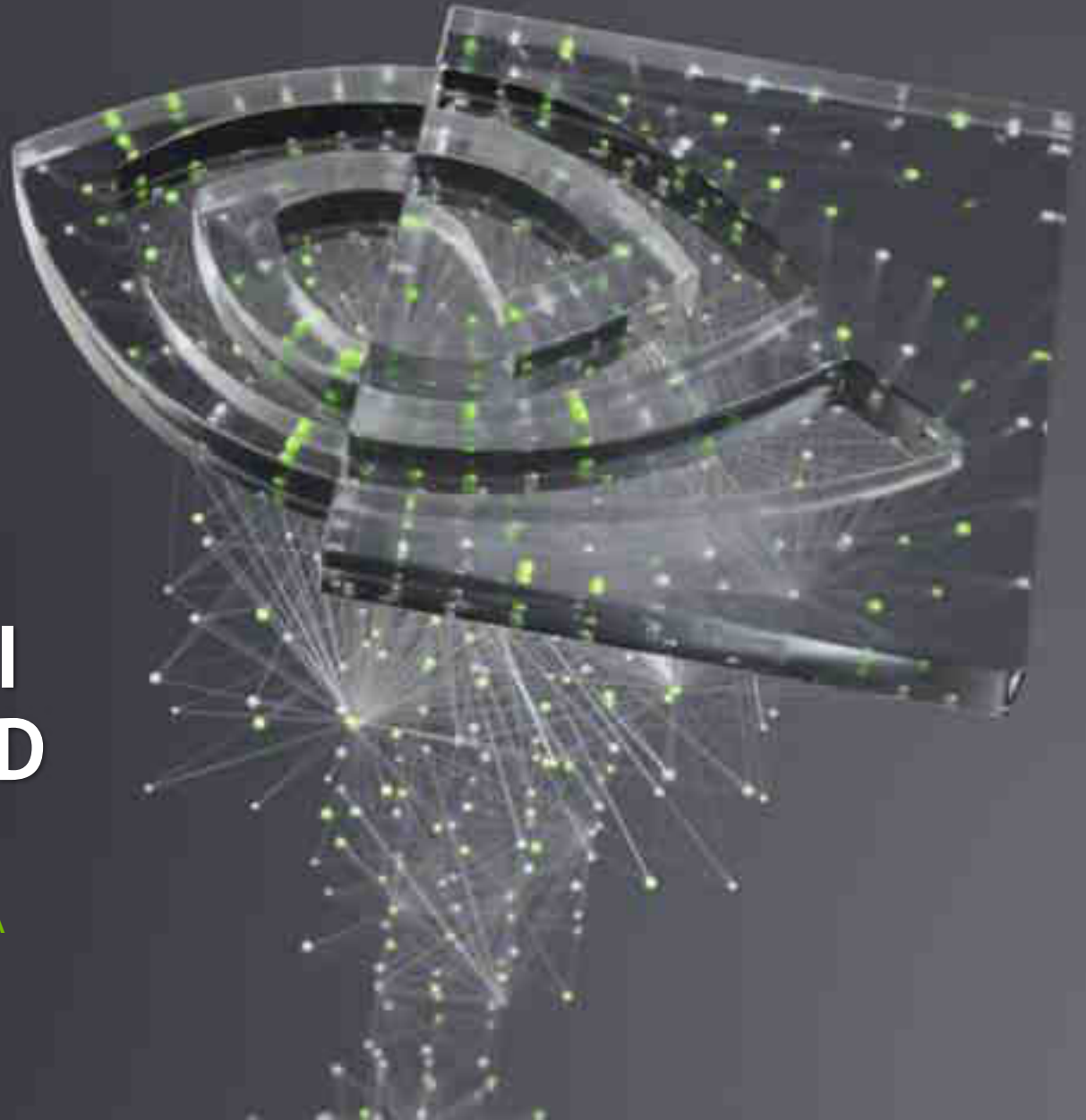




# APPLICATIONS OF AI IN SMART CITIES AND INDUSTRY 4.0

Nicolas Walker, Senior Solutions Architect @ NVIDIA





FSI

# FSI INDUSTRY CHALLENGES

AI lowers customer service costs by up to 95%



## Financial Pressure

Increasing risk drove the country's largest banks to set aside over \$45B in cash reserves



## Digital Engagement Accelerates

Banks must invest in digital channels to succeed in today's Covid-19 environment



## Customer Service Demand Spikes

Consumer calls to banks have grown significantly due to changes in employment, government programs and the economy.

