2nd Annual Regional Transportation Summit

EMBRACING INNOVATION

Integrating Technology in Transportation

October 17, 2024

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INLAND NORTHWEST CHAPTER

THE CONSTRUCTION ASSOCIATION


Parametrix

HAVE A QUESTION FOR ONE OF OUR SPEAKERS?

Submit by Web:

PollEv.com/srtcs511

Submit by Text:

Send **srtcs511** & your message to **22333**

Randy Iwasaki

Iwasaki Consulting Services

President & CEO

Transportation and AI

Randy Iwasaki

October 17, 2024

Image: AI Magazine

Topics

- Principles
- Definition of AI
- Applications
    1) Department of Motor Vehicles
    2) Airports
    3) Department of Transportation
    4) Computer Vision

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Principles

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Moore’s Law

Image: MIT Technology Review

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Kryder’s Law

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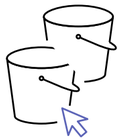
The Cloud in mobility and transportation

Agility: Develop and roll out new applications, quickly.

Cost savings: Pay for what you use. Total cost of ownership.



Elasticity: Only provision resources you actually need.

Innovation: Focus IT resources on transforming customer experiences.

Global reach: Deploy globally in minutes.

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Definition

https://nap.nationalacademies.org/catalog/27880/implementing-machine-learning-at-state-departments-of-transportation-a-guide?utm_source=TRB+Weekly&utm_campaign=ba17d22249-EMAIL_CAMPAIGN_2024_07_08_08_32&utm_medium=email&utm_term=0_c66acb9bce-ba17d22249-%5BLIST_EMAIL_ID%5D

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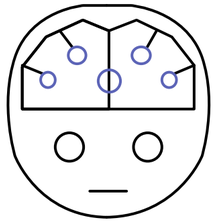
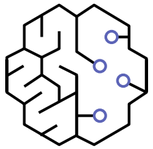
What is it?



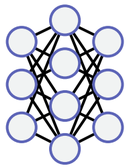
Artificial intelligence (AI)

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



Machine learning (ML)

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



Deep learning (DL)

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

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The reach of ML is growing

INCREASED SPENDING

By 2024, global spending on artificial intelligence will reach $110 billion

—IDC

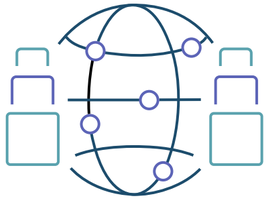
IDC, “Worldwide Spending on Artificial Intelligence,” https://bit.ly/3mpQac2.

FROM PILOTING TO OPERATIONALIZING

By the end of 2024, 75% of enterprises will shift from piloting to operationalizing AI

—Gartner

Gartner, “Gartner Identifies Top 10,” https://gtnr.it/3Bln3uU.



AI TRANSFORMATION

57% said that AI would transform their organization in the next three years

—Deloitte

Deloitte, “Thriving in the Era of Pervasive AI,” https://bit.ly/3CtGDqf.

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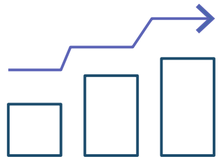
Business impact of machine learning

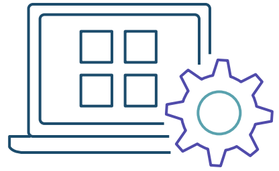


OPTIMIZING BUSINESS WITH NEW EFFICIENCIES

Create greater efficiency through sophisticated demand planning and forecasting models

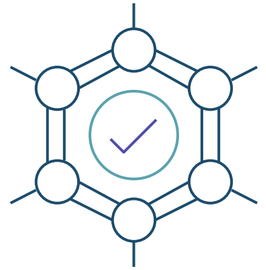
MAKING SMARTER, FASTER DECISIONS

Make more informed, faster decisions to act on opportunities sooner and get better results



ADDING NEW CAPABILITIES TO EXISTING PRODUCTS

Enrich existing product to improve customer engagement and
attract new users through deeper experiences



INVENTING NET-NEW PRODUCTS

Use data to develop innovative ideas and bring new products to market

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Example 1:
Department of Motor Vehicles

Department of Motor Vehicles

Image: Los Angeles Times

Image: Statescoop

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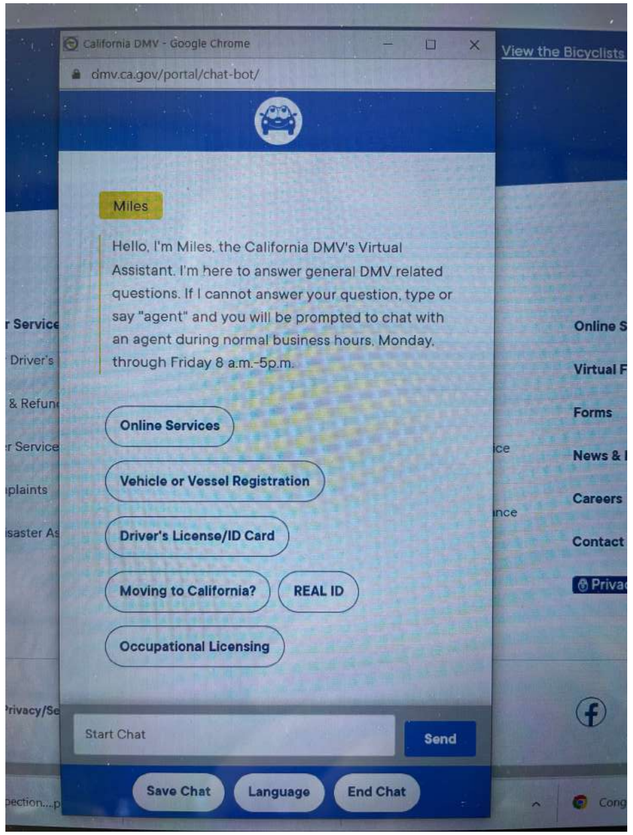
Department of Motor Vehicles



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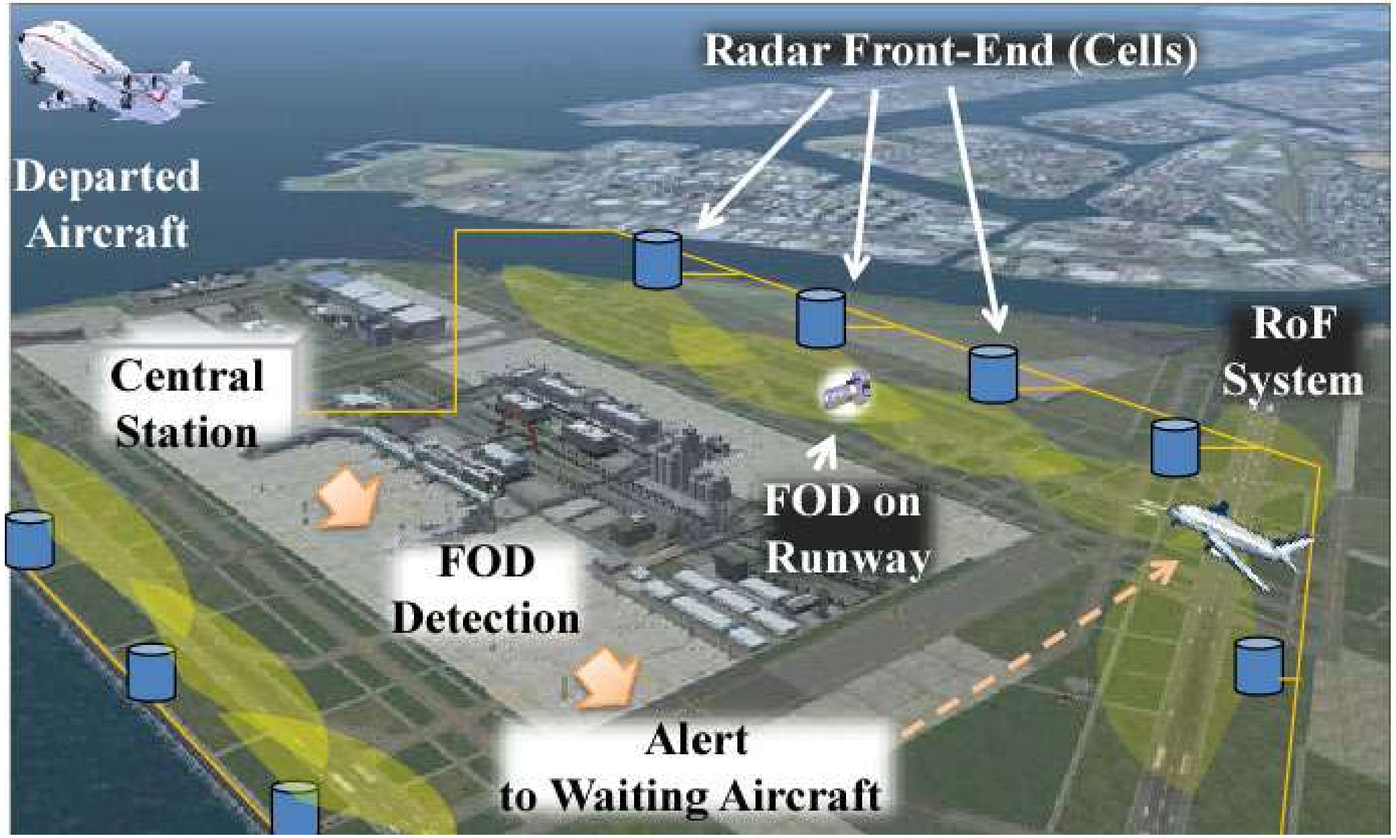
Example 2: Airports

Airports



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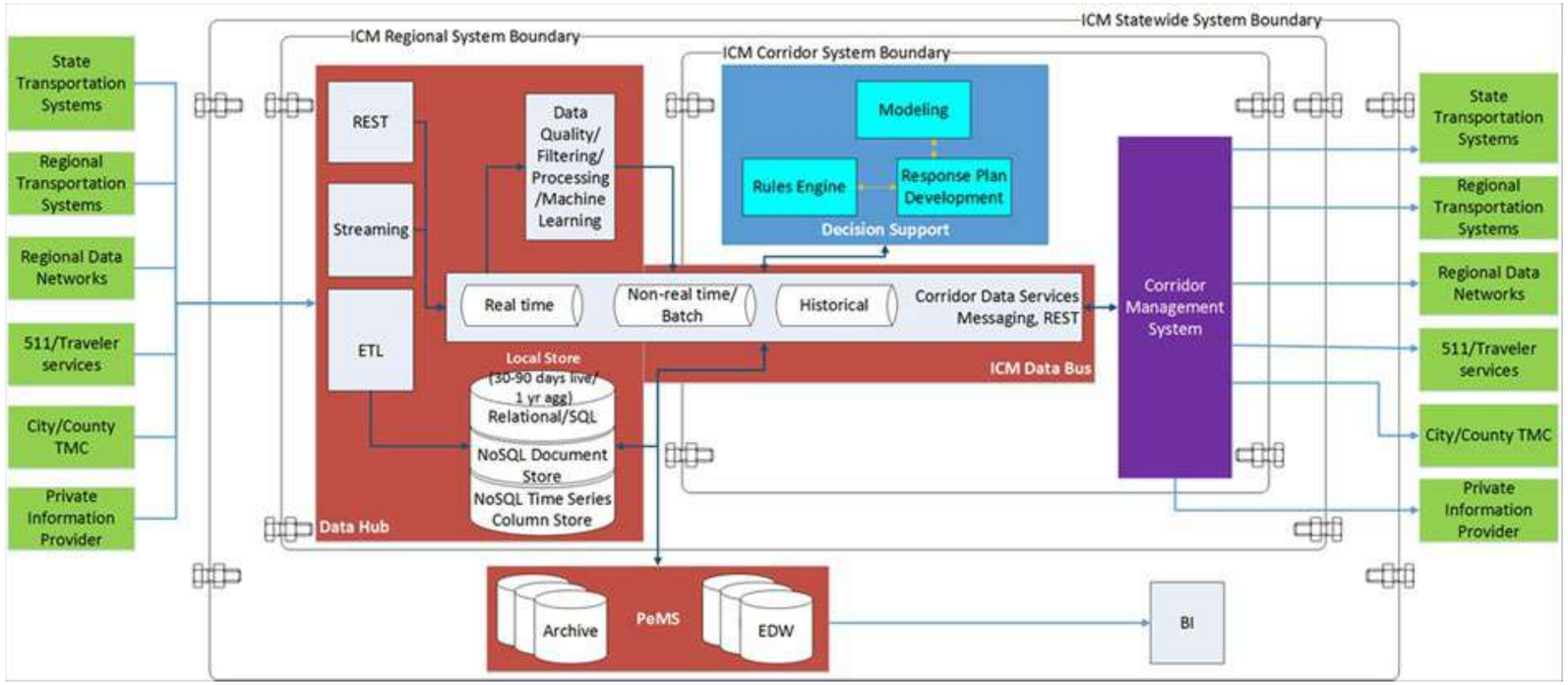
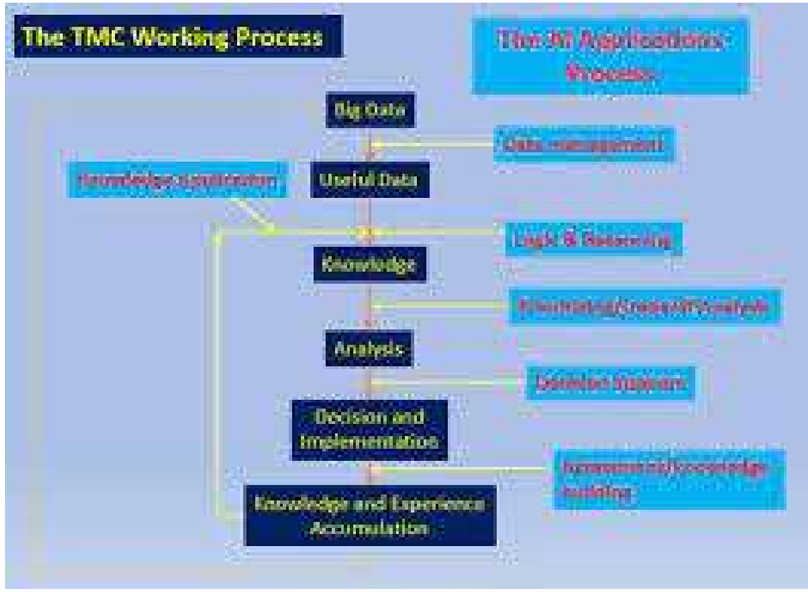
Example 3:
Department of Transportation

