of
custom fraud
detection models



Models learn from
past attempts to
defraud Amazon



Amazon SageMaker
integration



One interface to
review past
evaluations and
detection logic

Contact Lens for Amazon Connect

Better insights lead to better customer service



Transcribes live and archived calls



Enhanced search on call and chat transcripts, sentiment scores, silence duration etc.



Custom categorization to identify common call types



Prioritized list of recurring issues based on customer feedback



Real time dashboard and alerting for supervisors



Provide agents with answers to questions as they are being asked

Transcribe Medical + Comprehend Medical

Amazon Transcribe Medical (ASR)



Accurately transcribe conversations during patient encounters in real time



Accurately transcribe medical dictation after patient encounter in real time



Text output



Text analysis



Electronic health record (EHR) system

MACHINE LEARNING IS HAPPENING IN COMPANIES OF EVERY SIZE AND INDUSTRY

Tens of thousands customers have chosen AWS for their ML workloads | More than twice as many customers using ML than any other cloud provider



Building a digital voice scribe

By leveraging Amazon Transcribe Medical's transcription API, Cerner is in initial development of a digital voice scribe that automatically listens to clinician-patient interactions and unobtrusively captures the dialogue in text form.





SUMCO



Defect Detection w/ML

Problem

FST seek yield improvement in their silicon wafer factories. The current defect detection process is good but it involve significant human inspection efforts.

Solution

FST would like to partner with AWS to push the yield envelope with AI/ML. We conducted ML workshop and hackathon to educate the teams on the latest AWS technologies. We then worked together to create the ML silicon defect detection model using tens of thousands of wafer images for training.

Impact

We finally create a ML defect detection model with 99%+ detection rate (aka., Recall Rate), improved yield and reduced the human inspection efforts by half.

AWS not only is the ML expert with advanced capable tools but also our partner to show us how to use them to improve our production operations.

AWS 不只是提供先進機器學習工具的專家，更是教導我們如何在應用的合作伙伴。

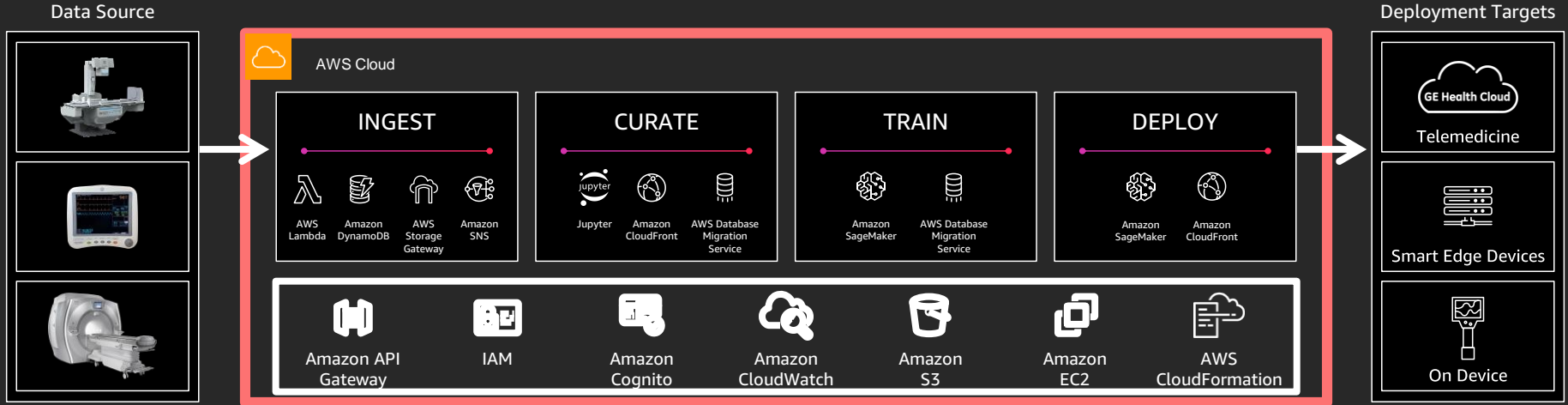
Jason Lin

Chairman, Formosa Sumco Technology Corporation

Edison | An Artificial Intelligence Factory For Everyone



Edison AI Services



Learn ML with AWS Training and Certification

The same training that our own developers use, now available on demand



Role-based ML learning paths for developers, data scientists, data platform engineers, and business decision makers



