

The image is a composite of two scenes. The background is a vibrant, futuristic city street. On the left, a modern multi-story building with glass facades and balconies is visible. The street is filled with diverse people: a man in a blue shirt and tan pants, a woman in a pink shirt, a man in a blue jacket riding a scooter, a person in a red shirt on a skateboard, and a woman pushing a stroller. A small white car is parked on the left. The ground is decorated with colorful geometric patterns. On the right, a traffic light shows a red light, and a pedestrian crossing sign is visible. A white bus is stopped at the intersection. The sky is blue with some clouds. In the center, there is a white rectangular inset. Inside this inset, a white box is being dropped from a drone. The text "AUTOMATED VEHICLES SAFETY" is overlaid on the inset. The word "AUTOMATED" is in white, "VEHICLES" is in white, and "SAFETY" is in yellow.

AUTOMATED VEHICLES SAFETY

My AV Journey



ARIBO, Fort Bragg, NC
1st plans and piloting AVs on military bases. 1st commercial AV in US



AV Demo @ CES 2014
1st Level-4 AV Demo @ CES
Automated Truck Working Group
Industry, DOT, DOD collaboration

LM AV Development
Led Olli creation,
testing, deployment
strategies



Averified - Trucking Safety/Performance
Verification
1st 3rd Party AV Safety & Performance
Verification

dRISK - AV Training & Risk Assessment
NASA tech applied to AV risk
identification and mitigation

US Ignite / US Army AV Pilots
Scalable AV strategies on military
bases (ERDC & Fort Carson)

UGVs/UAVs Swarms
Applying swarm artificial intelligence
to AVs (DARPA spinoffs)



2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021



GATEWAY London
1st AV pilots in
UK

North American Auto Show
1st Level-4 AV @ NAIAS

ITS World Congress
1st Level-4 automated Shuttle @ ITS WC

AAA AV Strategist
1st Public Access AV Shuttle
Pilot: Las Vegas



PME AV Product Innovation
AV development roadmap &
1st A-Pod in US

CES 2019 Aurigo AV Demo
1st automated pod demo in US

Michigan Mobility Challenge
1st public pilot with accessible A-
Pod

Dubai World Challenge for
Self-Driving Transport
1st automated shuttle pilot in
UAE (1 of 6 judges)



Munich Reinsurance
1st AV insurance product (One of
the world's largest reinsurance
groups)