Department of Transportation



https://www.fhwa.dot.gov/publications/research/ear/22026/22026.pdf



https://ops.fhwa.dot.gov/publications/fhwahop19052/chap4.htm

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Department of Transportation

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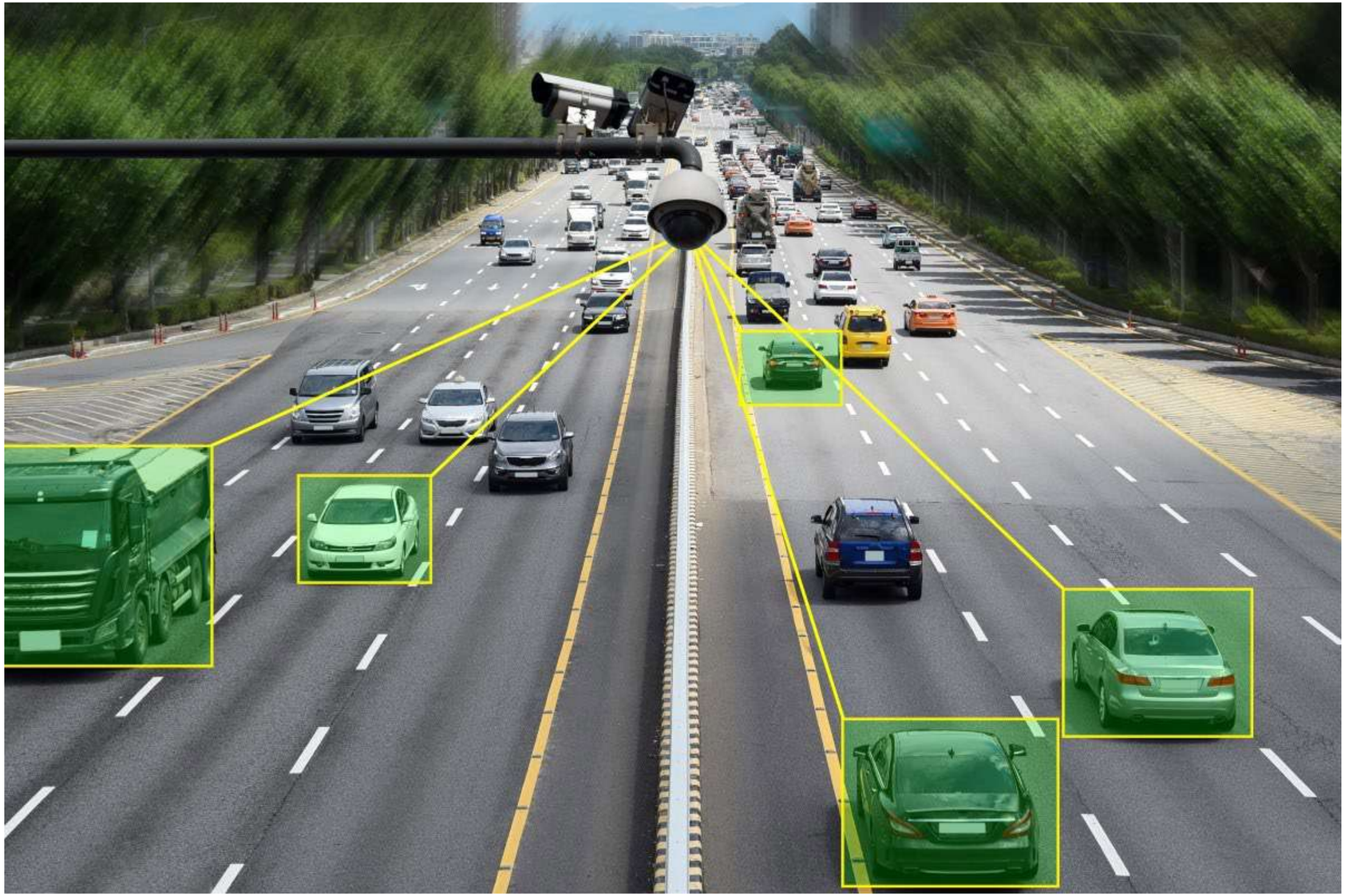
Department of Transportation

Department of Transportation



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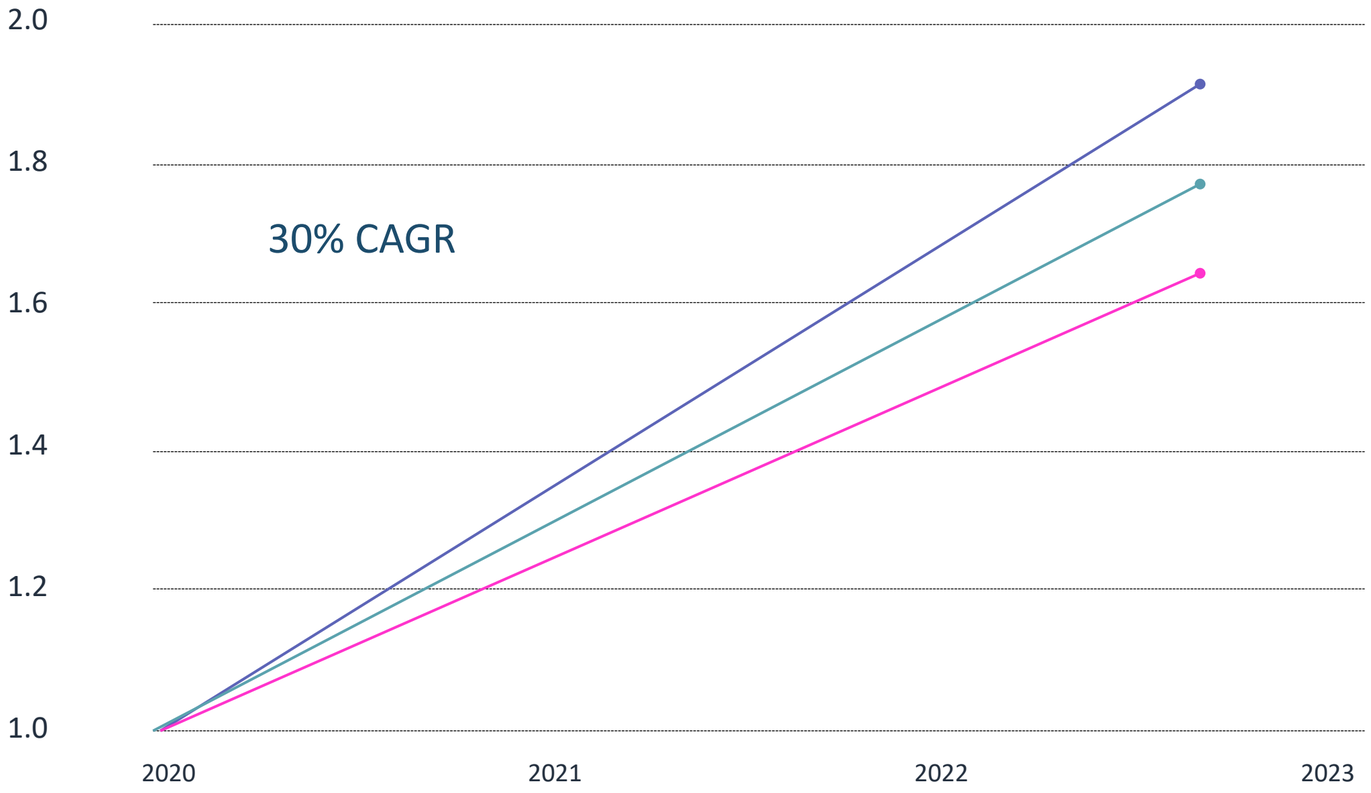
Bringing computer vision to the edge

Visual data from IP cameras doubles every 2.5 years



3,500 PB daily data from IP cameras

$13.4B video analytics market

175M enterprise IP cameras

However, **98%** of recorded footage is **never analyzed**

Source: Market Research Future: Global Surveillance Storage Market, and Global Market Insights: IP Camera Market Report

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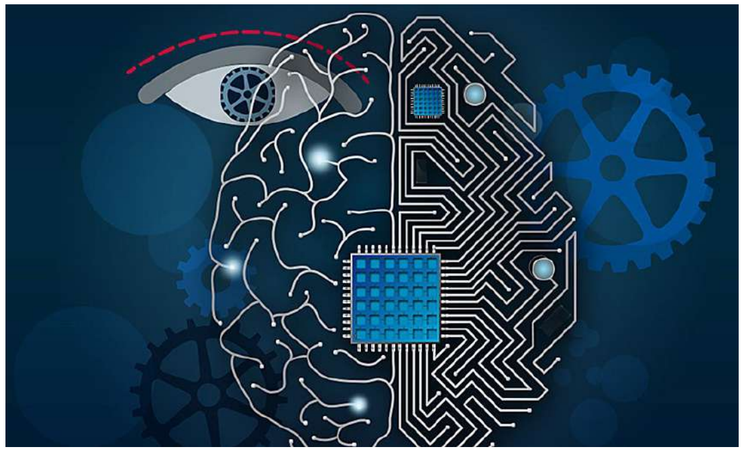
Computer vision can automate a variety of tasks



- Detect, count, and track movement of objects
- Classify objects based on color, condition, and type
- Measure distance and proximity
- Read text and numbers
- Recognize gestures and physical activities