# ACCELERATING DIGITAL TRANSFORMATION IN FSI

AI/ML optimizes performance and outcomes



DEFAULT PREDICTION/  
APPLICATION UNDERWRITING



CAPITAL MARKETS



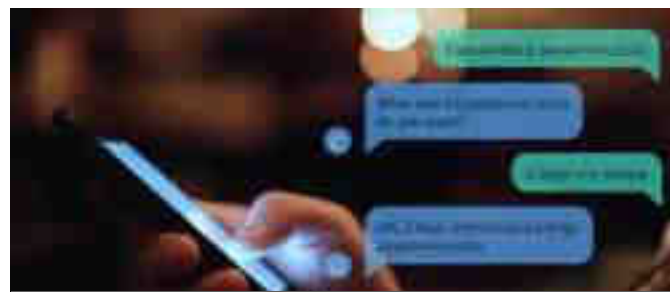
FRAUD / KYC / AML



DIGITAL PAYMENTS



RECOMMENDATIONS



CUSTOMER SERVICE/EXPERIENCE CX



VIRTUALIZATION/REMOTE (WFH)

# FINANCIAL SERVICES & AI ENABLED CUSTOMER ENGAGEMENT



## Call Center Transcription / ASR

Deliver better customer services outcomes from natural language inputs



## Virtual Financial Assistants

Chatbots offer an interactive customer support experience powered by AI



## Easy Digitization (Voice, Text)

Increase application conversion rates for extracted Documents via Natural Language for Business CX, risk and regulatory compliance



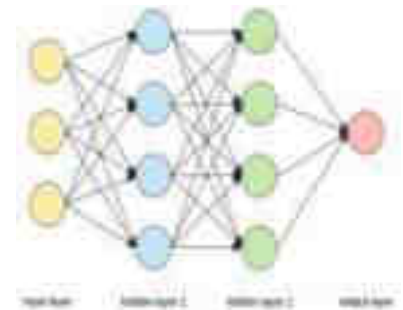
## Virtual Teller Machines

VTMs may employ AI-powered virtual avatars to support customers.



## Content Analysis

Analyze video and audio content instantly for better customer service outcomes



## Recommendation Systems

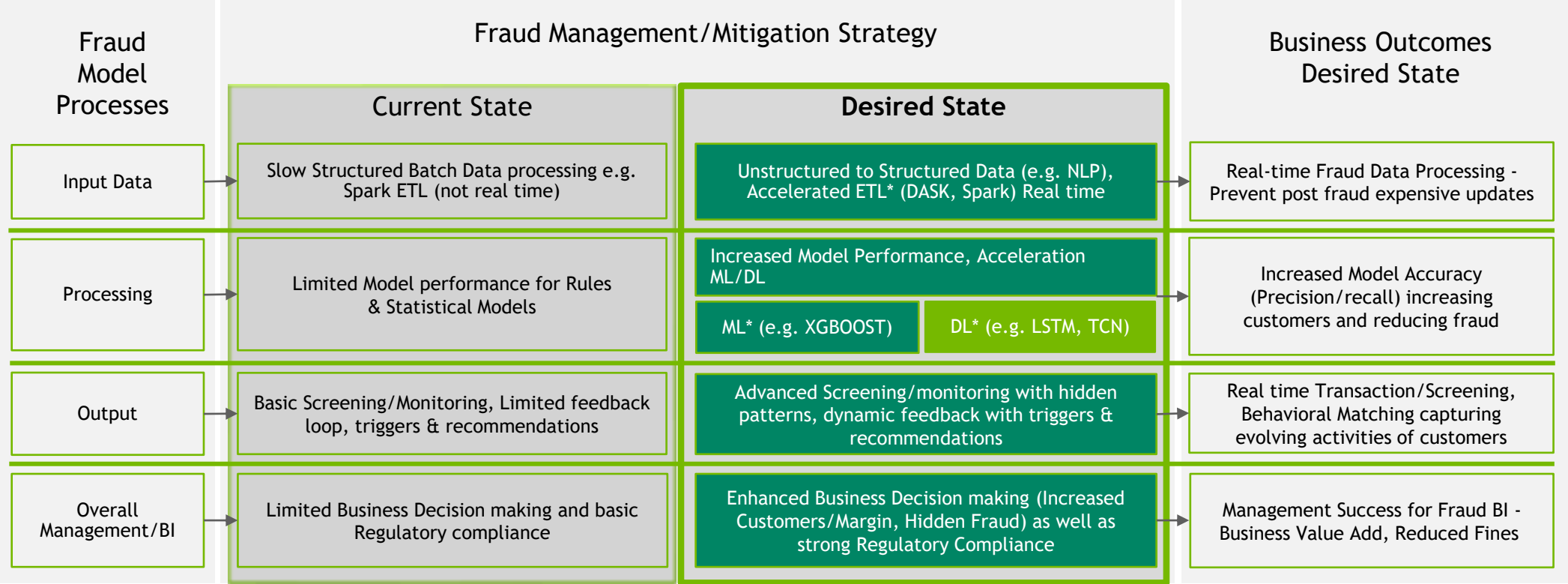
Improve application conversion rates, risk management and regulatory compliance