70+ free digital ML courses from AWS experts let you learn from real-world challenges tackled at AWS



Validate expertise with the
AWS Certified Machine Learning - Specialty exam

Visit <https://aws.training/machinelearning>

Q&A



Remember to complete
your evaluations!



Beseye

AI Security Camera Platform

Marketing Sales Manager

Boy Lee

Agenda

- **About Beseye**
- **Beseye Skeleton-Print™ Technology**
- **Show Cases**
 - **Railway**
 - **Retail**
 - **Factory**
- **High Level Structure in AWS**

Our Growth

2015

World's
No.1 iF, REDDOT
Awards,
Germany



2017

- Japan's Tier-1
Tokyu Techno Railway



- Far Eastone



- Chunghwa Telecom



2019

- Japan's Tier-1 CVS
- Japan second large
steel company JFE



Global Service Map



Due to NDA restriction, some key customers are not listed on this slide:
Including 3rd largest mobile brand, largest department store in Taiwan

Core Technology

Computer Vision



Object Recognition

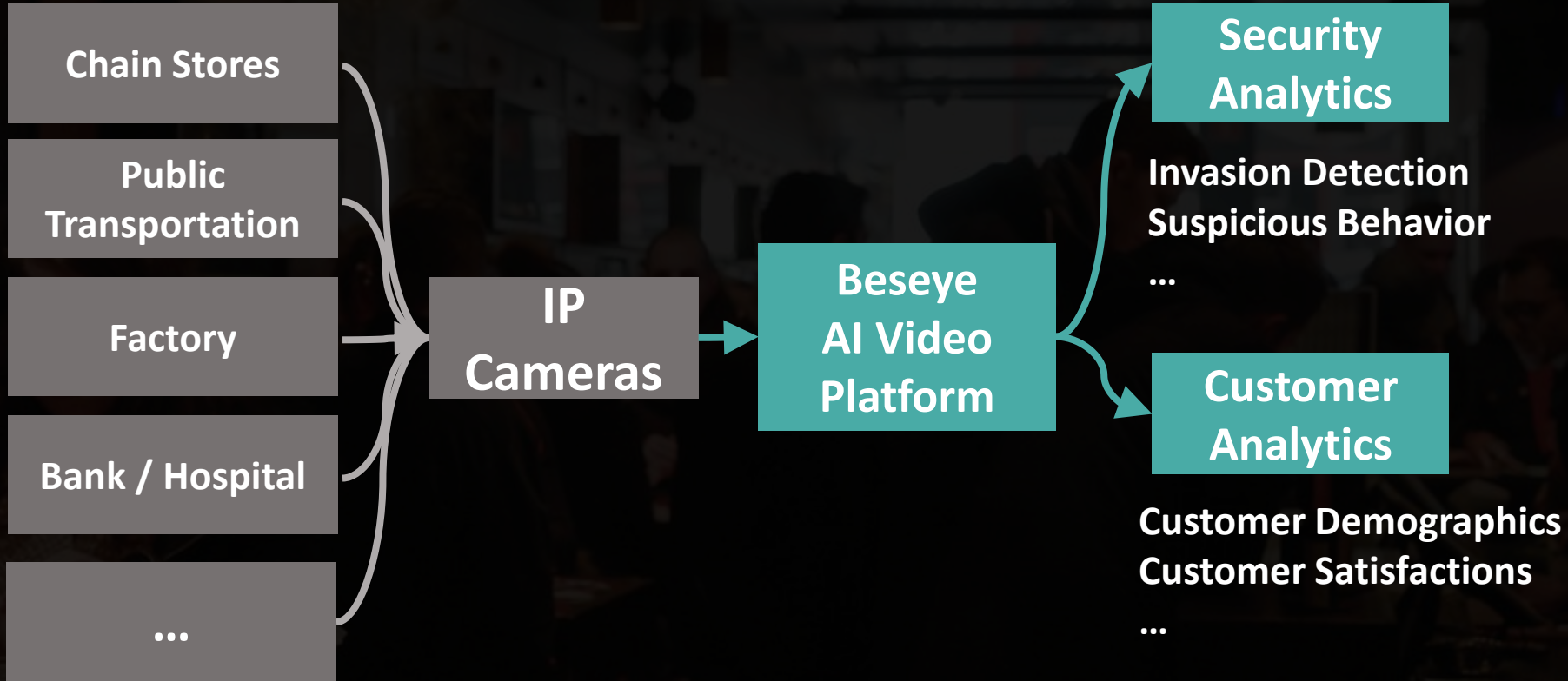


Facial Recognition



Beseye Skeleton-Print Technology

AI Platform Overview



Benchmark

Leading AI Skeleton-Print Tech. at 5-Meter Distance

- Improve > 30% Accuracy

Competitor



Skeleton Analysis



Skeleton + Facial Analysis



AI Deep Learning Engine



**Skeleton-Print
Analysis**



**Facial
Analysis**



**Background
Analysis**



Beseye

Beseye



28



Female



Neutral



NO

Beseye



**Beseye AI Video Analysis Platform
For Railway**

Beseye

Location Analysis



Beseye AI Engine (Railway Scenario)

Benefit for Tokyu Techno



Accident Rate

-30 %



Surveillance Cost

-40 %



Beseye AI Engine (Railway Scenario)



Beseye AI Engine (Railway Scenario)