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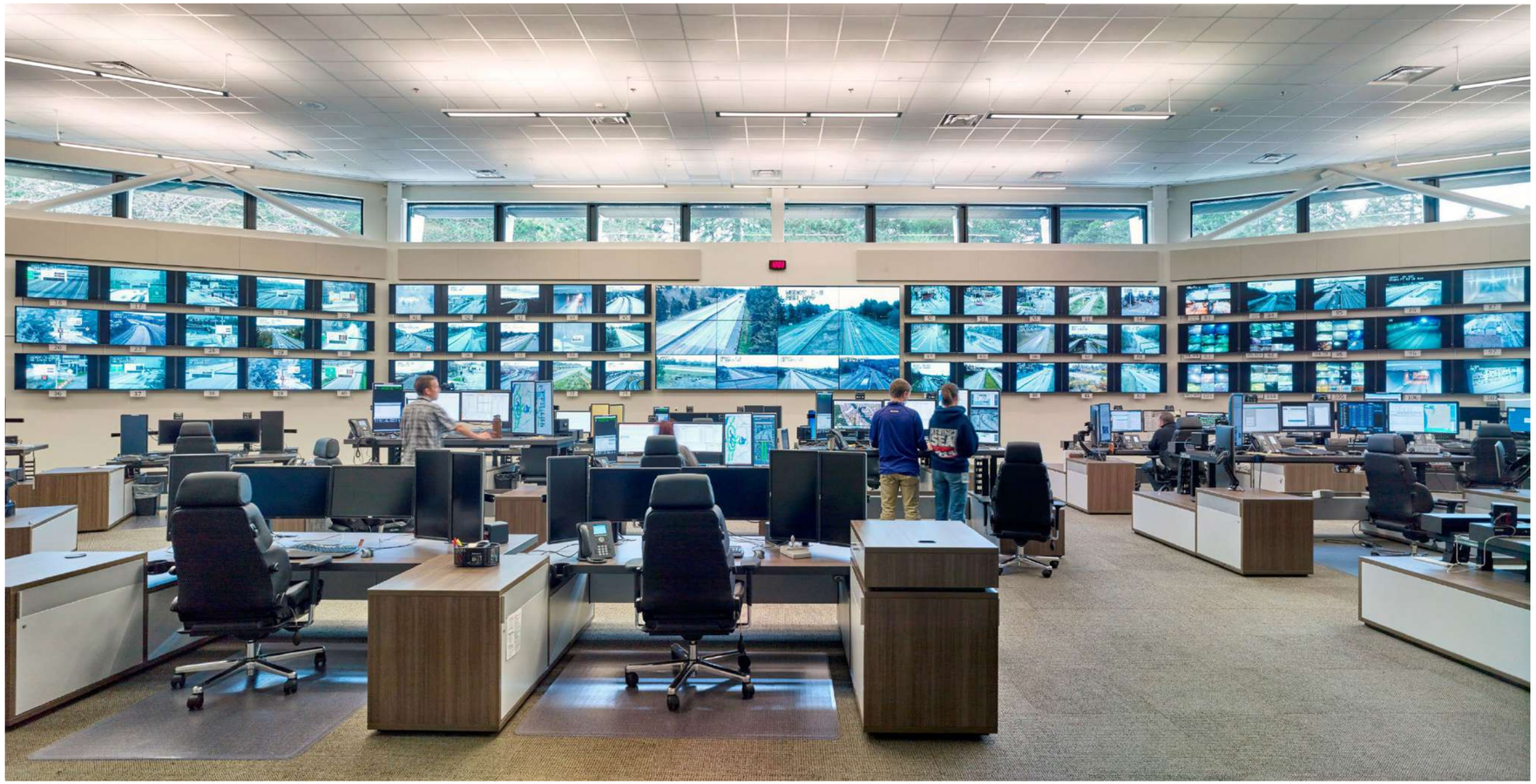


Department of Transportation

Bridge Inspection Report (BIR)

Page 1 of 3

DEPARTMENT OF TRANSPORTATION
Structure Maintenance & Investigations

Caltrans

Bridge Number : 39C0184
Facility Carried: EAST YOSEMITE AVE
Location : 0.9 MI W ARBOLEDA DR
City :
Inspection Date : 11/24/2015
Inspection Type
Routine PC Underwater Special Other
[X] Hydraulic

Bridge Inspection Report

STRUCTURE NAME: FAIRFIELD CANAL

CONSTRUCTION INFORMATION

Year Built : 1950
Year Widened: N/A
Length (m) : 12.5
Skew (degrees): 0
No. of Joints : 0
No. of Hinges : 0

Structure Description: 2-span continuous RC slab on RC pier wall and RC diaphragm abutments with monolithic wingwalls. Foundation type is unknown.

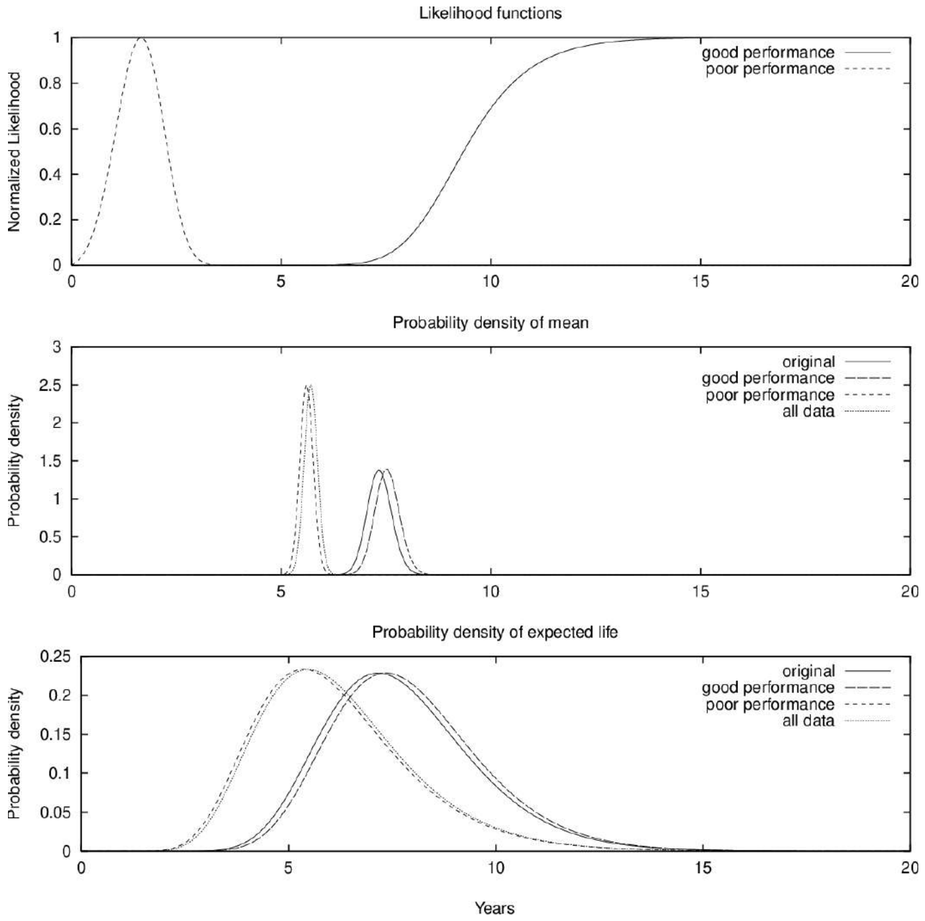
Span Configuration : 2 @ 19.5 ft

INSPECTION COMMENTARY

SCOPE AND ACCESS

A hydraulic field review was done on 11-24-2015. The channel had ponded water approximately 6 inches deep but no flow during this investigation. All substructure elements were inspected.

BRIDGE ORIENTATION



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Thank you!

Randell Iwasaki
President & CEO
Iwasaki Consulting Services Inc.
randy@iwasakics.com

Randell Iwasaki
@riwasaki2

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Randy Iwasaki

ASK RANDY A QUESTION

Submit by Web:
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Submit by Text:
Send **srtcs511** & your message to **22333**

Abby Morgan

Kittelson & Associates

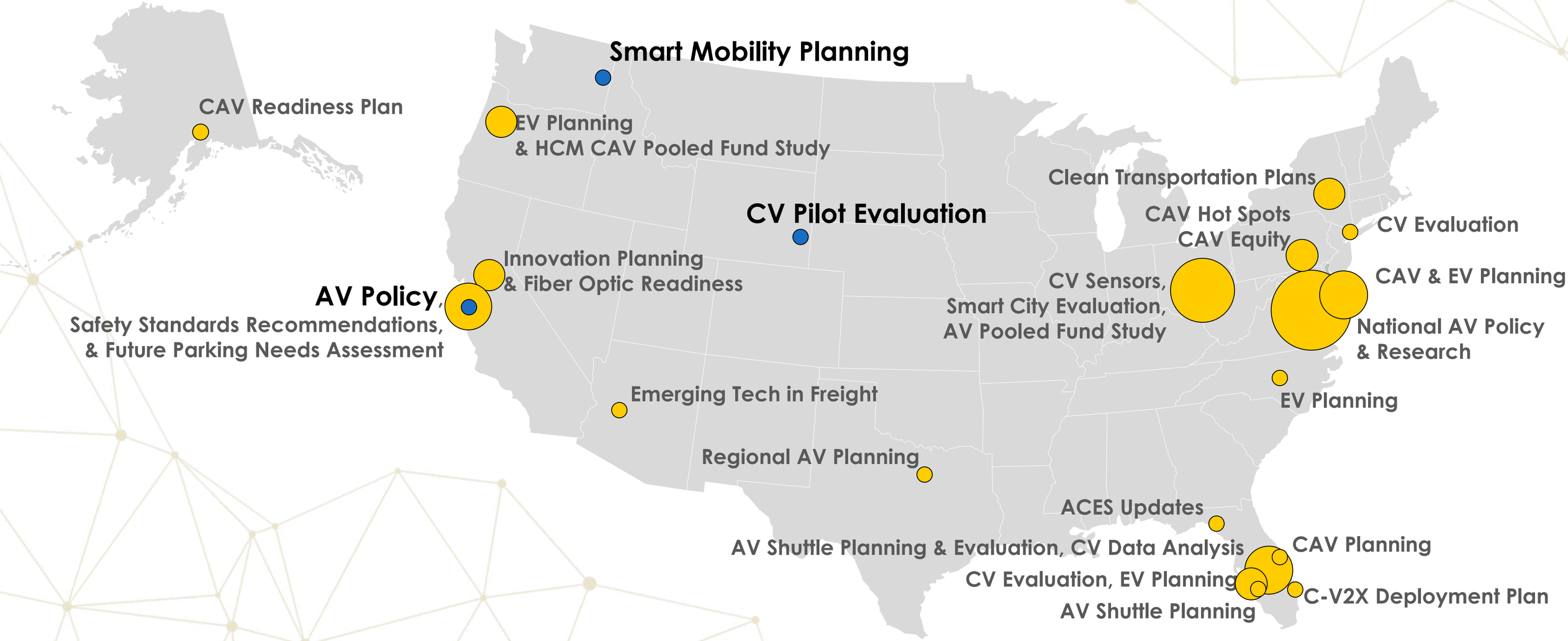
Principal Engineer

How can we plan for Land Use & Travel Behavior Impacts of Smart Mobility?

Abby Morgan, PhD, PE

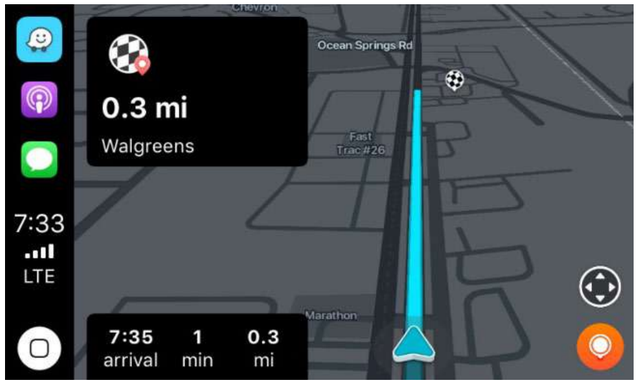
KITTELSON & ASSOCIATES

SRTC Transportation Summit
October 17, 2024



Lessons learned from our work

What are we talking about?



Automated
alternative-fuel
ride-hailing
Telecommunications
apps
shared
vehicles
Big-data
analytics
smart
V2V
connected
communities
wireless
Internet-of-things
3-D printing
drones

TODAY'S HOT TOPICS

1. Smart(er) Vehicles
2. Electric Vehicles
3. Smart Infrastructure
4. Land Use

Understanding the impacts of Emerging Transportation Technologies

Replace	Replace the need for personal travel
Enable	Enable better use of system resources
Support	Support better management of systems

Why plan for Smart Mobility before it comes to your city?