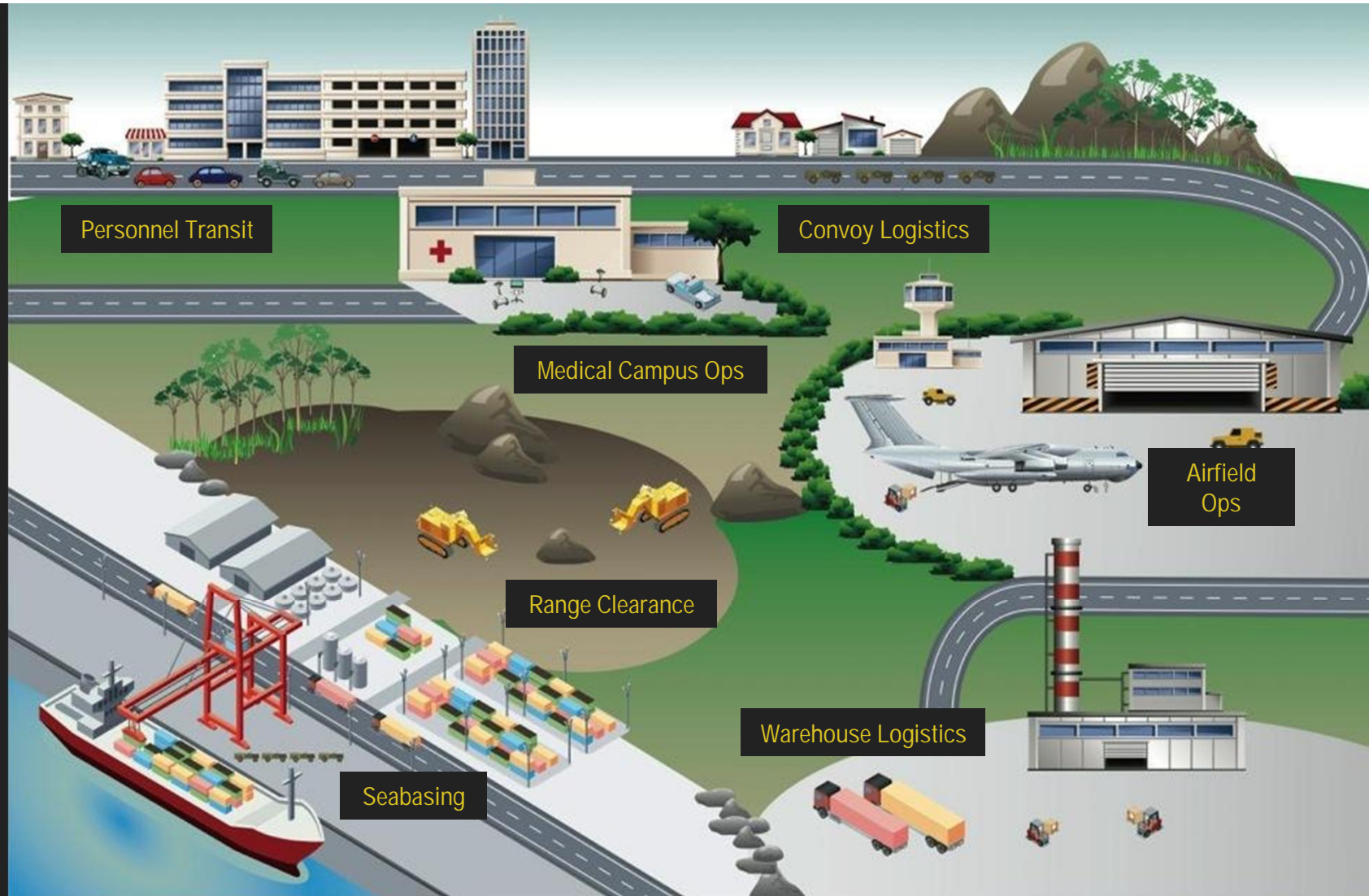
SMART AMERICA AL CITY IS CHALLENGE

STANTEC GENERATION AV™
ACCELERATING AUTONOMY

ACCELERATING AUTONOMY

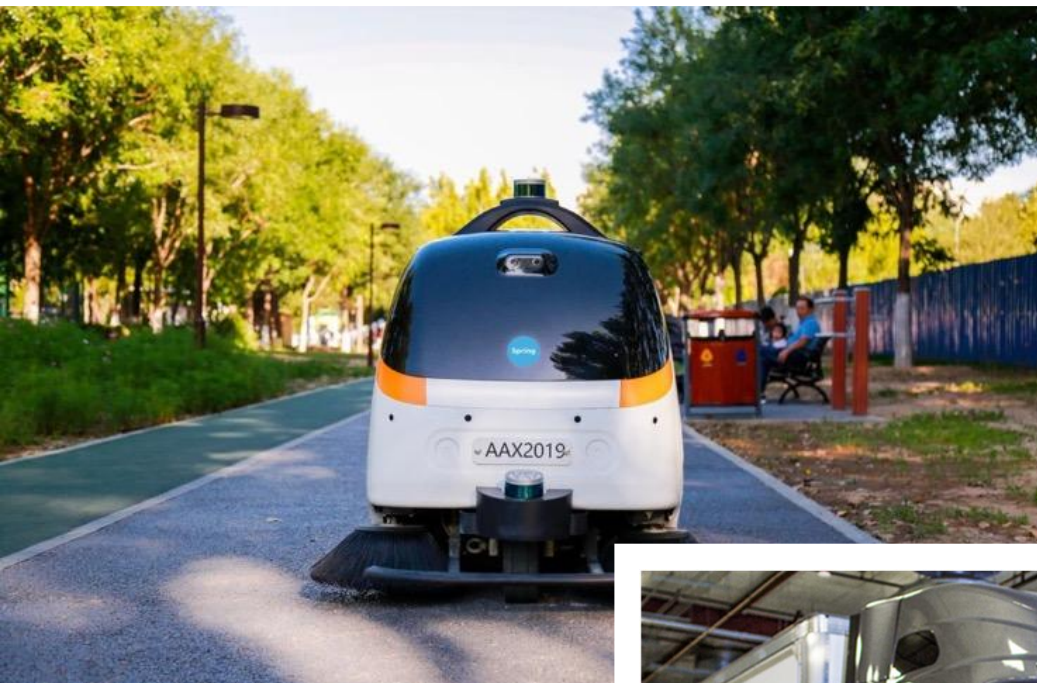
STANTEC GENERATION AV

Military AV
Applications Study
(2012)



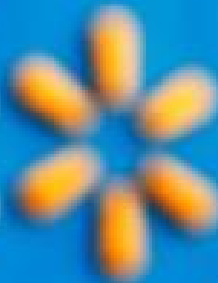
A vibrant, futuristic city street scene. On the left, a modern multi-story building with a green wall and balconies stands next to a colorful, geometric-patterned pedestrian crossing. People are walking, riding scooters, and using a small white delivery car. In the center, a white autonomous bus is visible. On the right, a traffic light with a red light and a pedestrian crossing sign is shown, with people walking and a person on a blue scooter. The background features a city skyline with a tall skyscraper and a drone carrying a package. The text "TRENDS AND TRANSITION" is overlaid in the center.

TRENDS AND TRANSITION



ACCELERATING AUTONOMY

Walmart



ARGO AI

self-driving system





see. think. act.