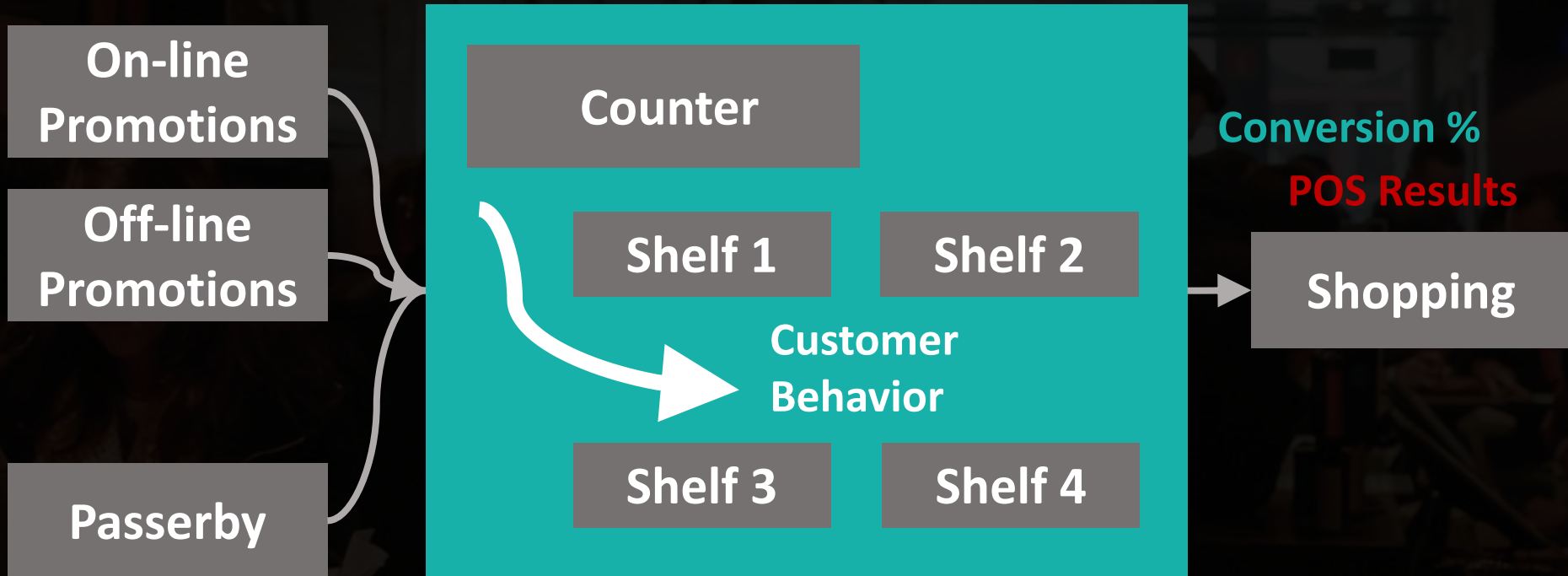


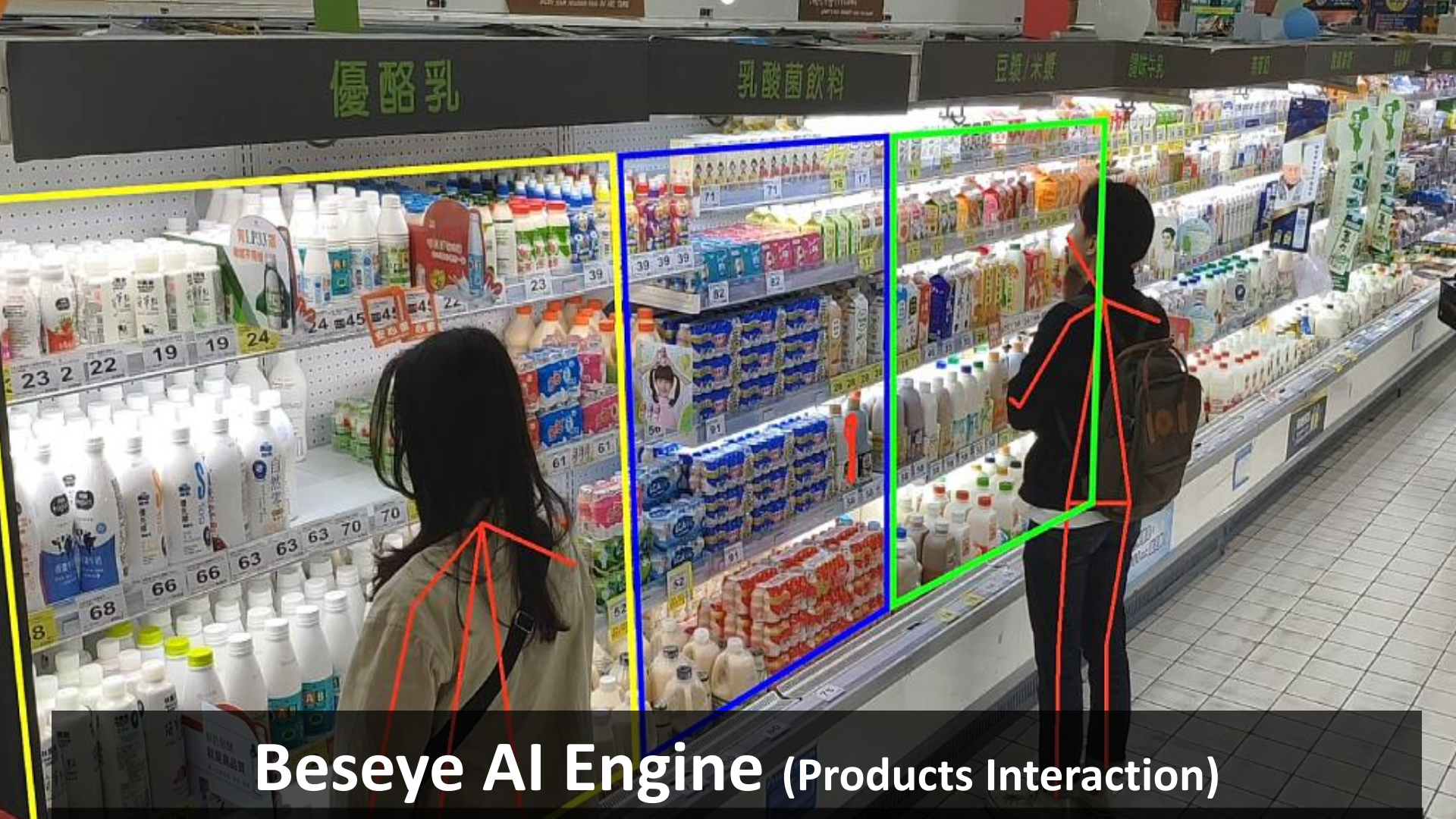
**Beseye AI Video Analysis Platform
For Retail**