# PAYMENTS ECOSYSTEM



# TRANSACTION FRAUD MODEL PROCESSES

## Migration - Current vs. Desired



\*ETL Data Preparation (RAPIDS.ai on Dask/Spark), \*ML (RAPIDS.ai), \*DL (PYTORCH, TENSORFLOW)

# NVIDIA DATA SCIENCE PLATFORM

## Fraud Implementation Illustrative reference

### DEPLOYMENT (KUBERNETES | DOCKER | NGC | SLURM | TENSORRT IS)

Deploy Fraud Solutions with Data processing, Model workflow (Training as well as Inferencing) accelerated

#### RAPIDS

DATA ANALYTICS | MACHINE LEARNING | STREAMING | VISUALIZATION

Fraud Uses

2. ML, 4. NLP

5. Data Gen/Simulation (e.g. HPC Monte Carlo)

6. Network science (e.g. property calculations on CuGraph)

#### DL FRAMEWORKS

PYTORCH | TENSORFLOW | MXNET | ...

STREAMING | TRANSFER LEARNING | TENSORRT

Fraud Uses

3. DL, 4. NLP/NLU (e.g. BERT),

5. Data Gen/Simulation (e.g. GAN)

6. Network science (e.g. Graph Convolutional Networks)

7. Fraud Identity access/CX management

#### DASK

BLAZINGSQL | DATAFRAMES | STREAMING

#### SPARK (GPU ACCELERATED)

SQL | DATAFRAMES

#### CuGRAPH

Graph Analytics

#### MEDIA PROCESSING

LOADING | AUGMENTATION

DATA PROCESSING - 1. Fast Accelerated ETL (Spark, Dask), 6. Network Science (e.g. graph analytics)

### CUDA-X (leveraged by RAPIDS, SPARK, DL Frameworks)

LINEAR ALGEBRA | DATAFRAMES | GRAPH | SPATIAL | SIGNAL PROCESSING | VISUALIZATION | NEURAL NETWORKS

### HARDWARE/NETWORK (TESLA V100, T4 GPUs, DGX)

WORKSTATION | DATA CENTER | EDGE | IOT | CLOUD | VIRTUAL  
TRANSPORT PROTOCOL | SYSTEM INTERCONNECT | NETWORK TOPOLOGY | STORAGE | FILE SYSTEMS

Note: Numbered use cases are presented in the previous slide



# AI POWERED FRAUD DETECTION

## The Impact of Transaction Fraud

### Fraud Detection

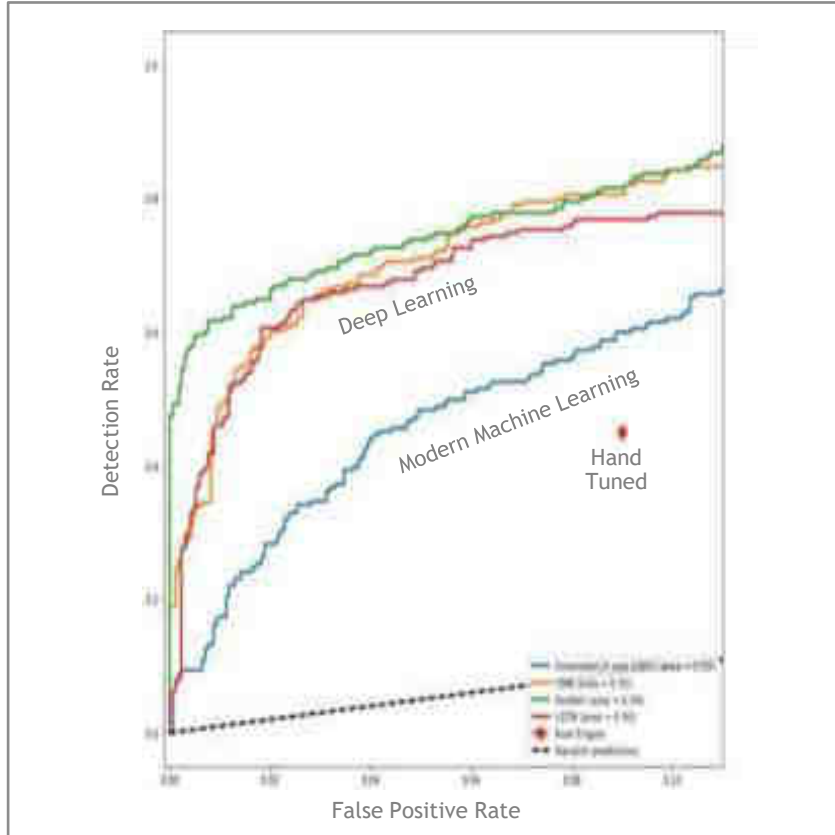
- Nearly \$33 billion in estimated losses in 2019
- Fraud impacts merchants, card issuers, and consumers
- Every \$1 of fraud costs \$2.90 to the financial institution overall
- 67% of firms state false positives are more costly than actual fraud to their business; Need better model precision