From robo-taxis to tractors



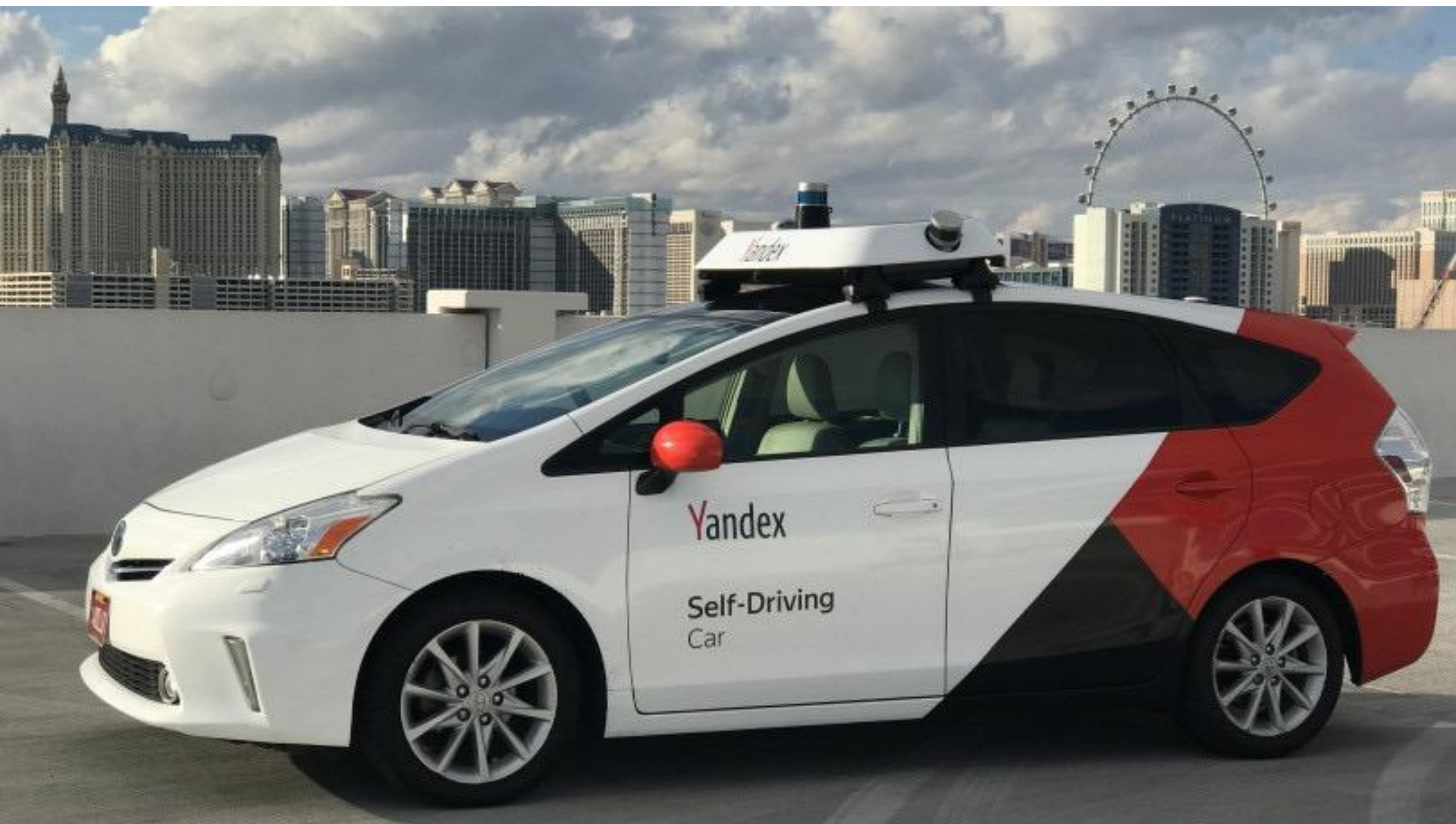
Transit



Robo-Taxi



Autonomous Delivery





cc12
KM4
KM5

Campus Cargo



Slide 11

- cc12 **Need a cargo vehicle like Aurrigo or EasyMile TLD**
corey clothier, 12/1/2020
- KM4 **Can we get permissions for EasyMile to use an image?**
Kesteven, Mike, 12/2/2020
- KM5 **<https://easymile.com/vehicle-solutions/tracteas>**
Kesteven, Mike, 12/2/2020

Delivery



Delivery



Delivery

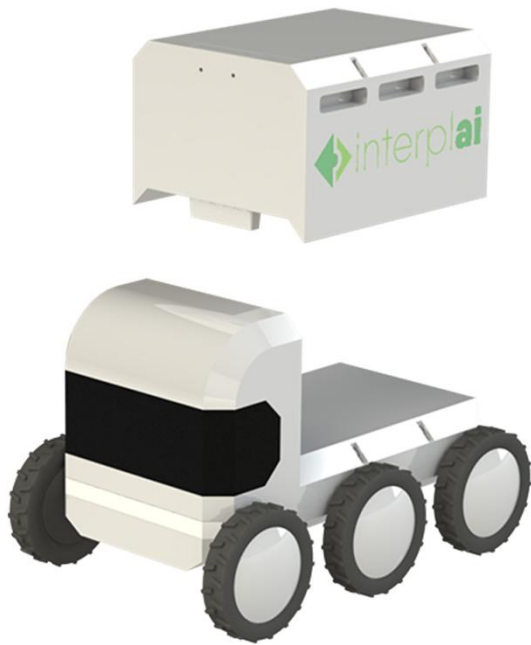


Bedestrian



evTS Firefly

Delivery



Interplai



Refraction.ai



SAFE DEPLOYMENT PROCESS

How safe is safe enough?

