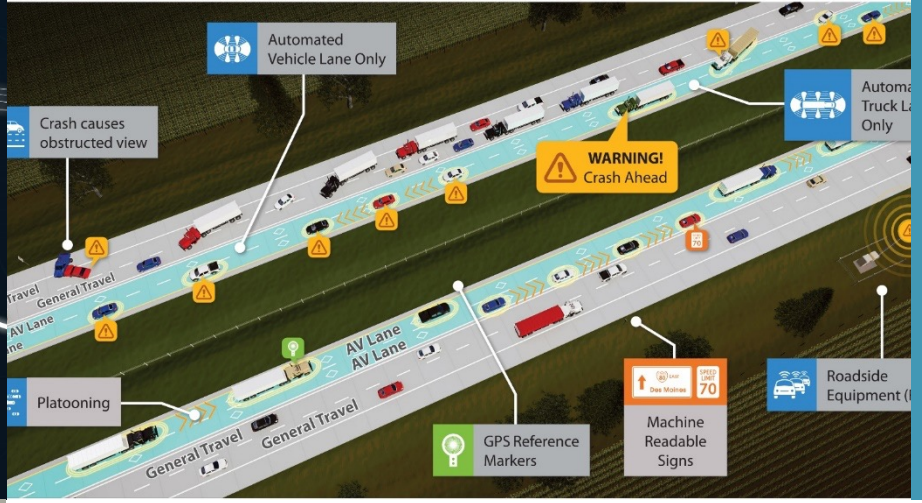


Empowering Innovation

Bringing Concepts to Reality

HDR

Moderator

Brad Thoburn

Transportation Policy and Strategic Planning Practice Lead

HDR

Panelists

Steven Bostel

Spaceport Development Program Manager, Space Florida

Fabio Tylim

Vice President, Global Business Development & Sales, Guident