Beseye

Retail Stores

Retail Stores





優酪乳

乳酸菌飲料

豆漿/米漿

調味牛乳

無糖

全脂

低脂

Beseye AI Engine (Products Interaction)

未購物出口
EXIT WITHOUT
PURCHASE



公告
親愛的顧客，
因應疫情
暫停供應奉茶
造成不便 敬請見諒
康樂藥房有限公司
批發部謹啟

Age: 20~30
female

Age: 20~30
female

Age: 20~30
male

Beseye AI Engine (Demographics & VIP)



中山國小站

ZHONGSHAN NATIONAL ELEMENTARY SCHOOL STATION

04

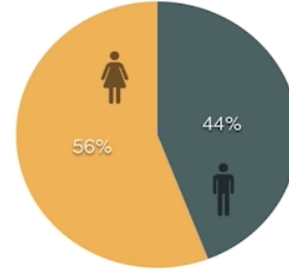
Beseye AI Engine (Route and Dwell time)

Beseye



358

People walked by



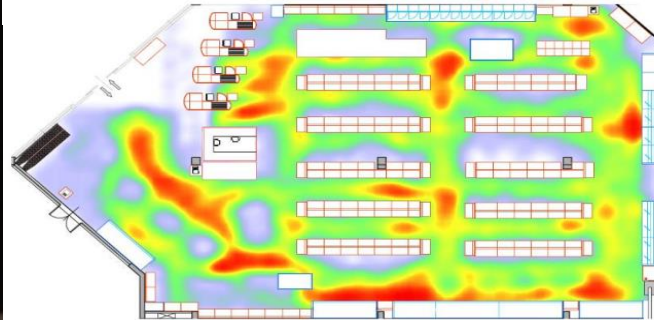
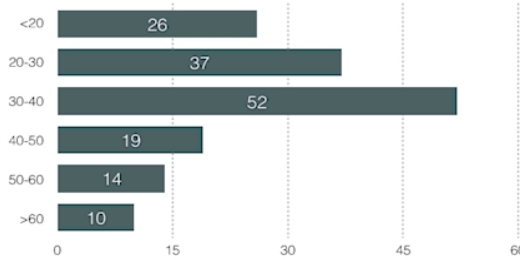
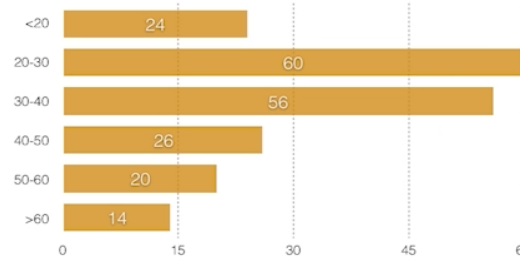
51%