- Safety = no harm
- Safety is a prerequisite for successful AV deployment
- Avoidance of unreasonable risk



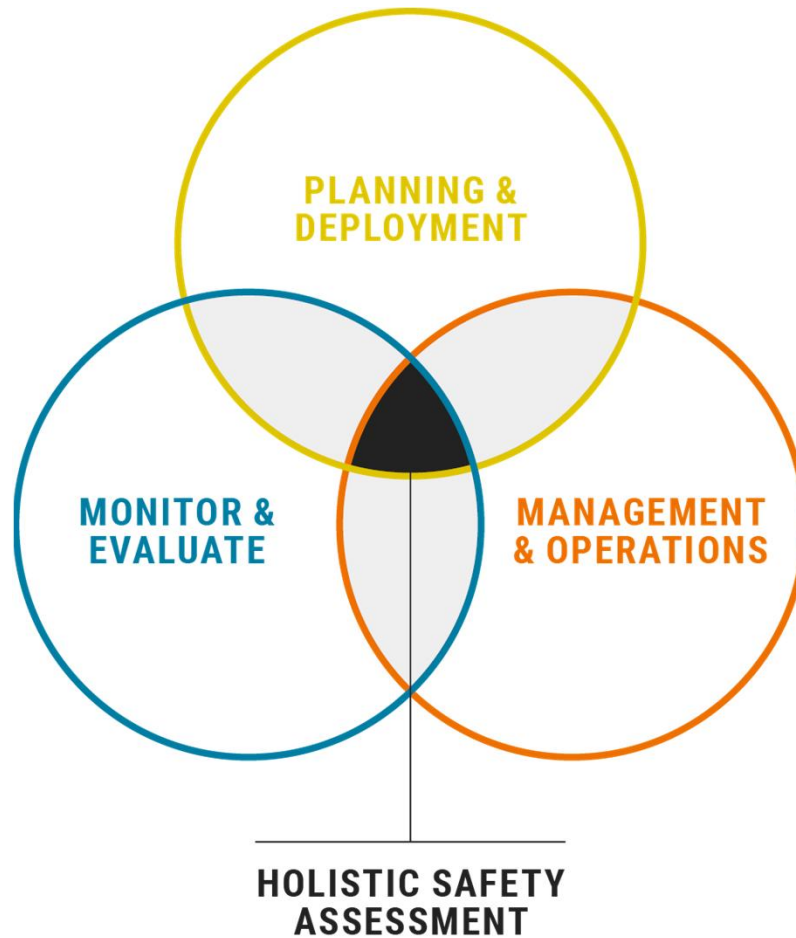
A holistic
safety
assessment is
needed!

What do we mean by holistic?

- Overall safety culture
- Operating environment
- The ADS and vehicle
- Performance
- Operational elements
- Experiential feedback
- Lifecycle



A Holistic Safety Assessment



HOLISTIC AV SAFETY ASSESSMENT



AV PLAYBOOK

AV Planning through a Playbook construct.