AUTOMATED RIDEHAIL SERVICE

San Francisco, CA

The Vision:

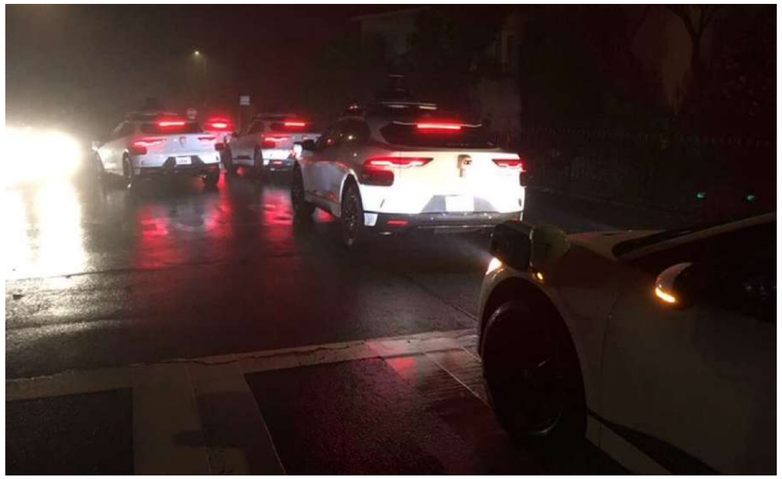
- Incentivize safe, efficient mobility alternatives

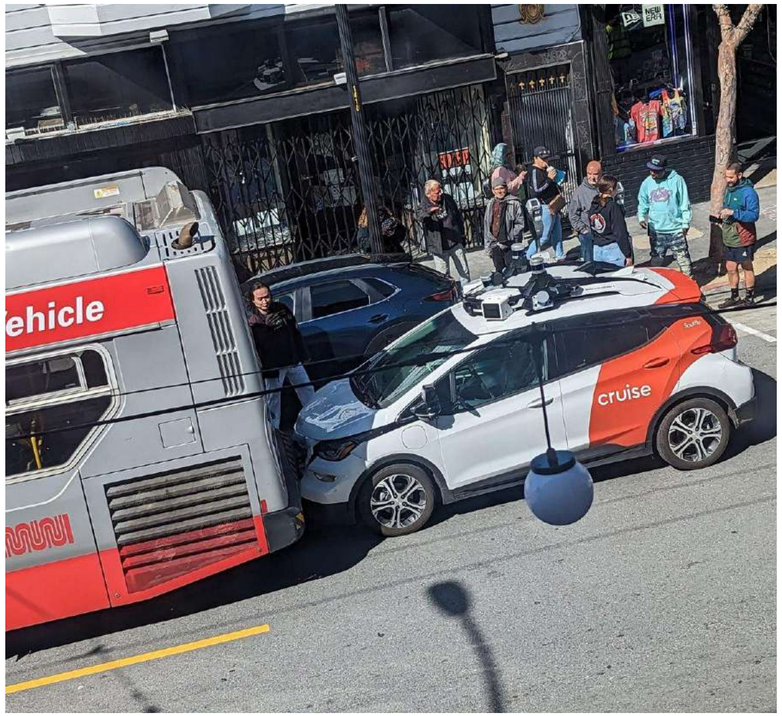
AUTOMATED RIDEHAIL SERVICE

San Francisco, CA

The reality:

- State and Federal governments authorize use
- Cities weren't ready
- No goals. No one knew what to expect.
- Cities experience first-hand impacts





AUTOMATED RIDEHAIL SERVICE

Phoenix, AZ

The reality:

- Not all technologies are created equal
- Simple operating environments enable better performance (flat, straight, dry)
- AVs can address equity and bias
- New mobility options

Travel behavior changes impact land use

Photo: Dorret Osterhoof

Using Technology to Solve Transportation Problems

What problem are we trying to solve?

What available tools can solve our problem?

Is this the right tool?

Use technology to reduce crashes

Photo: fox13now.com

Use technology to improve incident response

Source: SVFD

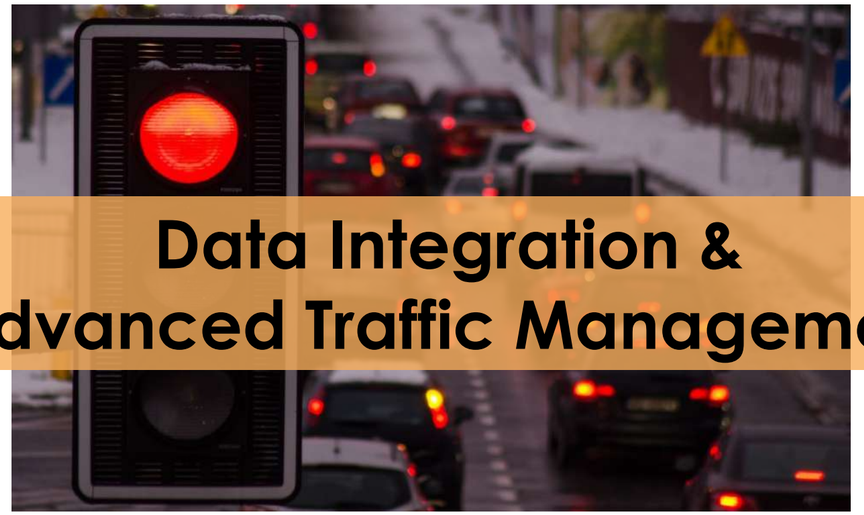
USE TECHNOLOGY FOR LOGISTICS

Support better management of systems

- ✓ Monitor mobility performance

Curbside Management

Asset Management



Data Integration & Advanced Traffic Management

WHAT SHOULD I DO NOW?

1. Identify your “Smart Corridors”
2. Maintain your infrastructure
3. Upsize conduit & signal cabinets
4. Collaborate across the region for consistent solutions

WHAT SHOULD I PLAN FOR?

1. Specify the problems you are trying to solve
2. Plan for Big Data (data sharing agreements, staff training)
3. Update land use plans and zoning codes
4. Rethink your hiring needs and organizational structure
5. Continue to monitor & be flexible

THANK YOU!

Abby Morgan, PhD, PE
Principal Engineer
amorgan@kittelson.com

KITTELSON & ASSOCIATES

Abby Morgan

ASK ABBY A QUESTION

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Submit by Text:

Send **srtcs511** & your message to **22333**

Daniel Lai

City of Bellevue

Smart Mobility Manager

Smart Mobility Technologies in Bellevue

Smart City Elements

CONNECTIVITY

Improve consumer services and communications infrastructure, with focus on speed, availability and choice

TRANSPORTATION

Improve people's ability to move around the city safely and efficiently

PUBLIC SAFETY

Further integrate infrastructure, services, agencies, and personnel to keep our residents and visitors safe

WATER

Ensure high-quality delivery of water services to homes and businesses to minimize disruptions and increase customer service

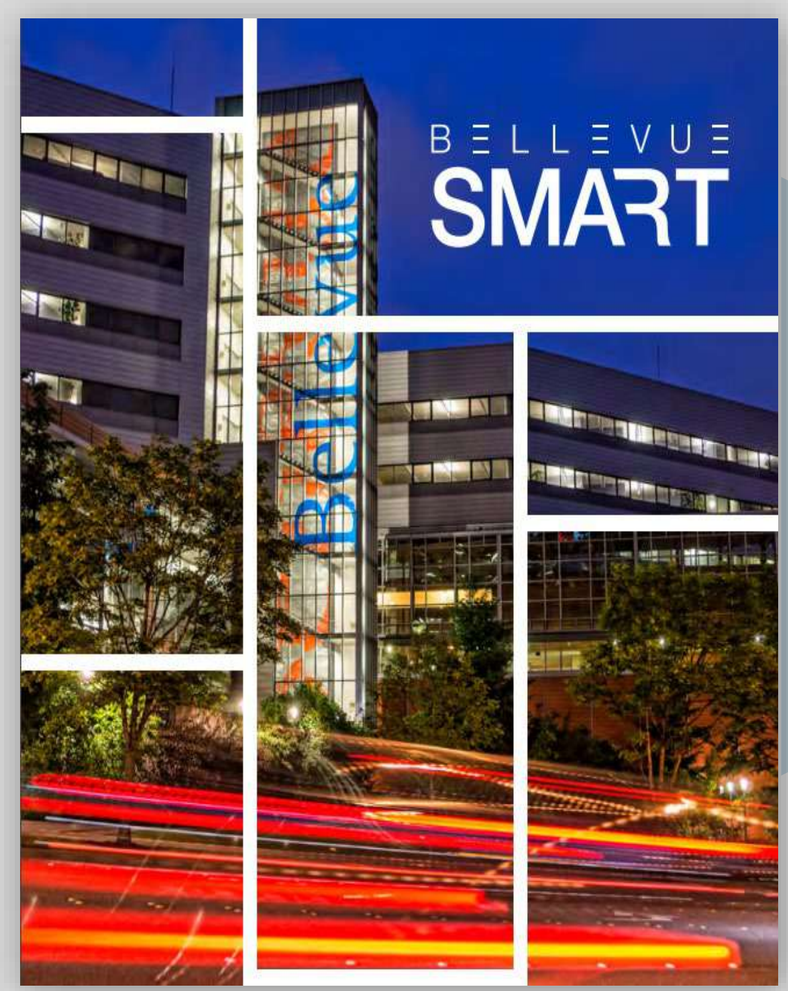
BUILDINGS

Enhance building systems and analytics to improve building systems performance, efficiency and resource conservation

ENERGY

Improve and integrate energy systems to ensure sufficient, efficient and reliable energy that powers our modern digital society

Smart Mobility Plan



Smart Cities

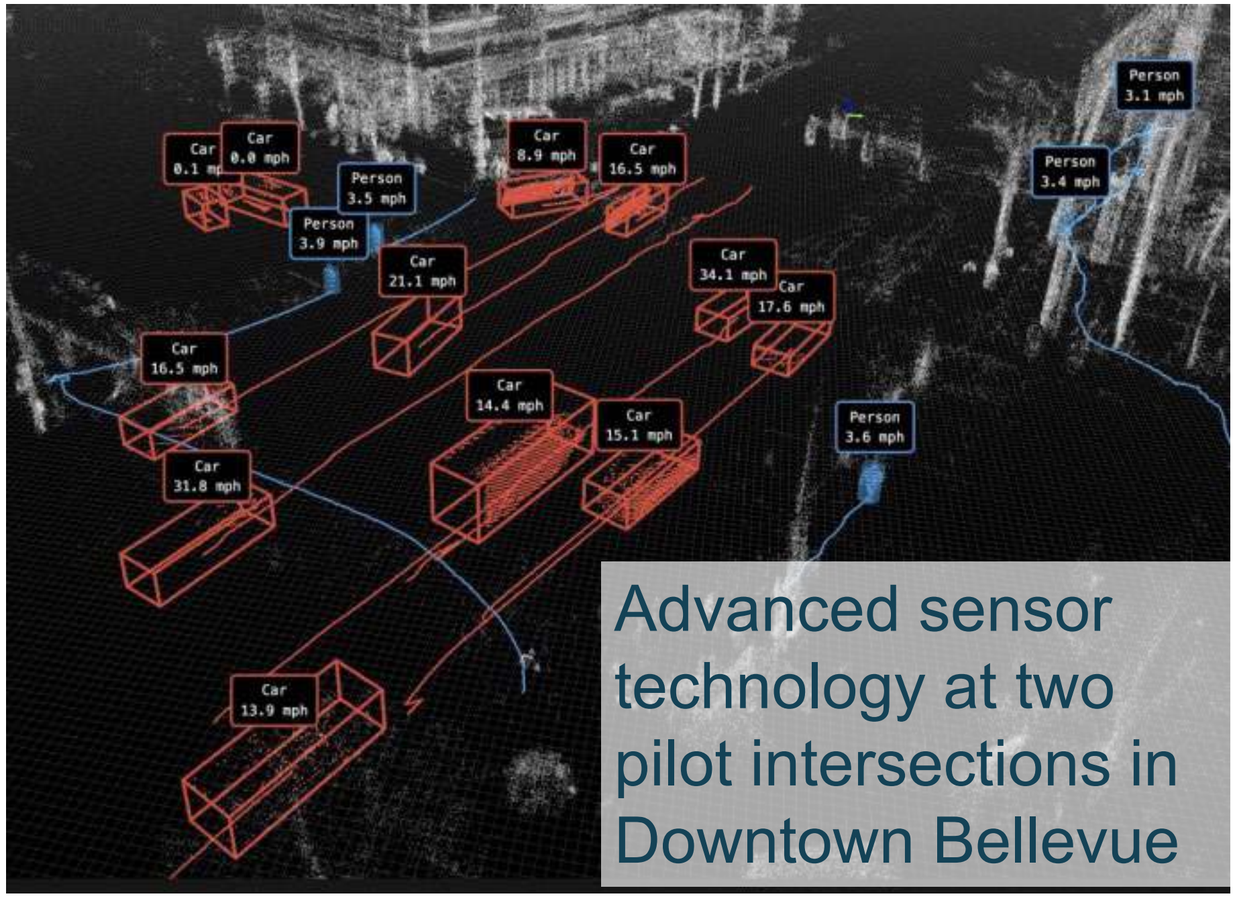
Transportation Element
of Bellevue Smart

Smart Mobility Vision

Use innovation and partnerships to deploy emerging technologies that enhance the safety, sustainability, efficiency, and accessibility of Bellevue's transportation system.