### How AI Can Help:

- Reducing overall false positives while catching more actual fraud

### Why NVIDIA:

- Efficient use of data scientist resources with NVIDIA CUDA-X AI
- Faster training to keep up with everchanging fraud risks
- Reduced Opex and Capex of infrastructure



<https://www.aba.com/-/media/archives/endorsed/rippleshot-state-of-card-fraud.pdf>

<https://www.experian.com/assets/decision-analytics/reports/global-fraud-report-2018.pdf>

Image source: <https://conferences.oreilly.com/artificial-intelligence/ai-ny-2017/public/schedule/detail/59252>

## REAL-TIME FRAUD DETECTION

When PayPal was looking to deploy a new fraud detection system, they set a high bar: the system had to operate worldwide 24/7 and in real-time to protect customer transactions from potential fraud.

CPU-only servers couldn't meet the requirements.

Using NVIDIA T4 GPUs, PayPal delivered a new level of service, using GPU inference to improve real-time fraud detection by 10% while lowering server capacity by nearly 8X.





## PREDICT HOW TO GET CUSTOMERS TO PAY THEIR BILLS

AI looks at patterns of behavior of millions of customers then recommends the best approach to contact them with email, phone call, collection agency etc.

*“The great thing about deep learning as a strategy and a technique is you don't have to have to figure it out all up-front. The data can actually tell you the right thing to do.”*

- Neil Bartlett, Scotiabank's SVP

Analytics



## AUTOMATING THE CALL CENTER PROCESS ON GOOGLE CLOUD

Gridspace gives companies the power to capture, understand, and handle conversations in real-time. Its automated call center agent as a system solves complex tasks in real-time, such as resetting passwords or replacing debit cards.

The system uses NVIDIA V100 GPUs on the Google Cloud with the cuDNN-accelerated TensorFlow deep learning framework to speed up training and inference. And with TensorRT on GPUs, Gridspace synthesizes natural sounding speech in real-time.



[Watch the video](#)

CALL DETAILS	EVALUATION
Authentication Complete	0.9
Yeah, I want to make sure no money was stolen from my Yeah, I want to make sure. There was stolen from my account. So can you. Please tell me my <b>checking account</b> balance.	0.9
Checking	0.9
Can you tell me my <b>checking account</b> balance.	0.9
Checking	0.9
Okay, bringing up your <b>checking account</b> .	0.9
Checking	0.9
Alright, Mr. Johnson I see here that your <b>checking account</b> balance is 37 dollars and cents.	0.9
Checking	0.9
Yes, I'd like to <b>transfer</b> a thousand dollars from my savings to my check.	0.9
Funds Transfer	0.9
I'd like to <b>transfer</b> a thousand dollars from my savings to my checking.	0.9
Funds Transfer	0.9
I'd be happy to make that <b>transfer</b> Mr. Johnson just to confirm you want me to move 1000 dollars from your savings to your checking.	0.9

Authenticate this user

Amount (USD)  
1000.0

- Get Statement
- Lookup Customer
- Transfer Funds
- Replace Card

## AI DELIVERS CLARITY IN A NOISY WORLD

Speech is a natural way for humans to interact with electronic devices but making oneself understood in this noisy world is a challenge.

BabbleLabs quiets the noise with Clear Cloud, a deep learning speech enhancement cloud API.

NVIDIA V100 GPUs speed training and inference, enabling Clear Cloud to cover a comprehensive range of languages, inflections, and capture conditions, while reducing the measure of unintelligibility by >55%.





## AUTOMATED CUSTOMER VERIFICATION WITH VOICE RECOGNITION

Ping An receives 40 million calls per year, with half of them requiring up to 4 minutes to verify the identity of the caller. With NLP, Ping An hopes to use voice recognition to verify customer identity in ~5 seconds.