GETTING
STARTED

FEASIBILITY

ACQUISITION

IMPLEMENTATION

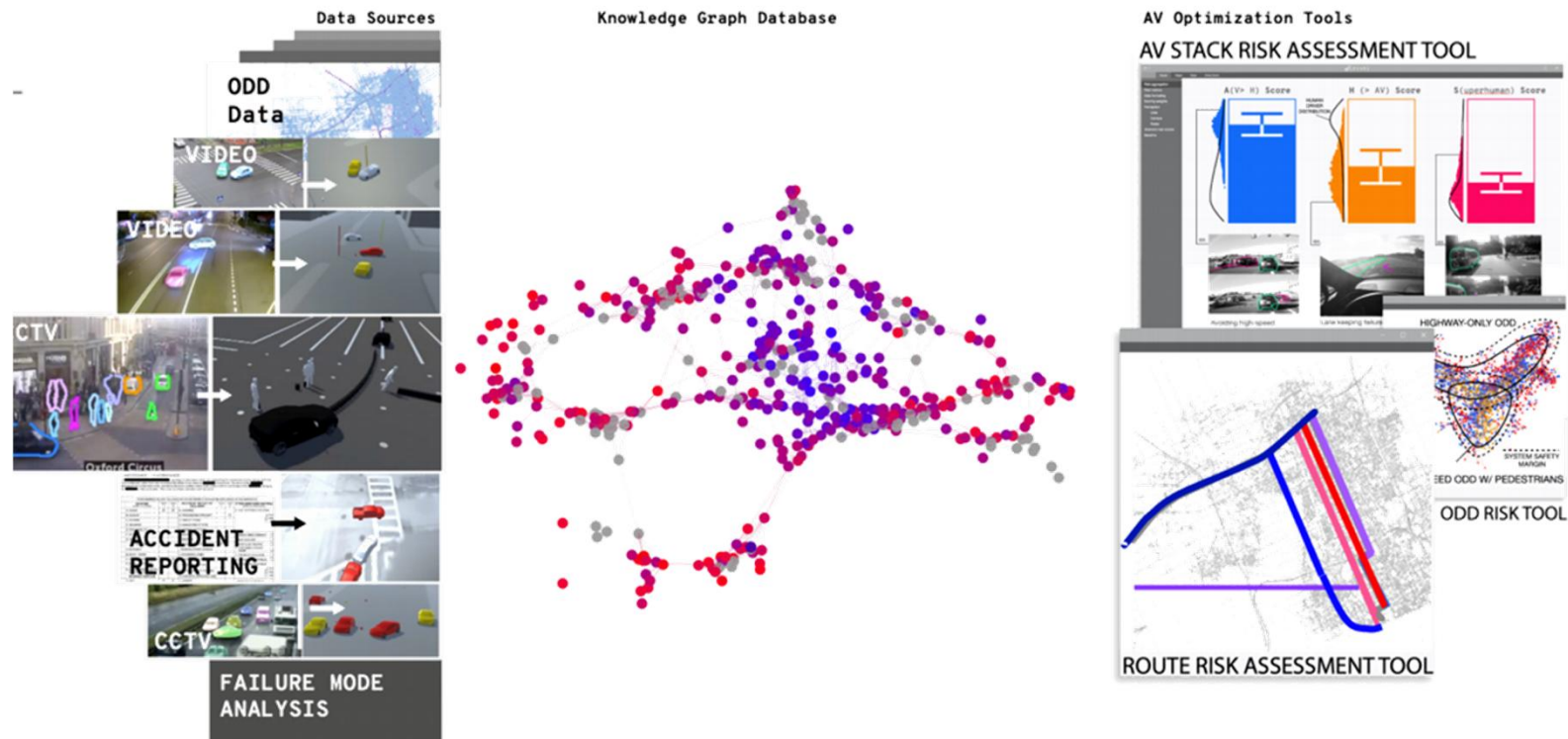
OPERATIONS

MONITOR
& EVALUATE



GENAV ODD RISK ASSESSMENT

powered by $d(\text{risk})$

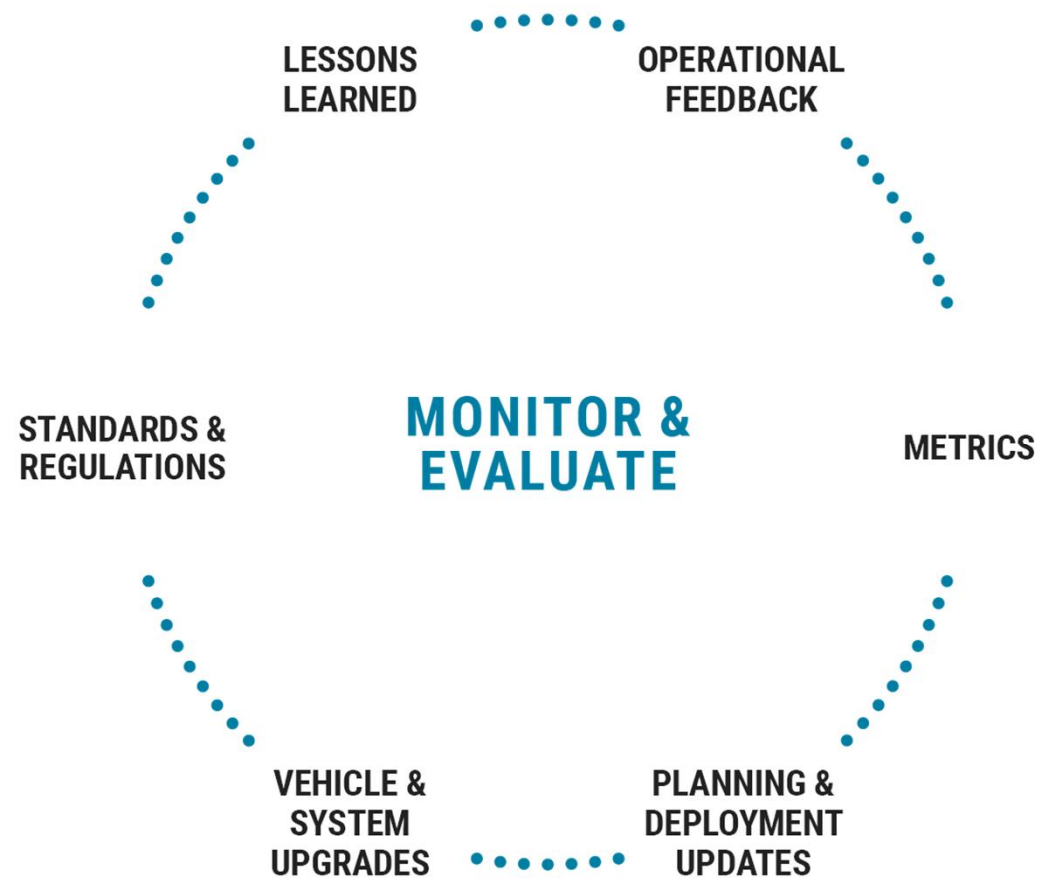


It is important to assess the ODD to align to the capabilities of the AV ensuring its ability to operate safely and effectively

Management & Operations



Monitor & Evaluate