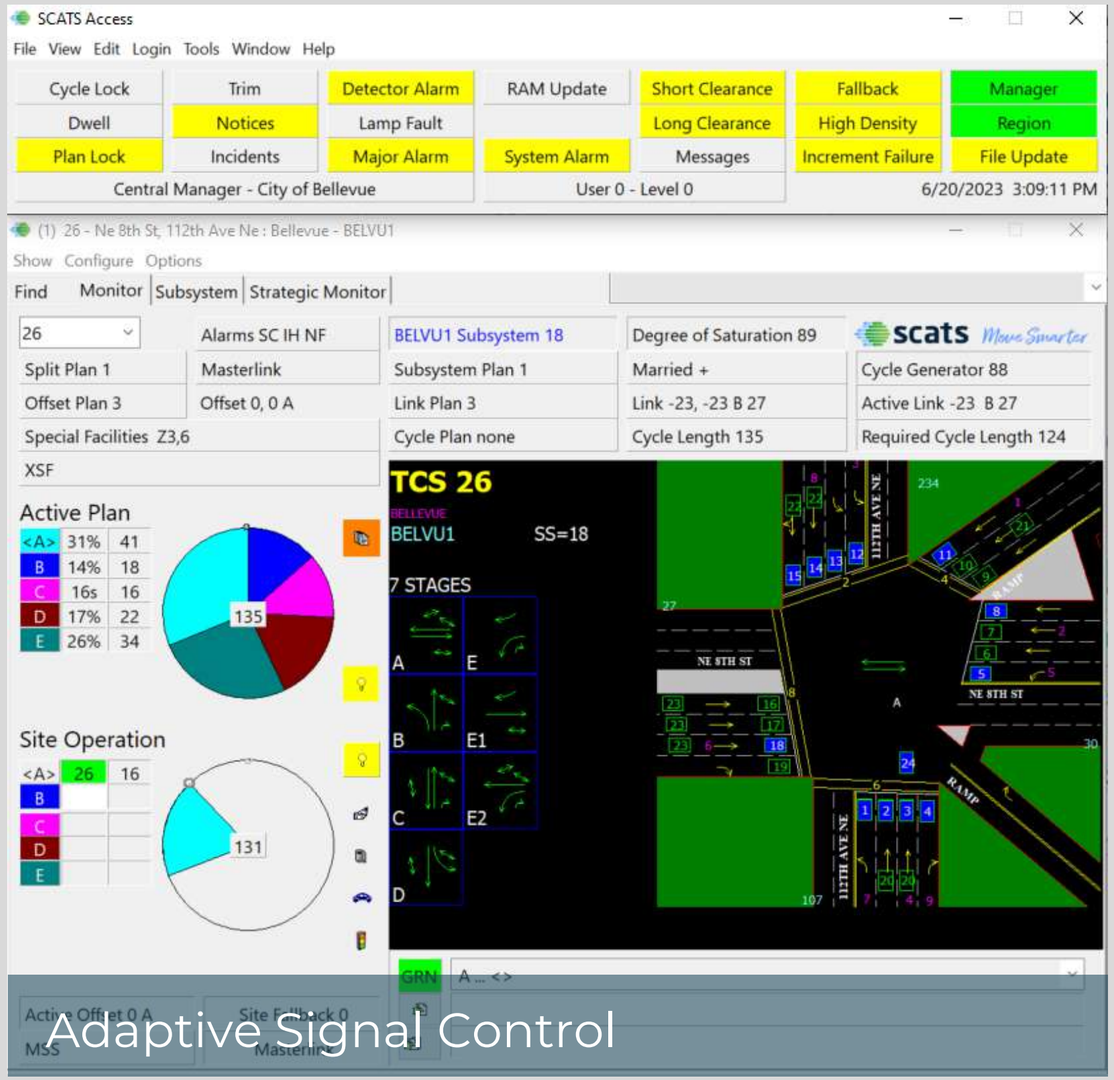
Traffic Signal Technologies

- Bellevue reached 100% adaptive signal control in 2016
- 100% high speed network connectivity between traffic signal and city hall