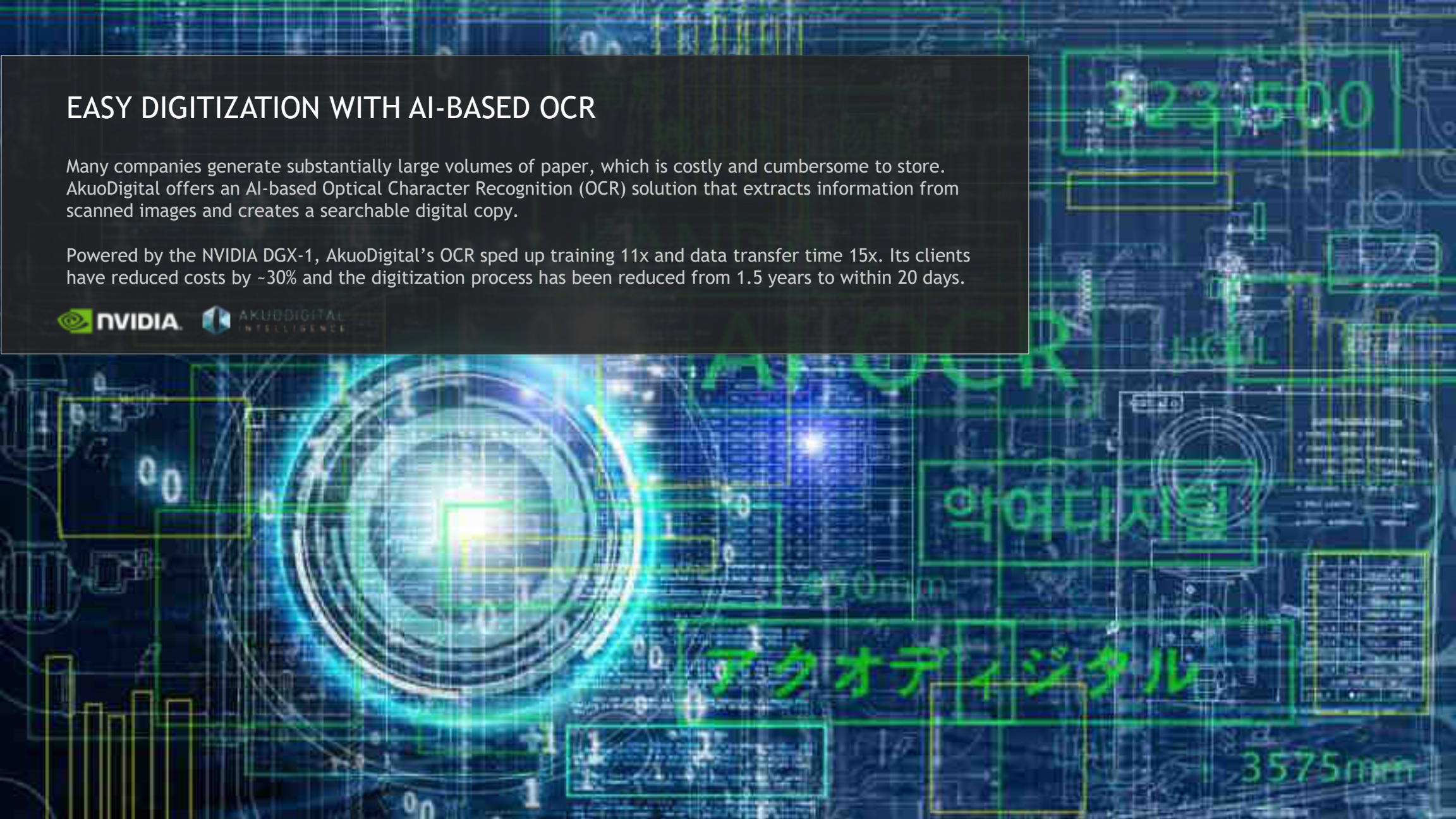


中国平安  
PING AN  
平安 保险 集团

## EASY DIGITIZATION WITH AI-BASED OCR

Many companies generate substantially large volumes of paper, which is costly and cumbersome to store. AkuoDigital offers an AI-based Optical Character Recognition (OCR) solution that extracts information from scanned images and creates a searchable digital copy.

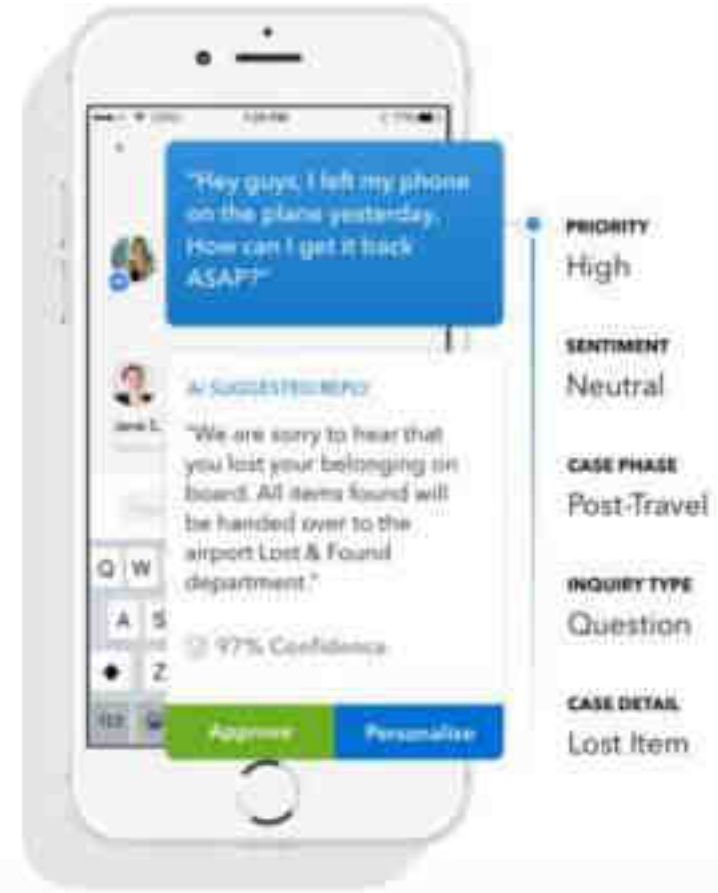
Powered by the NVIDIA DGX-1, AkuoDigital's OCR sped up training 11x and data transfer time 15x. Its clients have reduced costs by ~30% and the digitization process has been reduced from 1.5 years to within 20 days.