24%



25%





**Beseye AI Video Analysis Platform
For Factory/ Manufacturing**

Beseye

Challenges To Keep A Factory Working



Smooth Production Line



Workers Are Safe



Factory Is Safe

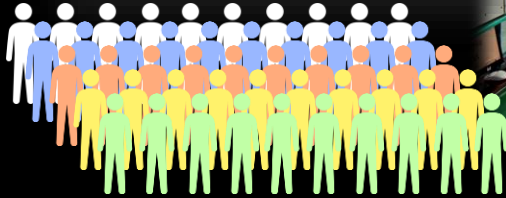


Production Line Analysis

Beseye

Challenges In Production Line

Products, Which Require **High Level of Human Force Involvement** During Production.



- Workers Don't Always Follow **SOP**.
- Foreman Can't Monitor Every Worker **All The Time**.
- **Supervisor Realizes Low Productivity Only By Result**. No Tool To Dig Out The Reason And Improve.

Production Target Fail, OT, Quality Issue → Additional Cost

Beseye示範工站

17:32:48:25

動作分析：裝底蓋

00:00:00:23

Beseye AI Engine (Products Interaction)



Safety Analysis

Beseye

Every Accident Is Additional Cost

Safety Analysis



Danger Zone



Suspicious Behavior
Detection

Workers' Safety

&

Factory's Safety

Transform into Smart Environments



Annunciation Lamp



AI Cameras



Machine Switch



ID : 0134
LOC. : 04
BEHAVIOR : Too Close to
The Danger Area

Suspicious Behavior Detection

LOC.: Backyard
BEHAVIOR: Walking

ABNORMALITY:
Face Coverage

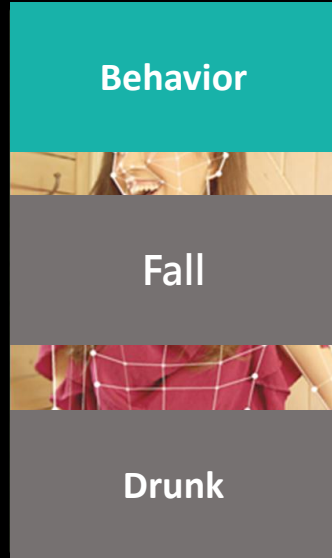


LOC.: Loading Dock
BEHAVIOR: Walking

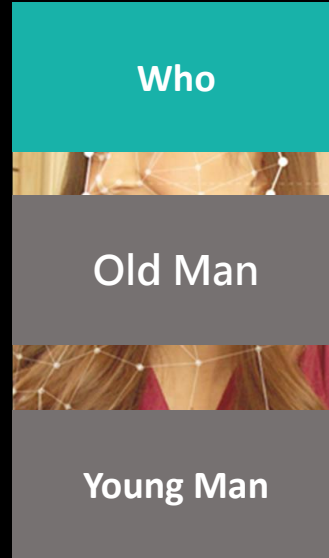
ABNORMALITY:
**Human Detected In
Off-hour**