STREETSCOPE TECHNOLOGY

Traffic Hazard Assessment: Fixed

© 2021 Streetscope, Inc. Confidential and Proprietary. Do not distribute.

Las Vegas Intersection



nFrames: 1024
Duration: 496.796 [seconds]
Distance: 0.000 [miles]
Display Units: English

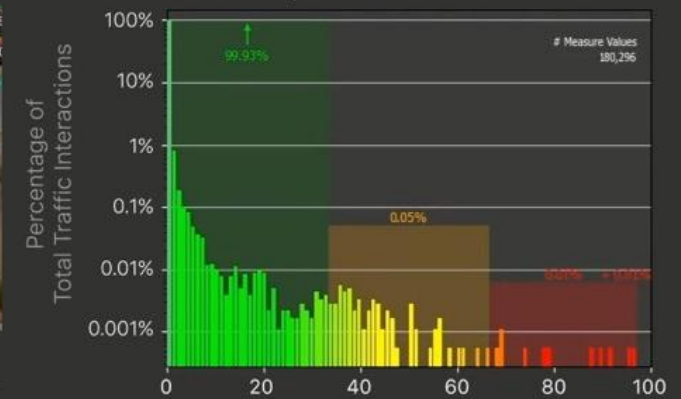
Frame: 000360, Time: 0:12.011

Collision Hazard Measure: m6
• Saturation Level: 100.00
• Line Persistence: 60 frames
• Car PRT: 750 [msec]