Chris Armstrong

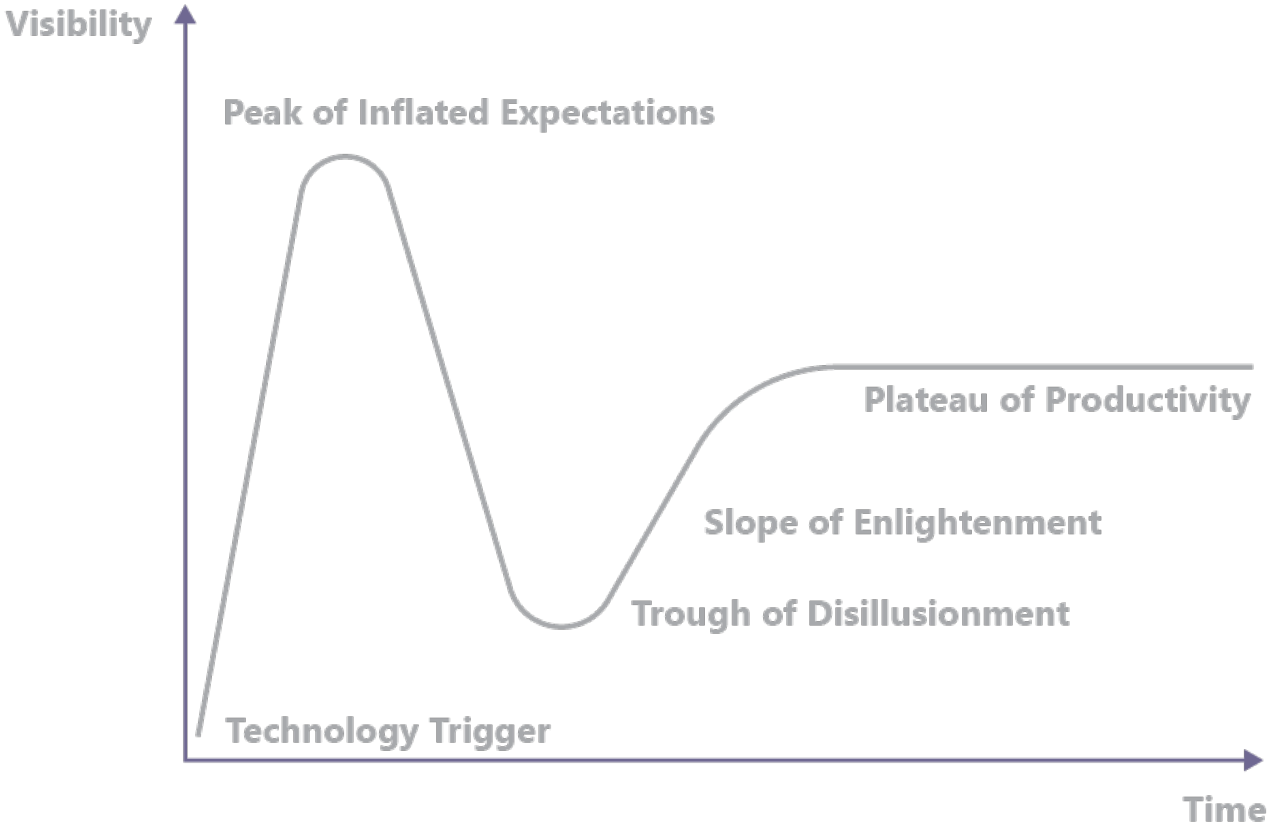
Vice President, Product, Cavnue

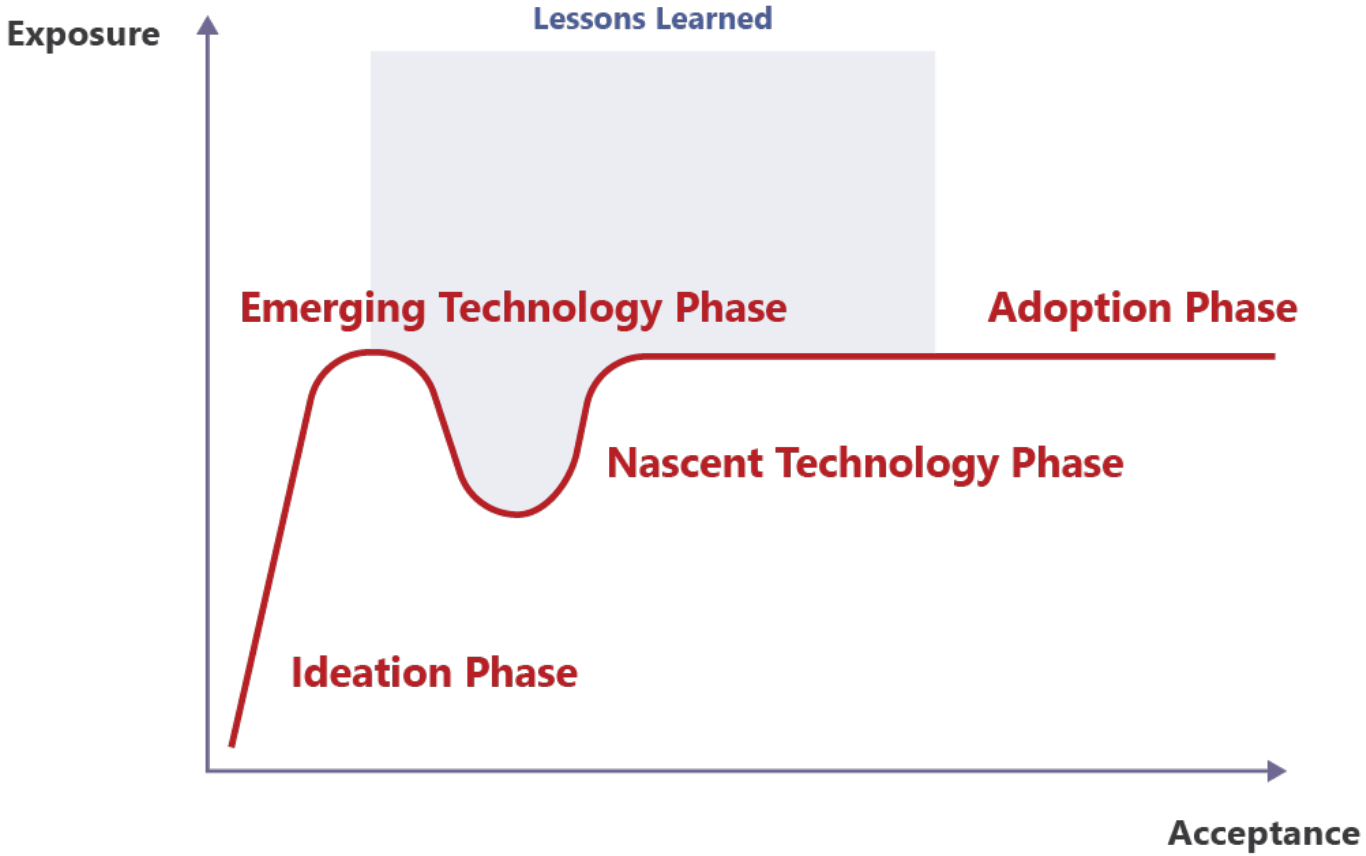
Connell McLaughlin

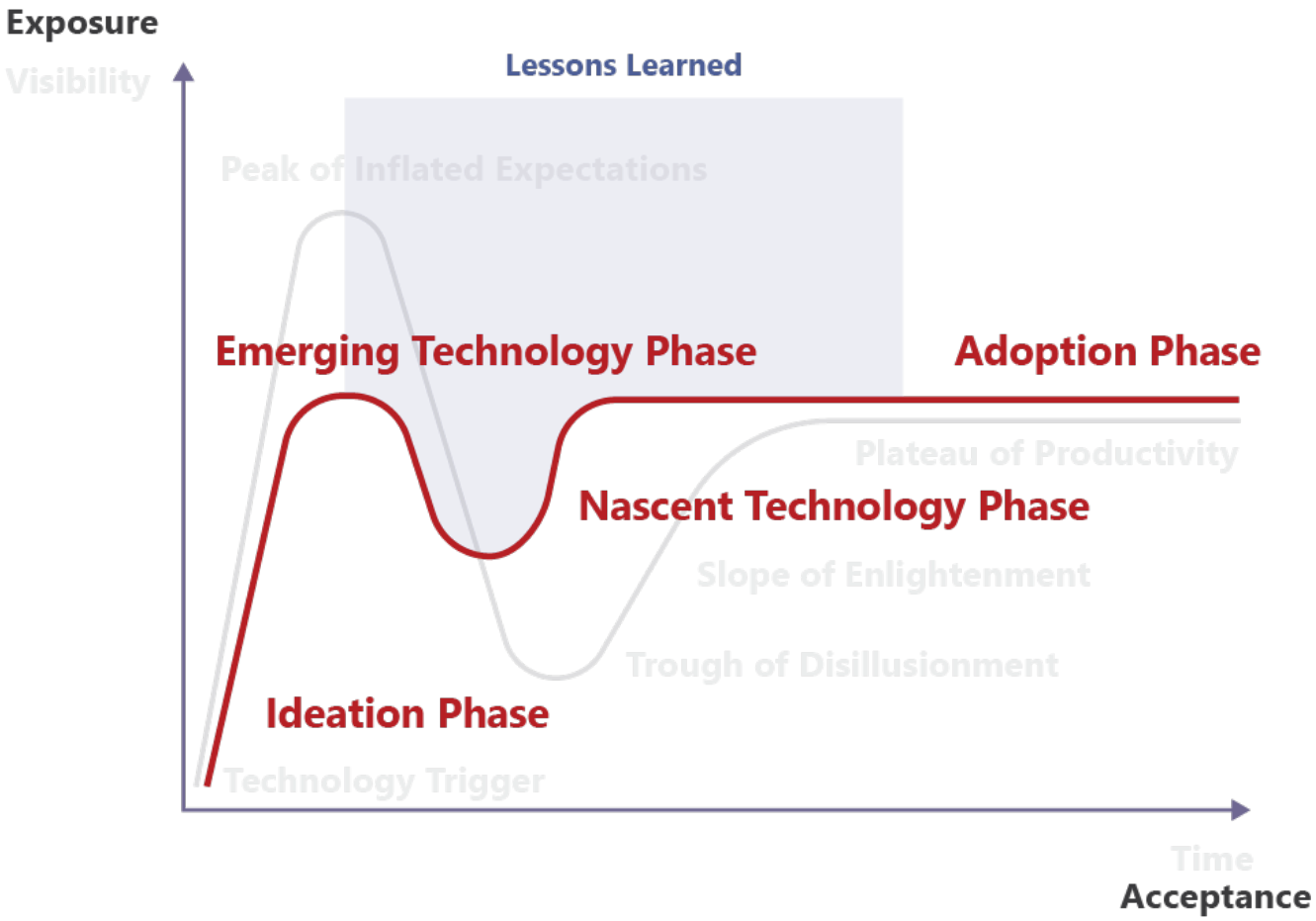
CEO, Route Reports

Innovation Phases

Gartner Hype Cycle




Exposure
Lessons Learned
Emerging Technology Phase
Adoption Phase
Nascent Technology Phase
Ideation Phase
Acceptance


Exposure
Visibility
Lessons Learned
Peak of Inflated Expectations
Emerging Technology Phase
Adoption Phase
Plateau of Productivity
Nascent Technology Phase
Slope of Enlightenment
Trough of Disillusionment
Ideation Phase
Technology Trigger
Time
Acceptance