Advanced sensor technology at two pilot intersections in Downtown Bellevue

ITS Technologies in Bellevue

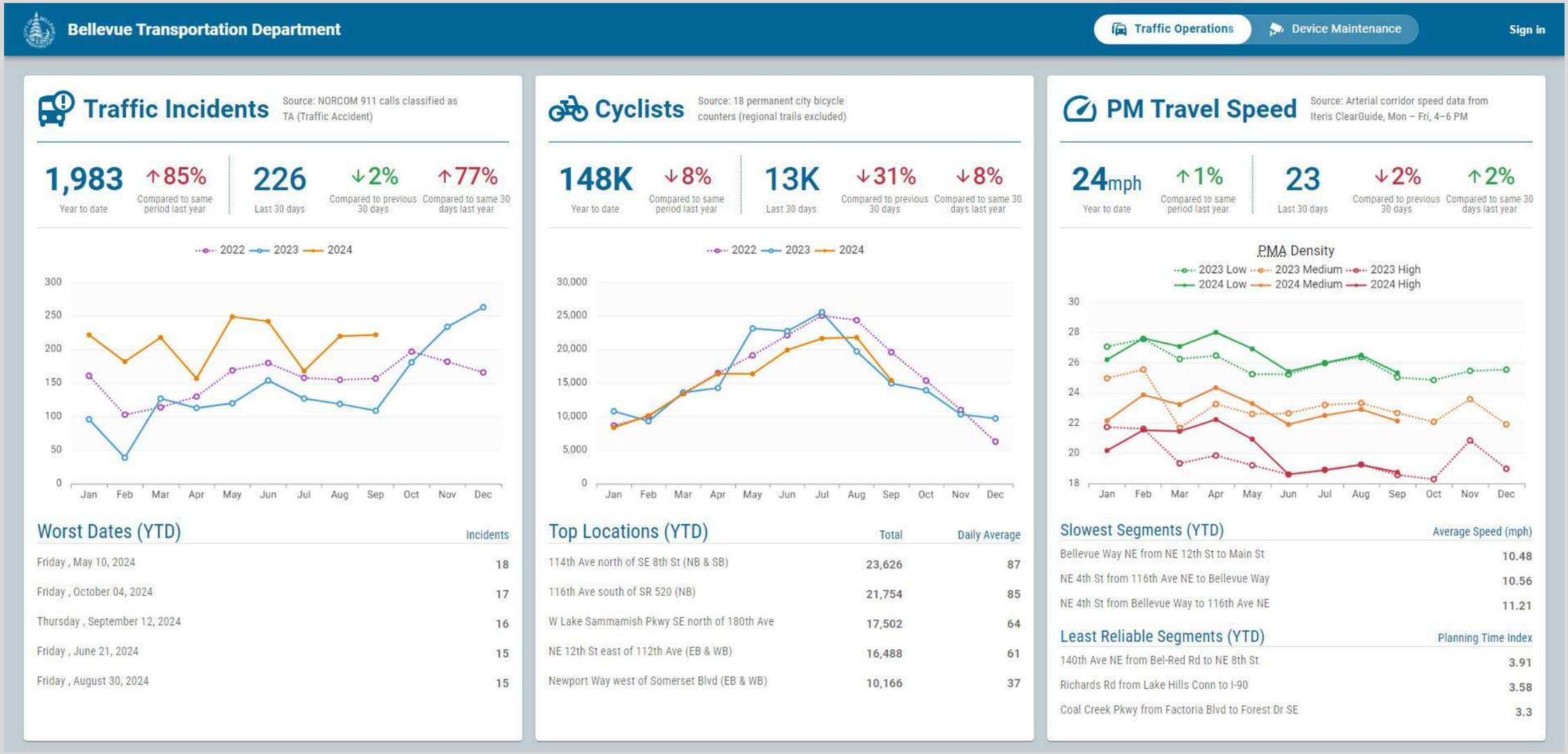


Adaptive Signal Control

360 HD CAMERAS: 100% COVERAGE

NETWORK: 10 GB SPEED

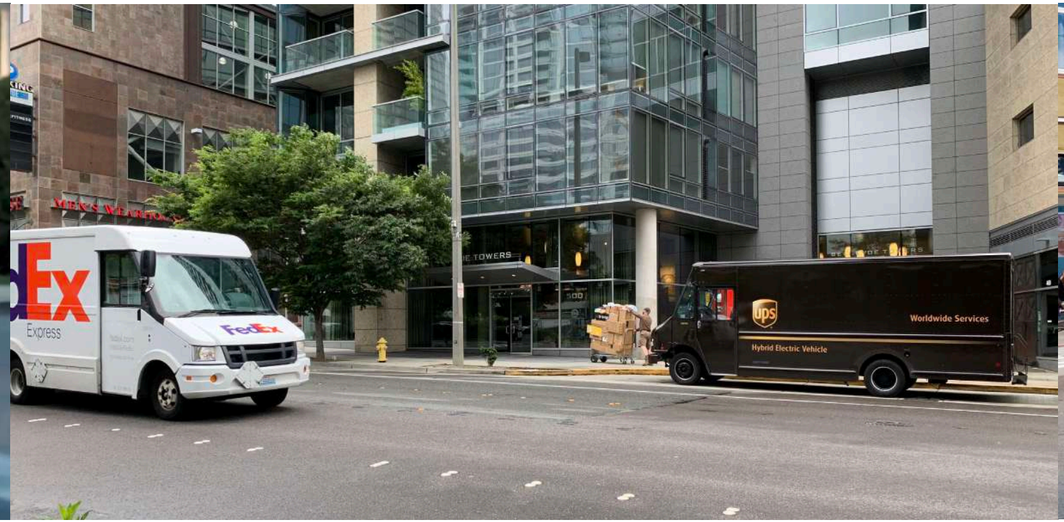
Data Analytics in Bellevue

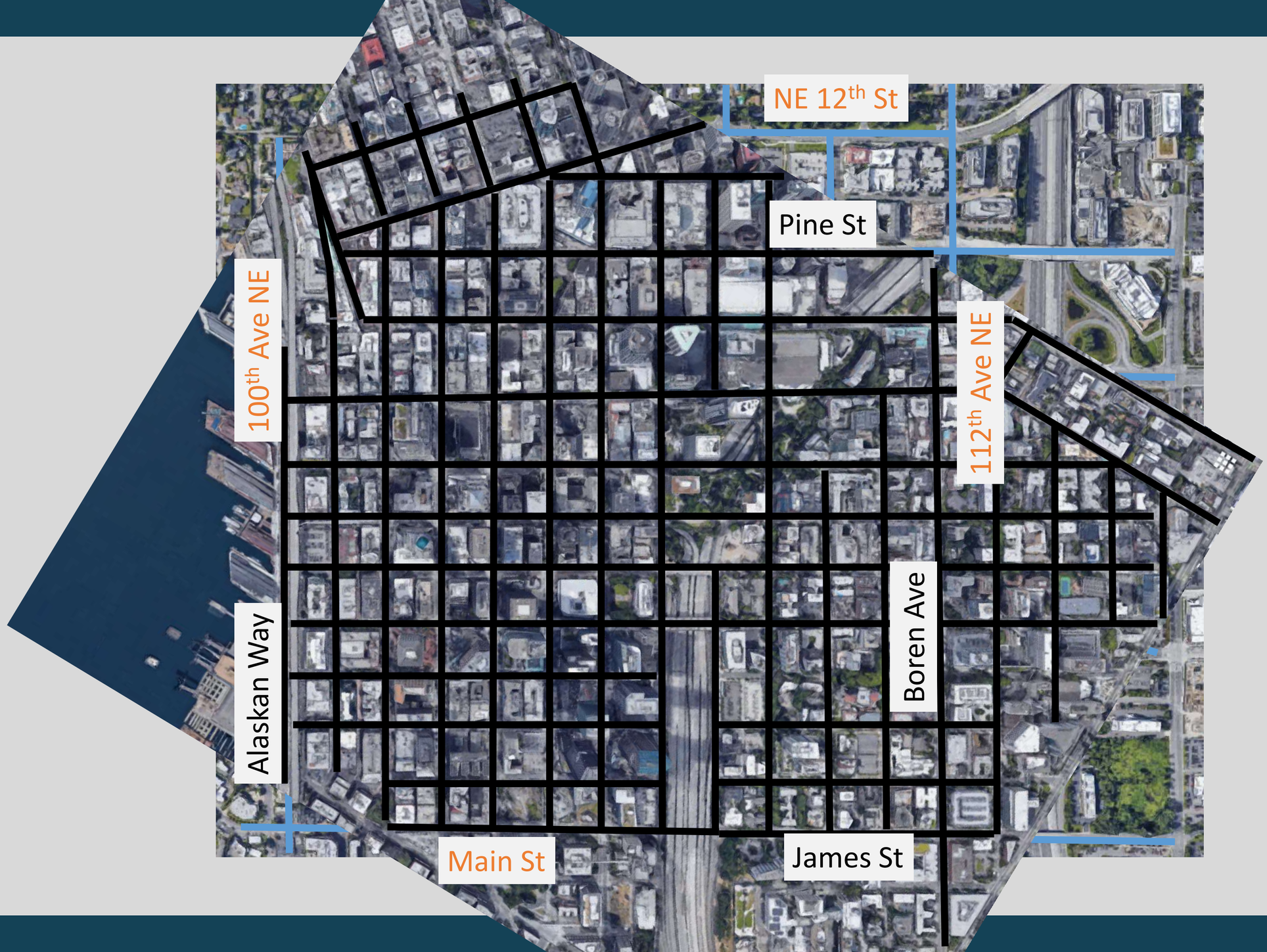


CHANGES
at the Curbside

Evolving Landscape at the Curb

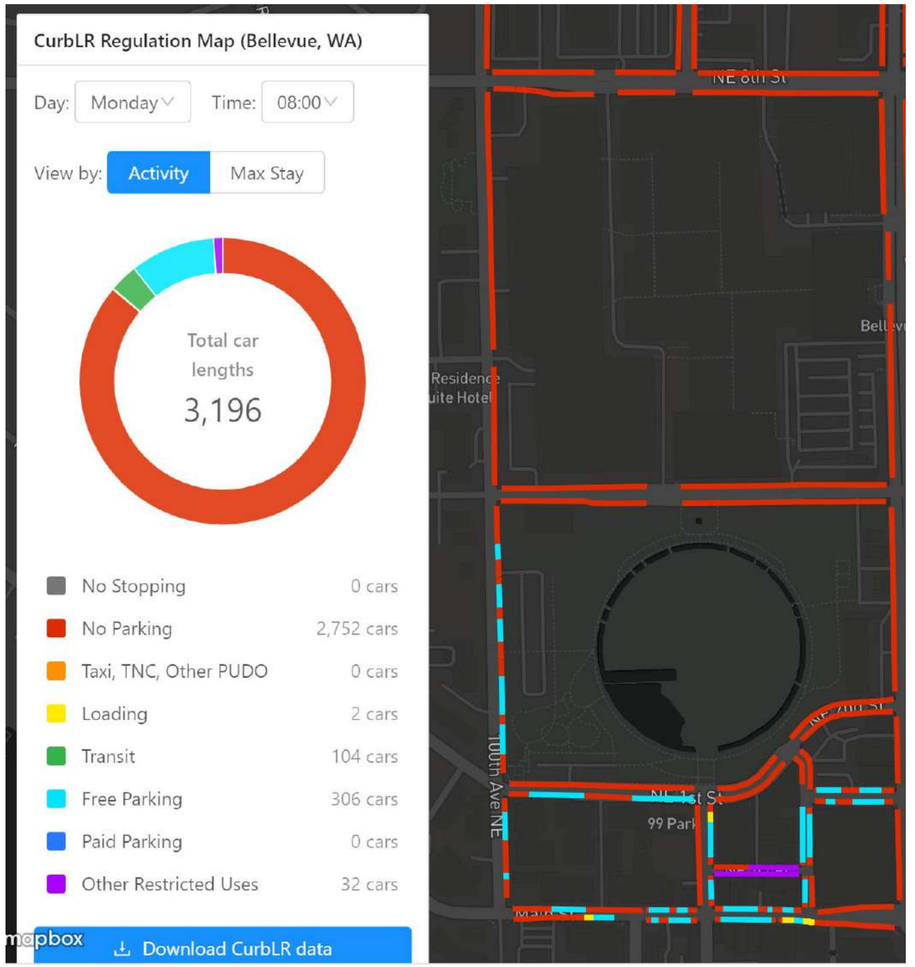
- On-demand Delivery *(eCommerce, Goods Delivery, Food Delivery)*
- Micromobility
- TNC/Taxis
- Parking
- Connected/ Autonomous Vehicles
- Delivery Robots




NE 12th St
Pine St
100th Ave NE
112th Ave NE
Boren Ave
Alaskan Way
Main St
James St

Curb Management Technologies

- Digital Curb Inventory
- Provides a dynamic capture of curb utilization relative to time and geography



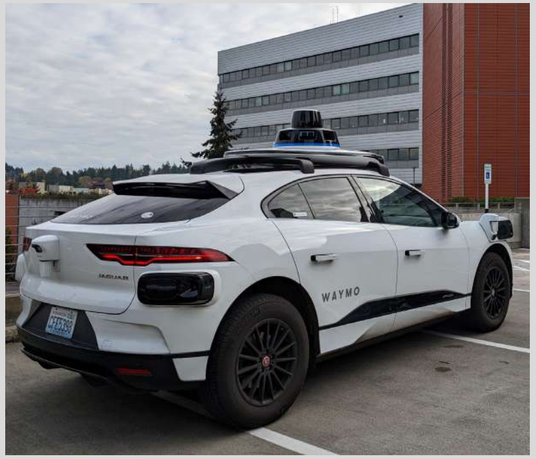
Shared Mobility in Bellevue

Crossroads Connect

BellHop

King County Metro Ride 2

Strategic Vision for Automated Vehicles



Strategic Vision for Automated Vehicles

- Improve Safety
- Invest in Innovation
- Ensure Transportation Equity
- Leverage Strategic Partnerships
- Increase Mobility Options
- Enhance Sustainability

Adapted from City of Bellevue 2018 Smart Mobility Plan; SDOT 2017 New Mobility Playbook, and Washington State AV Work Group 2018 Cooperative Automated Transportation Policy Framework

Bellevue's Safe System Approach to Vision Zero

Death/Serious Injury is Unacceptable

While no crashes are desirable, the Safe System approach prioritizes crashes that result in death and serious injuries, since no one should experience either when using the transportation system.

Humans Make Mistakes

People will inevitably make mistakes that can lead to crashes, but the transportation system can be designed and operated to accommodate human mistakes and injury tolerances and avoid death and serious injuries.

Humans Are Vulnerable

People have limits for tolerating crash forces before death and serious injury occurs; therefore, it is critical to design and operate a transportation system that is human-centric and accommodates human vulnerabilities.

Responsibility is Shared

All stakeholders (transportation system users and managers, vehicle manufacturers, etc.) must ensure that crashes don't lead to fatal or serious injuries.

Safety is Proactive

Proactive tools should be used to identify and mitigate latent risks in the transportation system, rather than waiting for crashes to occur and reacting afterwards.

Redundancy is Crucial

Reducing risks requires that all parts of the transportation system are strengthened, so that if one part fails, the other parts still protect people.

Bellevue's Safe System Approach to Vision Zero

Safe System - Council Resolution (2020)