## AI TOOL BOOSTS CUSTOMER SERVICE

KLM's 350+ social media service agents handle 15K requests/week. To support the volume of incoming messages, KLM uses GPU-accelerated deep learning to predict the best response.

Service agents review and either approve or personalize each response. The resulting time savings allows agents to focus on customers with more pressing needs and handle more questions while maintaining high levels of customer satisfaction.





# AUTOMATED INSURANCE CLAIMS






Lower costs and improved customer experience

Insurance company concerns:

- Have employees add value to customers.
- Streamline claims process for customers.
- Reduce overall expense of service.

Outcome of moving to AI:

- Proving out to have dramatic improvement.
- 79% of Insurance execs willing to move to automated claims, up ~50% year over year.

METRICS USED	IMPACT OF CURRENT AUTOMATION
 Manual touches	<b>1-4 manual touches</b> removed from claims process
 Cycle time	<b>1-15 day reduction</b> in processing time per claim
 Cost / LAE	<b>Up to 50% reduction</b> in processing cost per claim
 Staff efficiency	<b>3-10x more cases</b> processed per adjuster
 Customer experience	<b>Higher</b> satisfaction, loyalty, net promoter scores

<https://blogs.lexisnexis.com/insurance-insights/2018/12/touchless-claims-automation/>