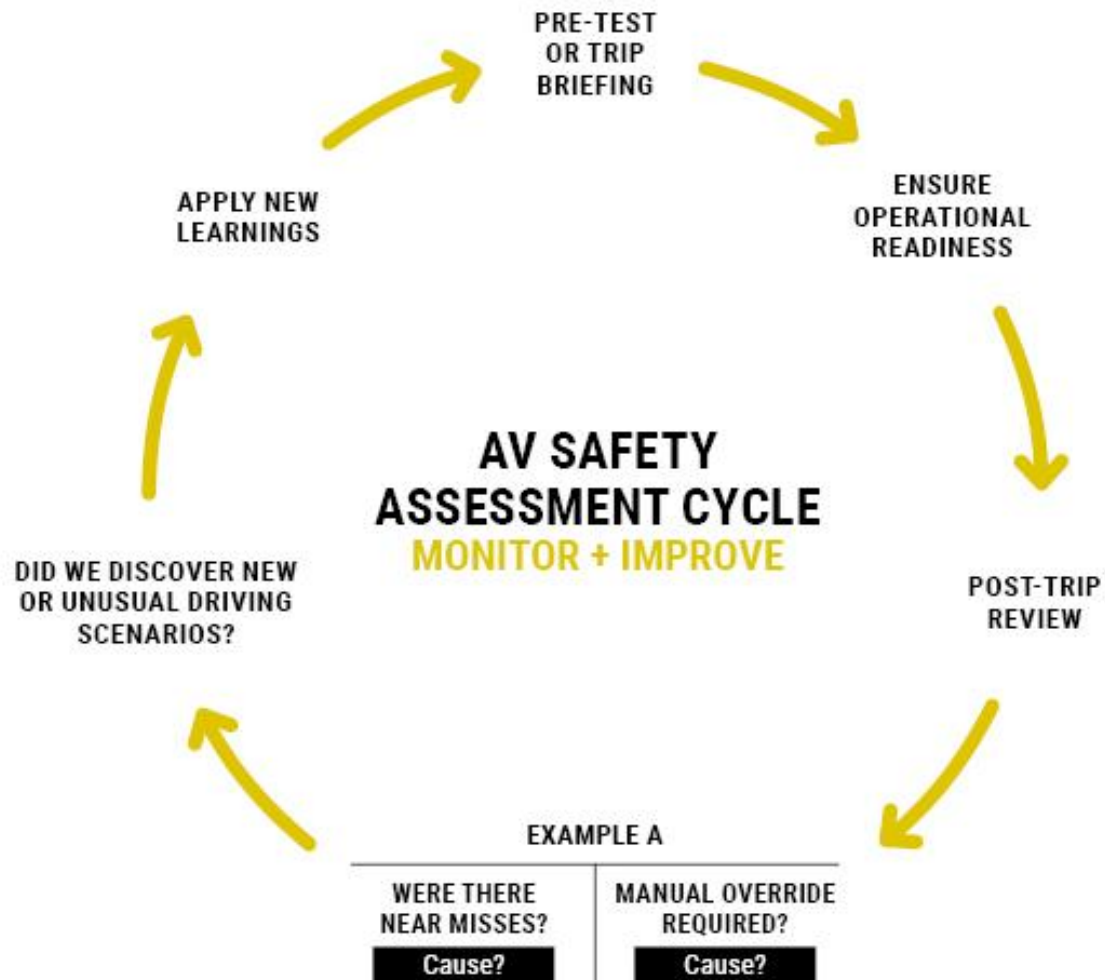
 Streetscope



Streetscope Collision Hazard Measure



© 2021 Streetscope, Inc. Confidential and Proprietary. Do not distribute.



Benefits of using a holistic safety assessment

- Builds owner/operator confidence
- Builds public trust
- Applicable to all types of AVs
- Applicable to all deployment environments
- Goes beyond the vehicle into management operations and lifecycle



Thank you

LET'S CONNECT

Corey Clothier

Director
Stantec GenerationAV®
Corey.clothier@stantec.com

Andrew Smart

Safety Consultant
Stantec GenerationAV®
Andrew.smart@stantec.com