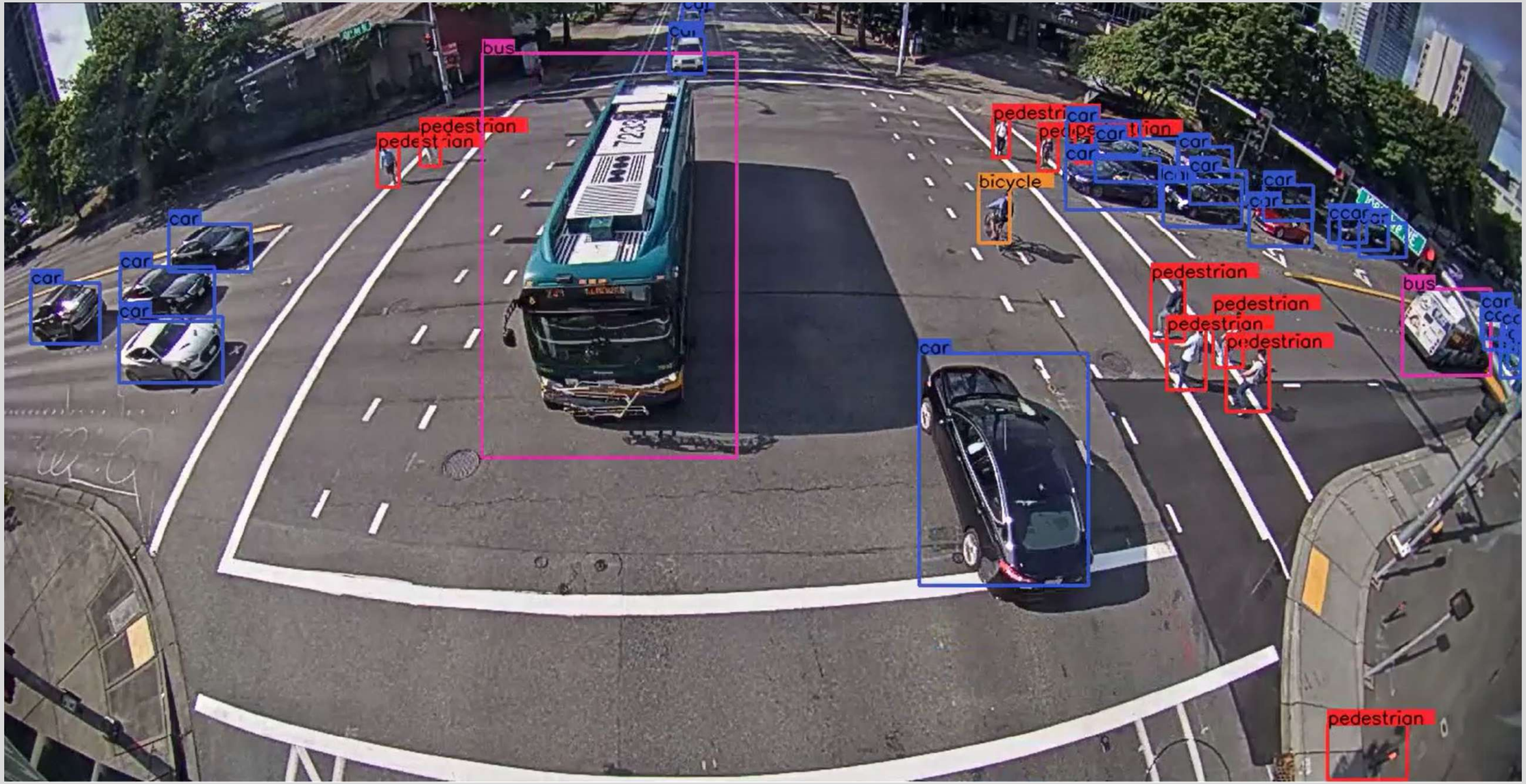
2020 Vision Zero Strategic Plan

2021 Vision Zero Action Plan

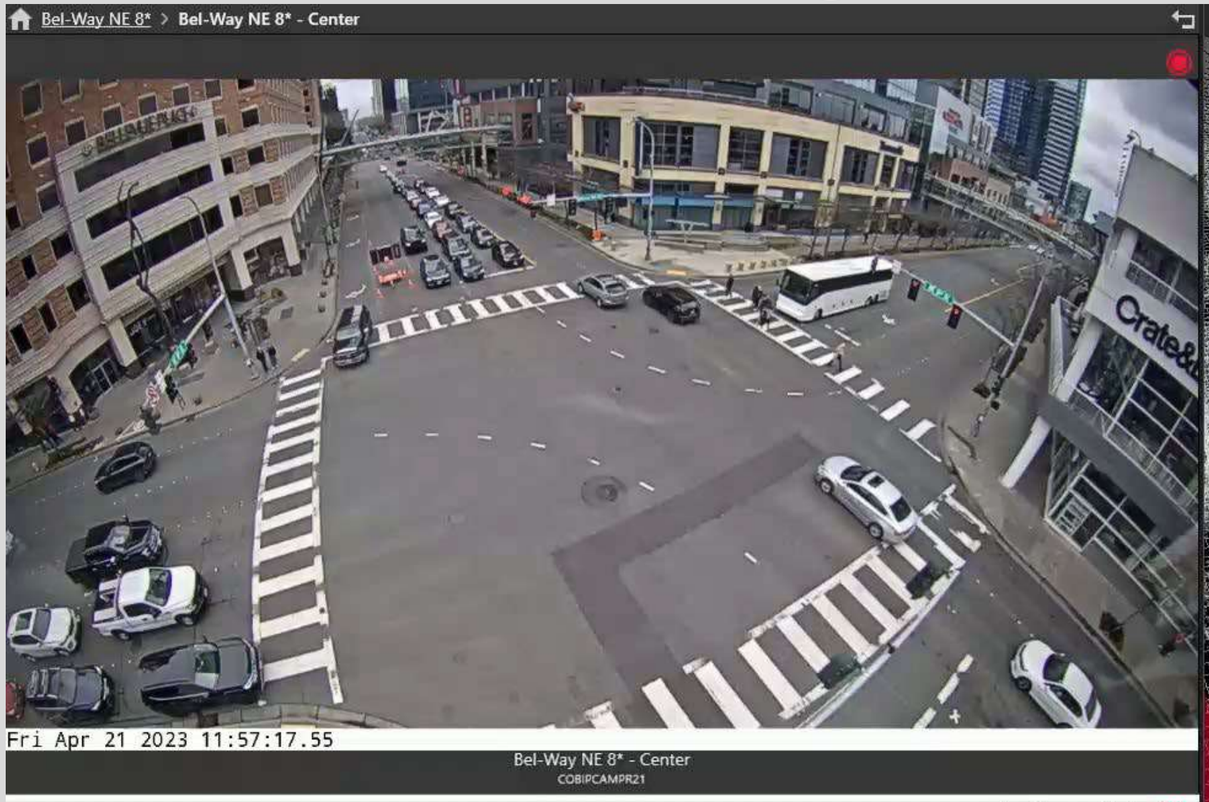
2022 Vision Zero Action Plan

2023 Vision Zero Action Plan

Cloud Computing + AI + Video Analytics

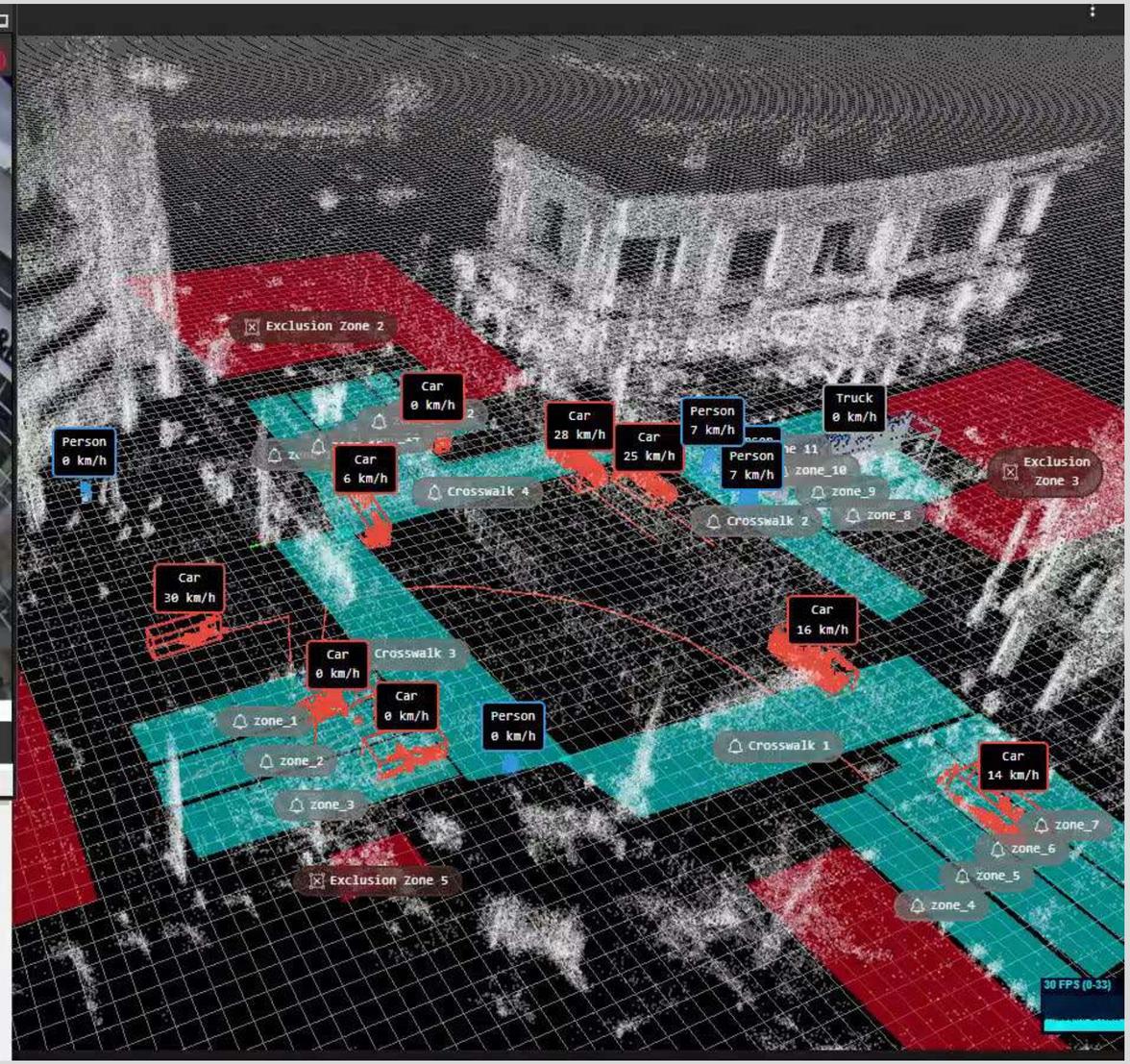


2023-2024 Edge Compute Partnership



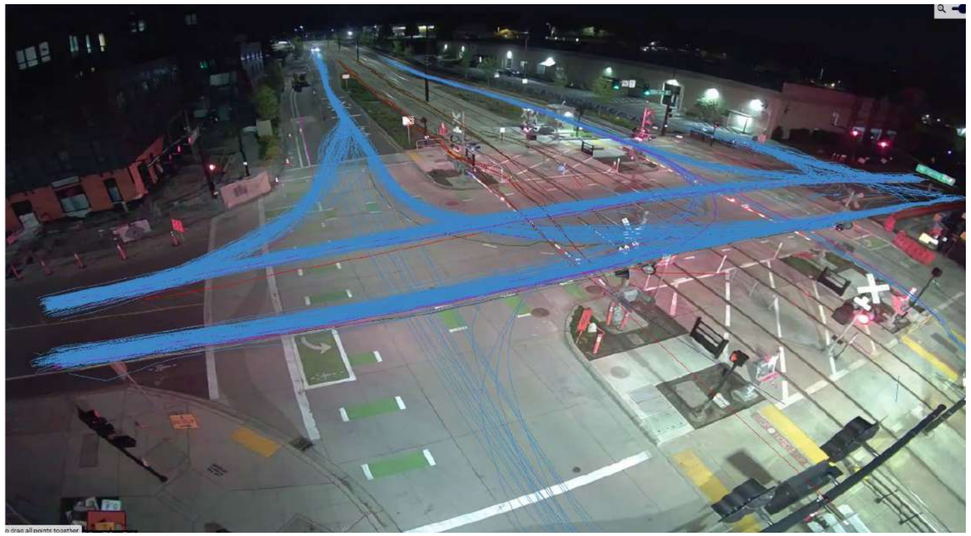
Alarms and Tasks 100

ID	Name	State	Occupants
0	Crosswalk 1	VACANT	0
1	Crosswalk 2	OCCUPIED	3
2	Crosswalk 3	VACANT	0
3	Crosswalk 4	VACANT	0



Safe System - Video Analytics

- Cloud-based video analytic solution
- Leverages Bellevue's traffic camera platform
- Automatically flags anomalous movements based on vehicle trajectory
- Provide video playback of events that constituted an anomalous movement
- Provides comprehensive insights on traffic operations and safety



SMART Operations

ALERTS

DANIEL LAI

Live Alerts

Map | List

Map | Satellite | NE 8th St / Bellevue-Way

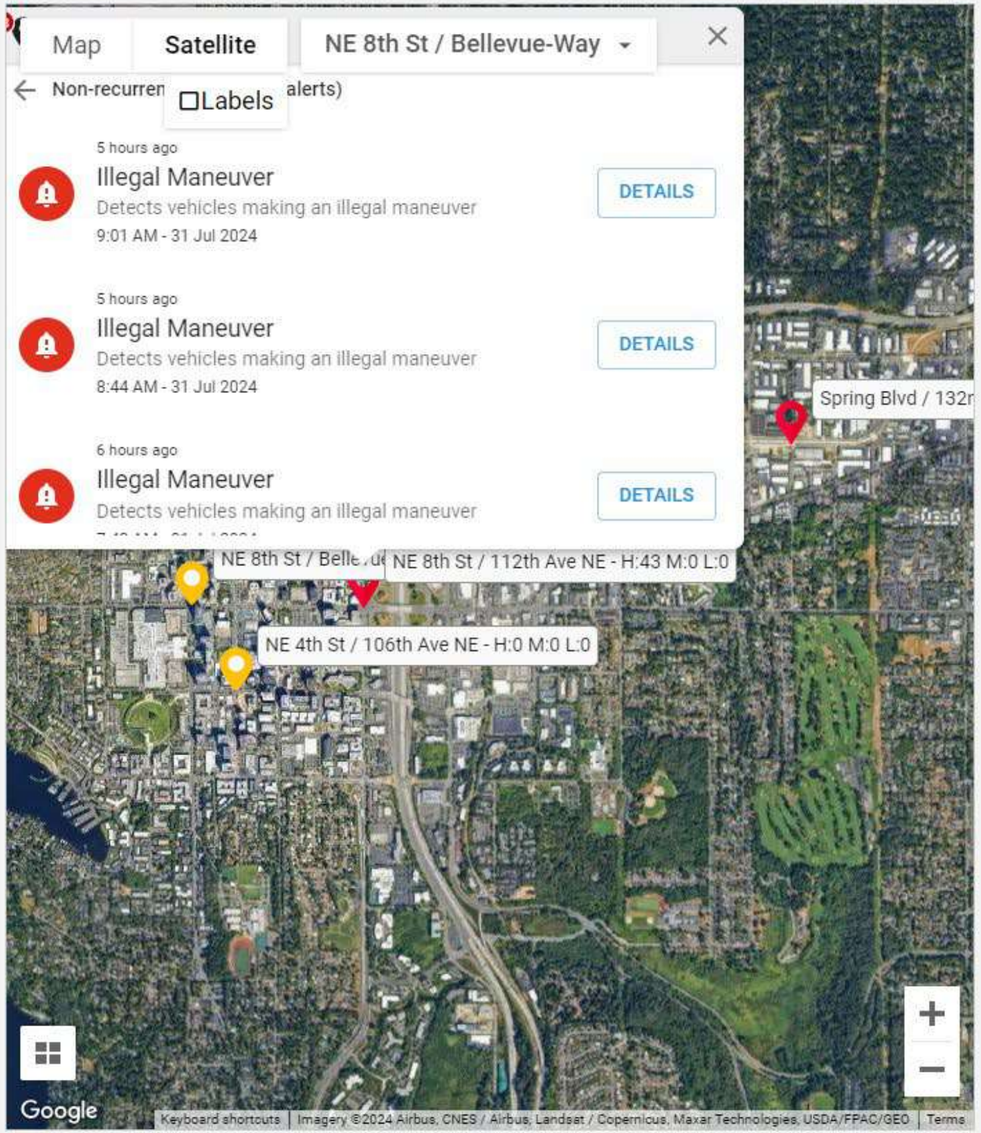
Non-recurren… alerts)

Labels

5 hours ago
Illegal Maneuver
Detects vehicles making an illegal maneuver
9:01 AM - 31 Jul 2024
DETAILS

5 hours ago
Illegal Maneuver
Detects vehicles making an illegal maneuver
8:44 AM - 31 Jul 2024
DETAILS

6 hours ago
Illegal Maneuver
Detects vehicles making an illegal maneuver
DETAILS



Illegal Maneuver

ALERT DETAILS | MANAGE ALERT | ACTION HISTORY

Configured for: NE 8th St / Bellevue-Way; NE 4th St / 106th Ave NE; NE 8th St / 112th Ave NE; Spring Blvd / 132nd Ave NE

SITE DETAILS

Site Name: NE 8th St / 112th Ave NE
Road User Type: Passenger Car
Camera Name: Test WWD 1