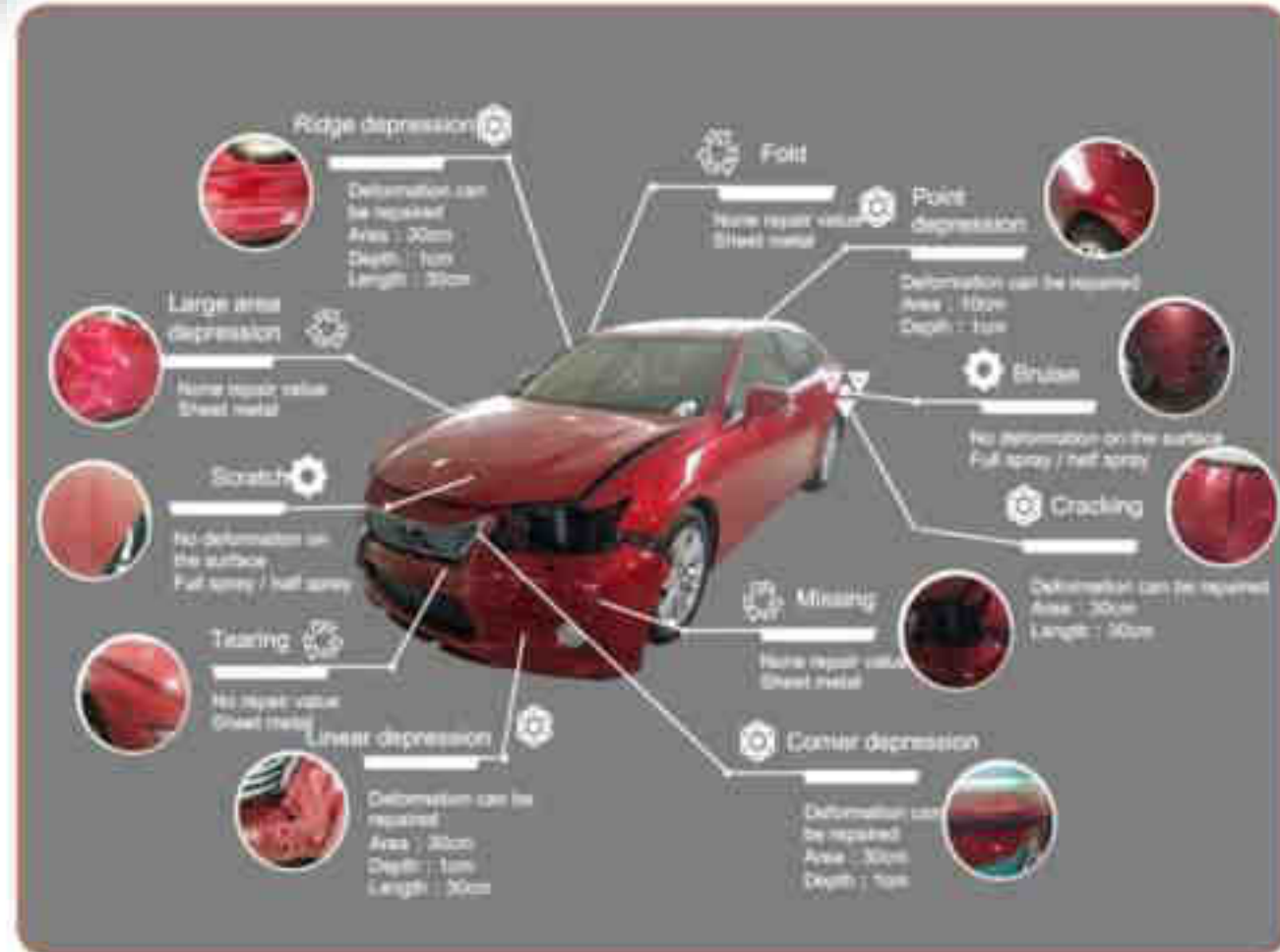
# Car Damage Estimation

- Identify car damage quickly by using image analysis
- Estimate costs
- Helps to avoid car insurance claims fraud
- 31,000 Claims / Day
- 98.7% Paid out in less than a day

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保险 · 银行 · 投资

# AI FOR PROCESS AUTOMATION

#1 INSURANCE COMPANY GLOBALLY, 150M CUSTOMERS





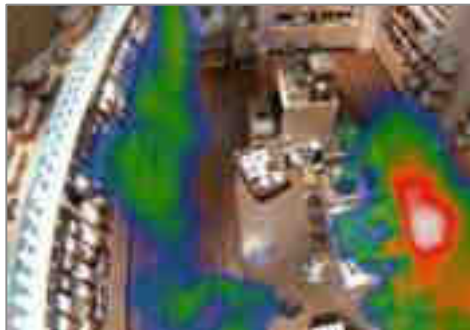
SMART CITIES

# AI REVOLUTION

Measuring Utilization of Space is More Critical Than Ever



Traffic Management



Retail



Factories



Public Safety & Health



Warehouse & Logistics



Stadiums & Casinos



Access Control



Transportation Hubs

**\$2T INDUSTRY** – Increase operational efficiency and safety across many industries using AI

# PILLARS OF NATIONAL AI INITIATIVES

Industry-Standard Platform

Rich Software Ecosystem

State-of-the-Art AI Computing

## AI CENTERS OF EXCELLENCE

Starting the AI economy requires knowledge and skills, which require computing infrastructure, which can be afforded only if there is demand. Government can kick-start this virtuous cycle by providing access to large-scale AI computing infrastructure to its universities, startups, and industry.

Basic Research

University-Industry Collaboration

Vibrant Startup Community

Reskilling Workforce

## SKILLING AND RESKILLING

AI will accelerate job growth, but harnessing it requires specific skills and expertise. Countries need to invest in training and education programs that add AI skills to their workforce.

Safe, Efficient Transportation

Affordable, Accessible Healthcare

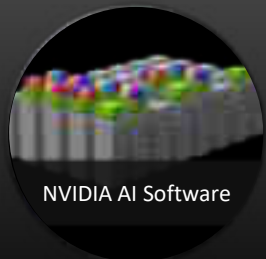
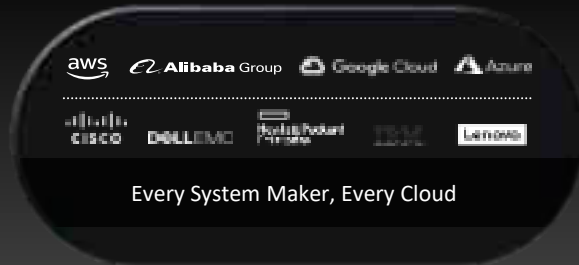
Hyper-Productive Manufacturing

Smart, Safe Cities

## INDUSTRY SOLUTIONS

By investing in key industries, countries have a unique opportunity to drive growth and solve their greatest social and economic challenges.

# NVIDIA PARTNERSHIP FRAMEWORK FOR AI NATIONS



NVIDIA AI Software



NVIDIA DGX

## TECHNOLOGY & ECOSYSTEM

NVIDIA's AI computing hardware and software are the most advanced in the world. And our GPUs are offered by every computer maker and are in every cloud.