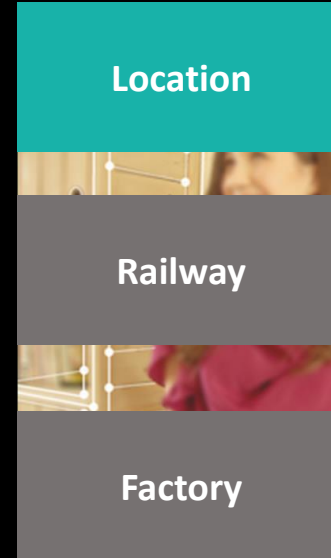
Beseye AI Solution



Skeleton-Print



**Facial
Analysis**



**Background
Analysis**

Product Model

Turnkey Solution

Beseye Camera
Beseye AI Platform Service



Cloud

OR

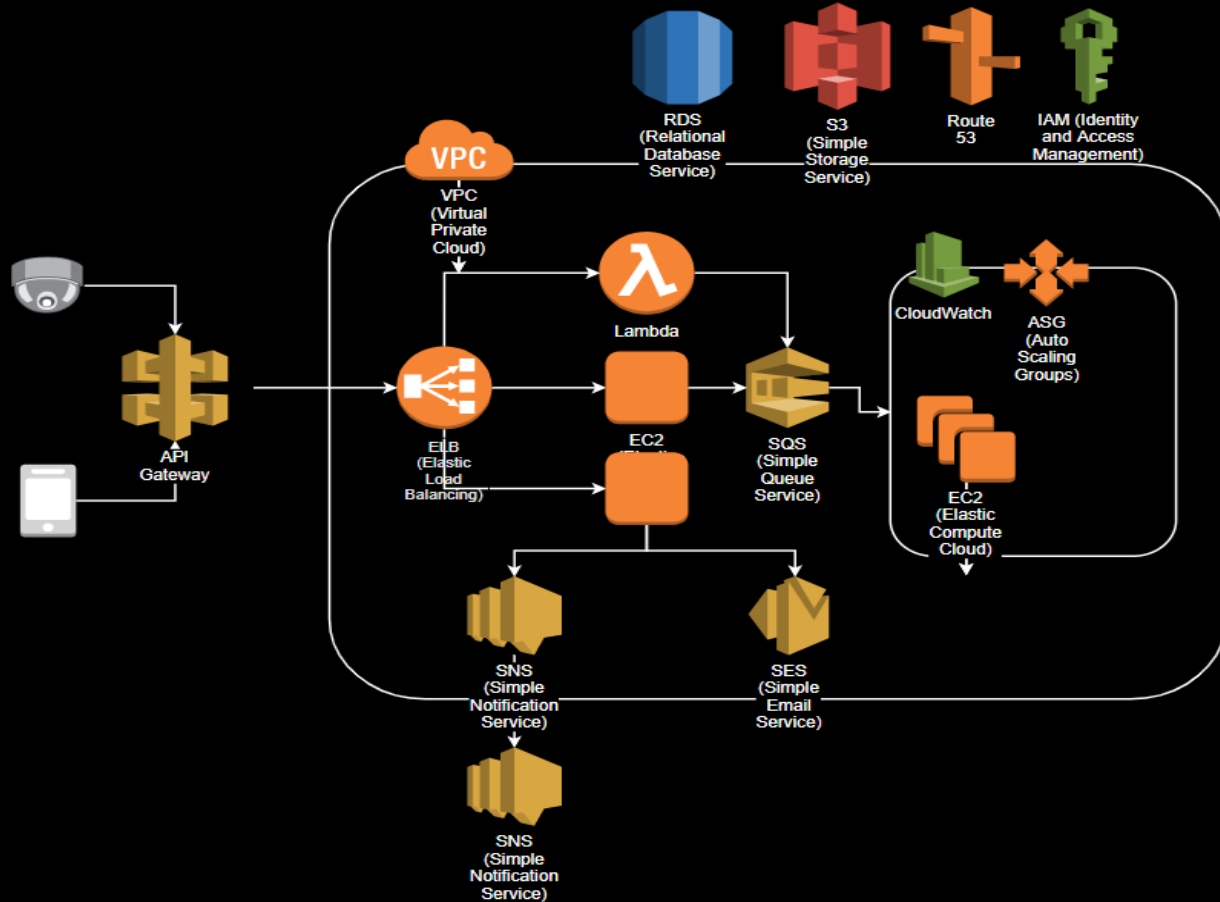


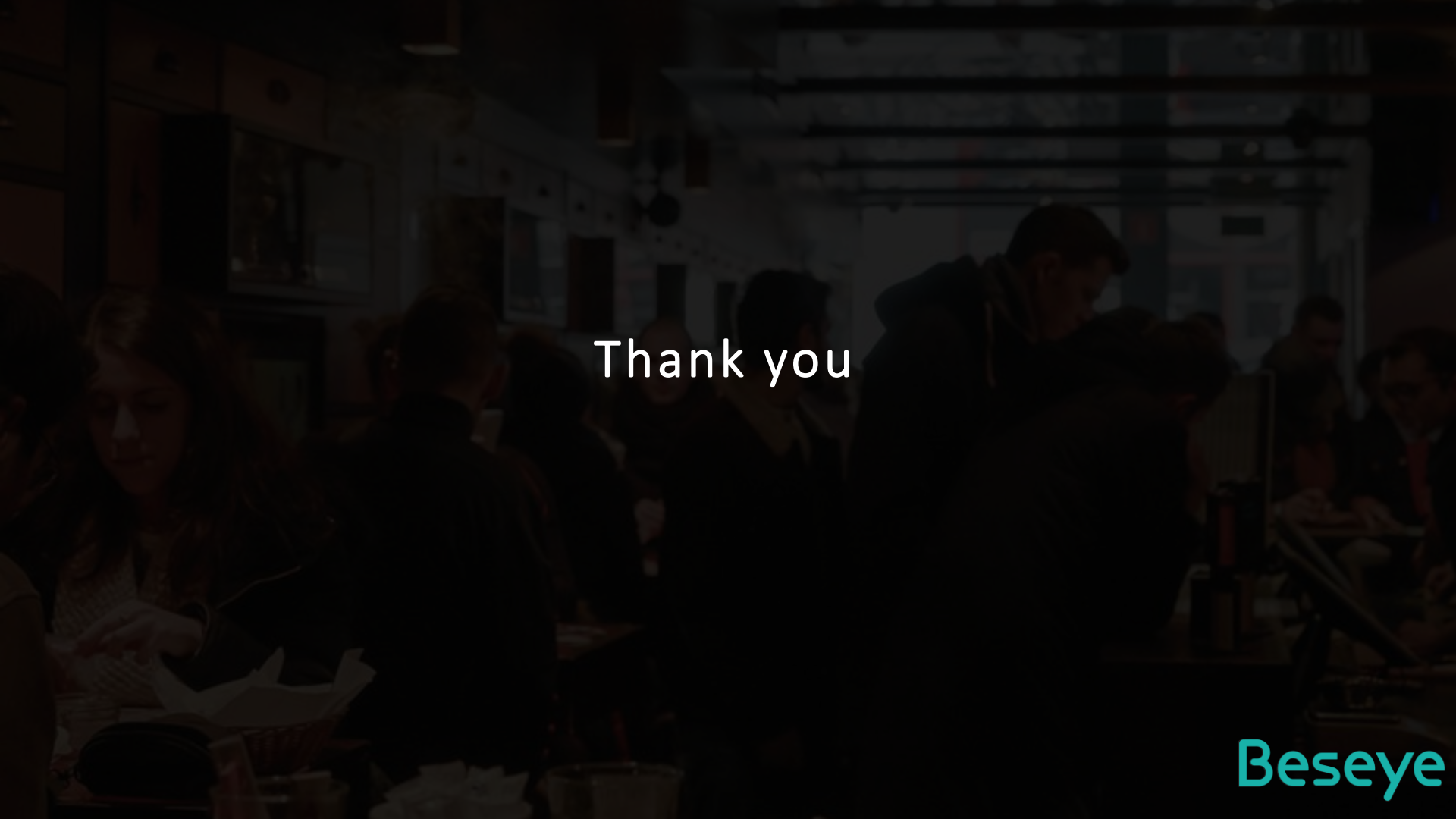
Local

Open Platform Solution

Beseye AI Platform Service

High Level Structure in AWS





Thank you

Beseye