SYSTEM INFORMATION

Alert PK: COB~1662
Alert SK: 1722384774114

ALERT CLIP

REPORT ERROR

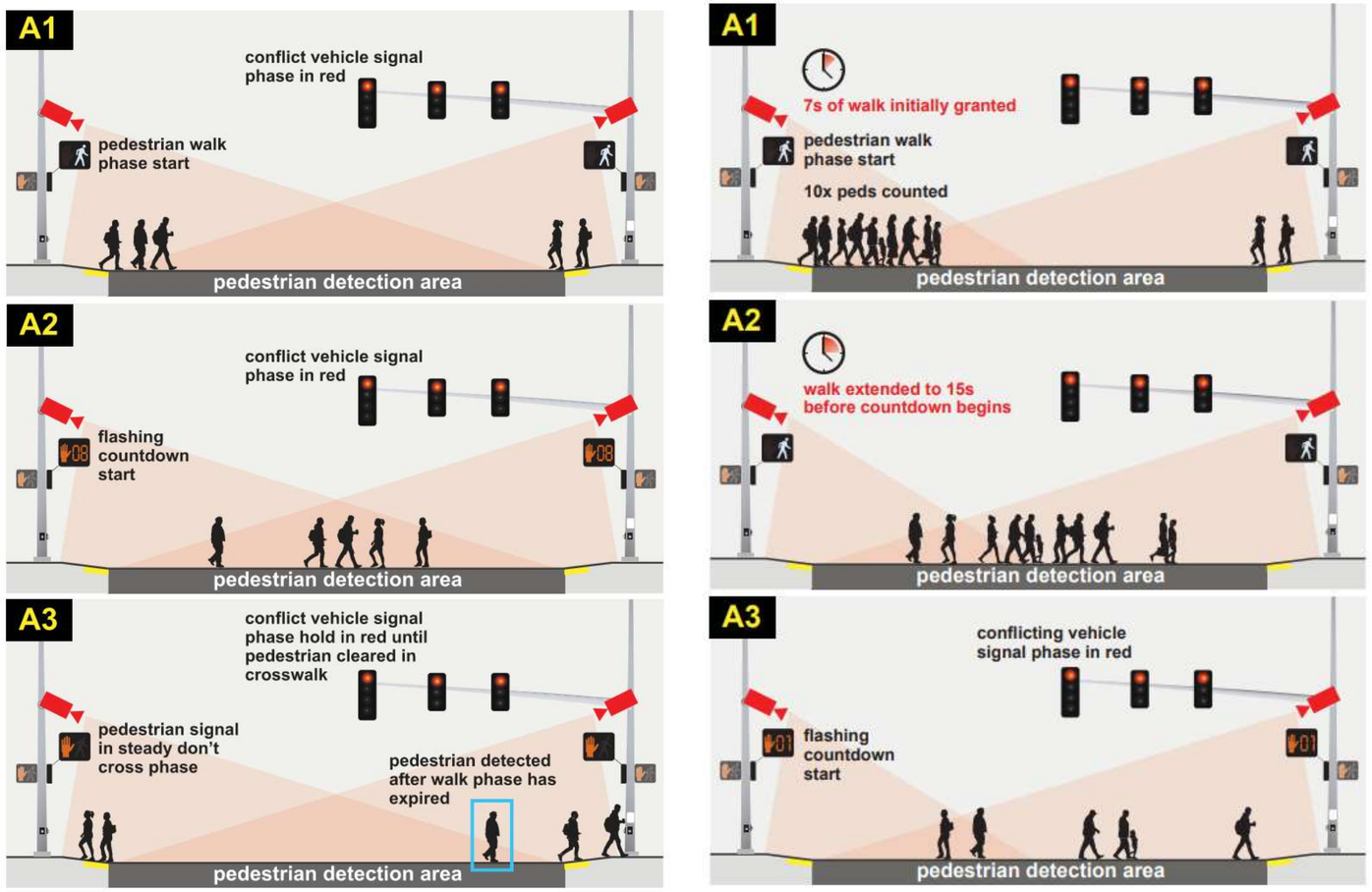
SMART Grant


Real-Time Traffic Signal Safety Interventions (RTSSI) Project
CITY OF BELLEVUE WASHINGTON
Strengthening Mobility and Revolutionizing Transportation (SMART) Stage 1 Planning and Prototyping
GRANT APPLICATION
(DOT-SMART-FY23-01)
October 10, 2023
Submitted by:
City of Bellevue
UEI#: DQ3JYJ78JMD5
In Partnership with:
AAA
UNIVERSITY of WASHINGTON
IIHS


LEGEND
Study Intersections
Bus Rapid Transit
East Link Light Rail
SR-520
Study Area Census Tracts
Disadvantaged Census Tracts
N
NE 40TH ST
140TH AVE NE
148TH AVE NE
520
BEL-RED RD
NE 24TH ST
148TH AVE NE/
NE 24TH ST
124TH AVE NE
NE 20TH ST
156TH AVE NE/
NE 20TH ST
237.02
132ND NE/
SPRING BLVD
BEL-RED RD
156TH AVE NE
NORTHUP WAY
Crossroads Park &
Community Center
156TH AVE NE/
NE 10TH ST
NE 8TH ST
NE 8TH ST
NE 8TH ST
(CROSSROADS)
148TH AVE NE
236.03
232.01
232.02
MILES
0
0.25
0.5

Passive Pedestrian Detection:

- **GOAL**: Detect slow moving pedestrian and extend current phase so conflicting vehicles are not released
- **HOW**: Real-time detection and identification of pedestrian in crosswalk zones, using LIDAR and/or video analytics



2023-2024 Cellular Vehicle-to-Everything Partnership


The Seattle Times

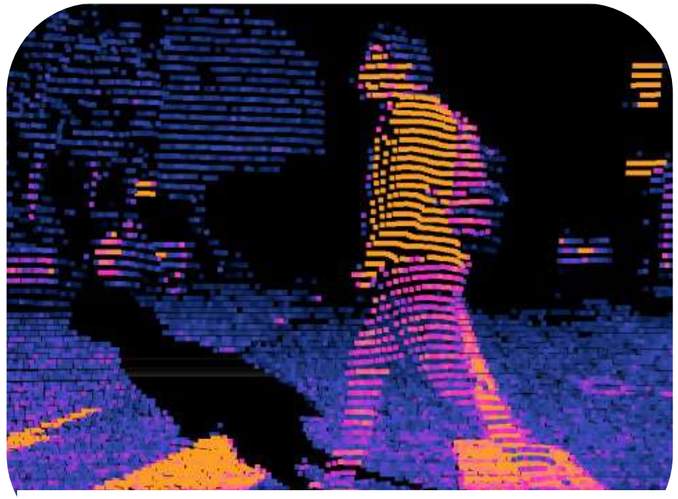
WINNER OF 12 PULITZER PRIZES

$2.00

Bellevue blazes trail in technology to make roads safer for cars, bikes, pedestrians

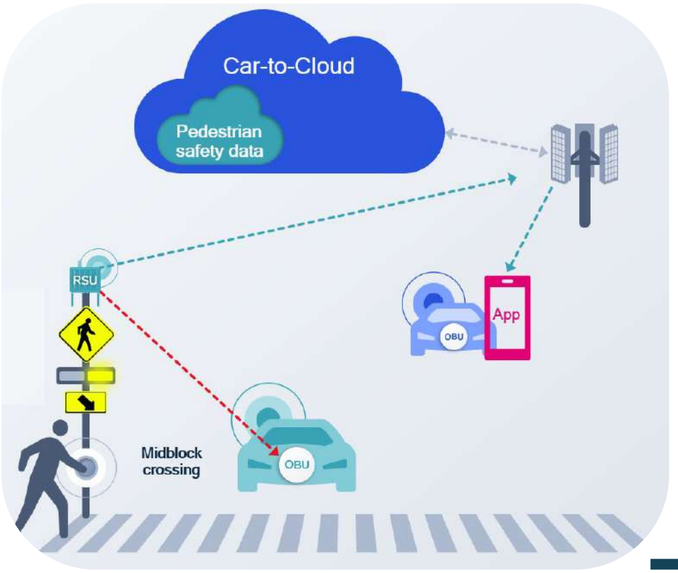
C-V2X Partnership: Use Cases

Radar speed feedback signs

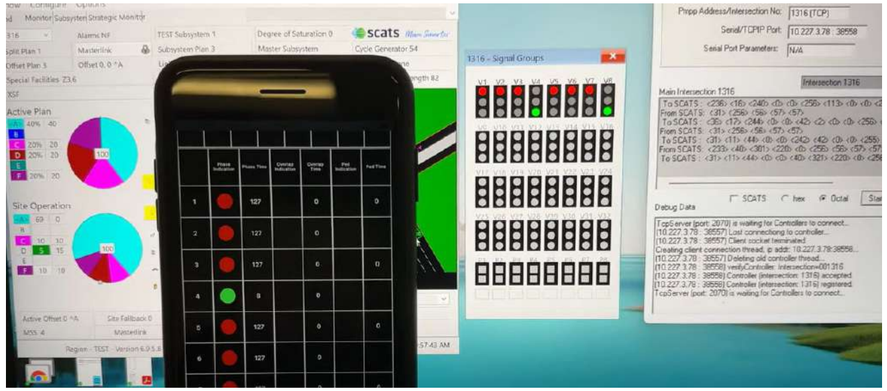


Pedestrian detection in intersection

Mid-block pedestrian crossing



C-V2X Partnerships



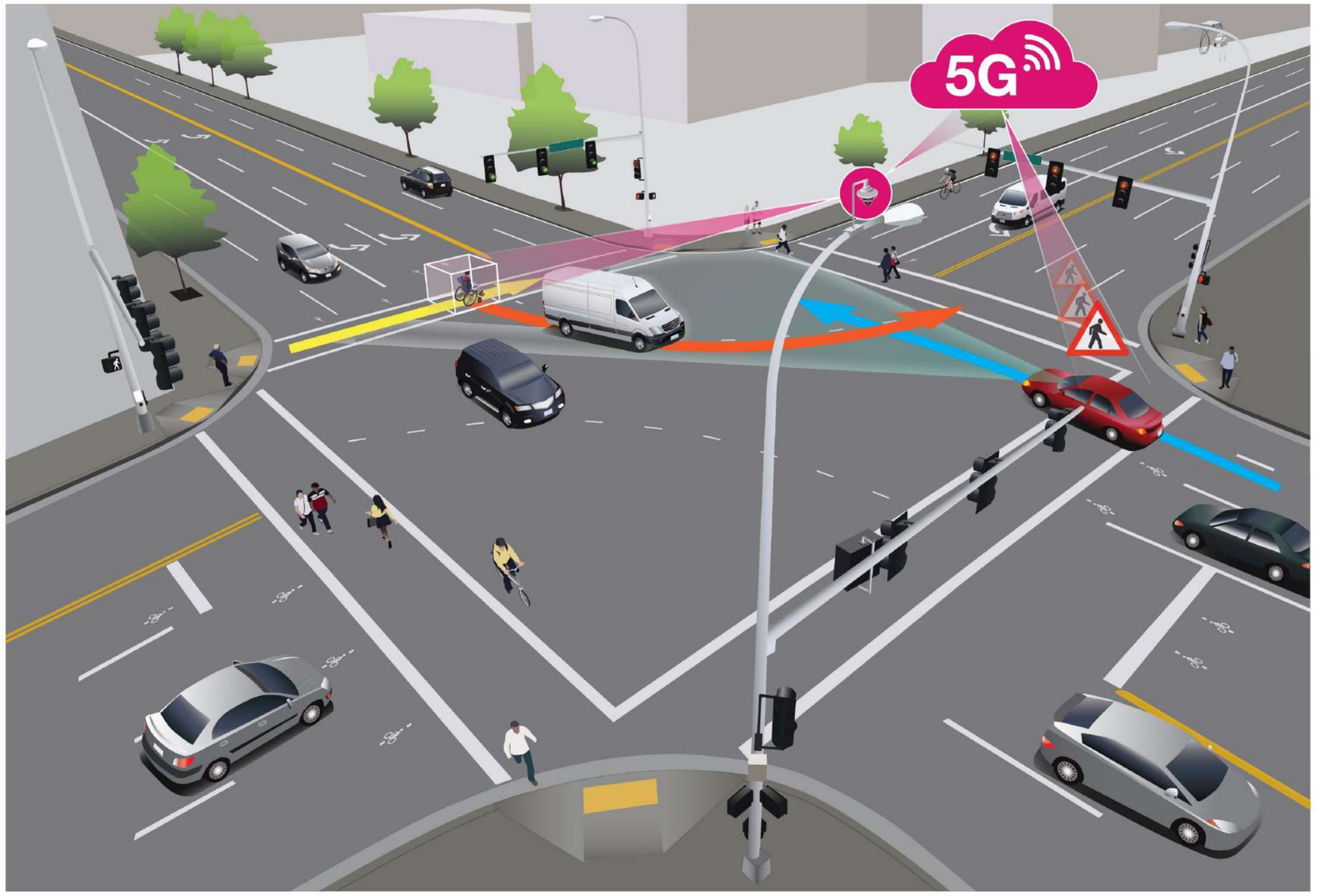
CITY OF BELLEVUE WASHINGTON

T-MOBILE FOR BUSINESS

scats
Move Smarter

applied INFORMATION

C-V2X Partnership: Making the Invisible Visible



C-V2X

Cellular-Vehicle-to-Everything (C-V2X) technology enables critical safety alerts and enhanced situational awareness between drivers and the surrounding environment.

V2P
Vehicle-to-pedestrian

V2V
Vehicle-to-vehicle

V2I
Vehicle-to-infrastructure

V2N
Vehicle-to-network

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425-452-6178

Daniel Lai

ASK DANIEL A QUESTION

Submit by Web:
PollEv.com/srtcs511

Submit by Text:
Send **srtcs511** & your message to **22333**

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Thank you for coming!

2nd Annual Regional Transportation Summit

EMBRACING INNOVATION

Integrating Technology in Transportation

October 17, 2024

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