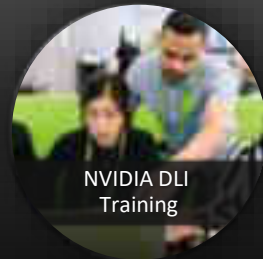
NVIDIA Research



NVAIL University Collaboration



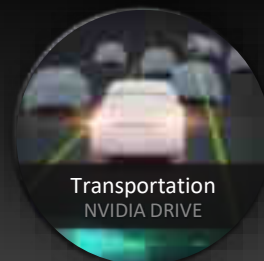
NVIDIA Inception Startup Program



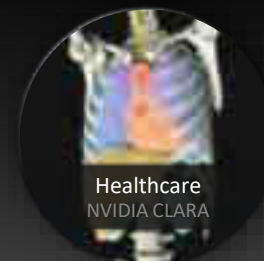
NVIDIA DLI Training

## EXPERTISE & INVESTMENT

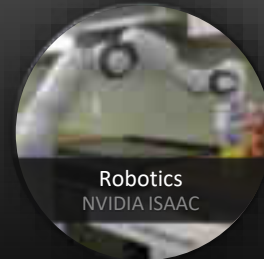
NVIDIA boasts some of the best minds in AI research. Our NVIDIA AI Lab (NVAIL) education program fosters AI in universities. Our Inception program fuels AI startups. Our Deep Learning Institute (DLI) trains individuals for the jobs that AI is creating.



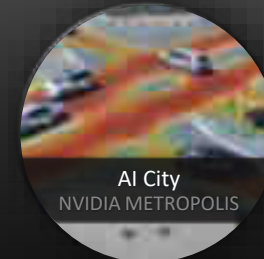
Transportation  
NVIDIA DRIVE



Healthcare  
NVIDIA CLARA



Robotics  
NVIDIA ISAAC



AI City  
NVIDIA METROPOLIS

## INDUSTRY SOLUTION PLATFORMS

Our four industry platforms combine our technologies and ecosystems to help governments advance society's foundational industries.

# COVID-19 RISK MITIGATION APP PACK

## IntelliSite – Human-based Temp Detection

- ▶ Turnkey Solution
- ▶ Managed Service
- ▶ AI & GPU powered
- ▶ Personalized Portals



<https://www.intellisite.io/solution/human-based-monitoring-hbm/>

# STADIUM, AIRPORT, CAMPUS APP PACK

1

## Mitigate Risk at Entrance



Elevated Body Temp, Mask Detect

2

## Better Customer Experience



Dwell times, Line Length

3

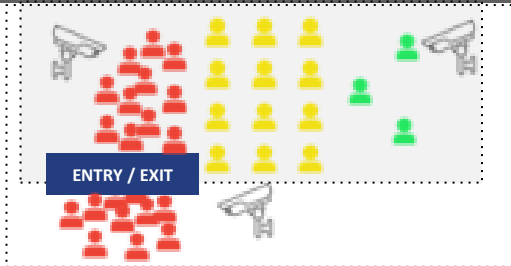
## Maintain Secured Areas



Identity Validation & Monitoring

4

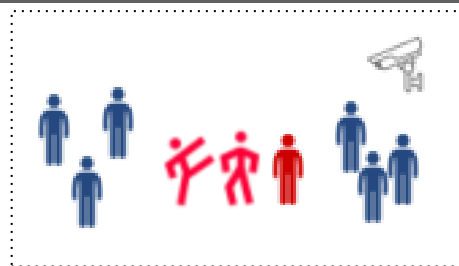
## Customer Safety



Occupancy, Social Distancing

5

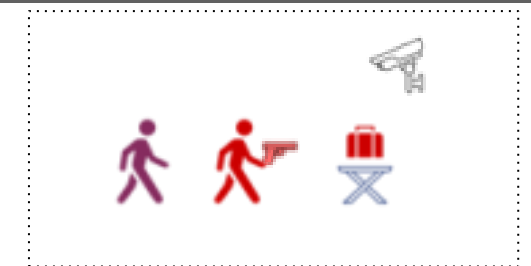
## Customer Safety



Risk Behavior, Fights, Crowd Forming

6

## Customer Safety



Weapon Detection, Abandoned Object



# HOSPITAL APP PACK - CLARA GUARDIAN



Body Temperature Screening



Patient Monitoring



Surgery Analytics



Safe Social Distancing



Fall Prevention



Contactless Controls

# RETAIL APP PACK



SAFETY, PPE, CROWDING



CONTACT TRACING



ASSET PROTECTION



STORE ANALYTICS



AUTONOMOUS SHOPPING



STOCK OUT & PLACEMENT



Q & A