SPACEFLORIDA

BE WHERE NEW IDEAS TAKE OFF™

Empowering Innovation
Florida Automated Vehicle Summit
September 2024

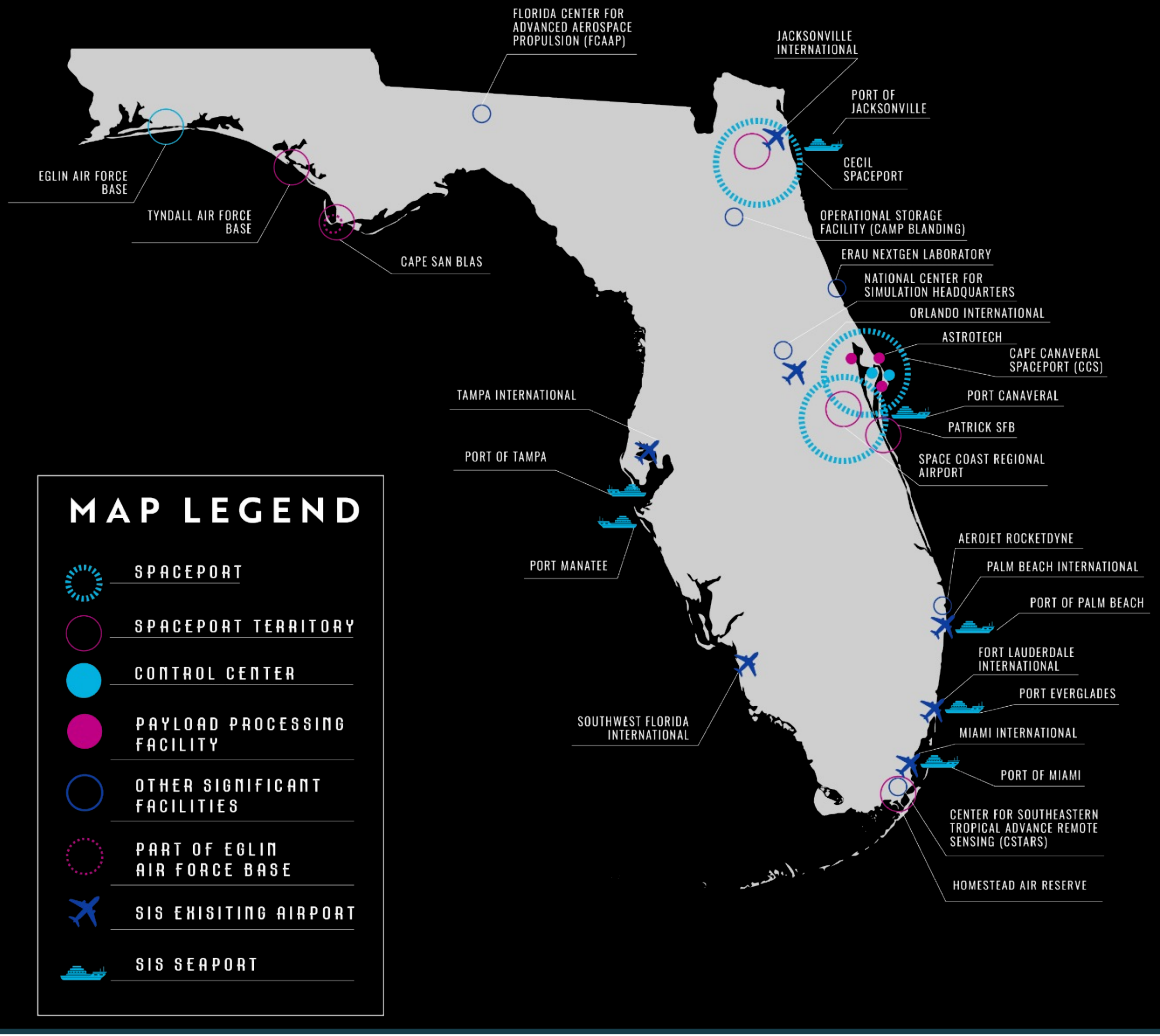
WHO WE ARE + WHAT WE DO

Space Florida is the state's **aerospace** finance and development authority. In 2006 a unique state statute was enacted that would open the door to more creative financing options and infrastructure access – making aerospace ventures much easier to launch. This attracted even more aerospace activity to the state. And every new deal brought new ideas and broader experience to the Space Florida community.

Today, Space Florida offers leading aerospace companies **unrivaled experience, unmatched financial tools**, and **an unbeatable location** for their new initiatives.

Space Florida: Be Where New Ideas Take Off ™

FLORIDA'S SPACEPORT SYSTEM



PORTFOLIO + BUSINESS AREAS

From spaceport authority operations and business development roles, Space Florida brings finance, business, and industry experts who have proven they know exactly what it takes to launch successful, groundbreaking aerospace initiatives.

Spaceport Authority

- Develop Infrastructure
- Statewide Planning
- Build, Own, Lease, & Operate
  - Launch Complex 46 and 20
  - Exploration Park
  - Launch & Landing Facility

Business Development

- Statewide aerospace projects in both spaceport and non-spaceport territory
- Diverse financial toolkit of capital programs, structure providing financial and tax efficiencies, infrastructure investment, conduit financing
- Simplify treasury, tax, and intercompany issues

“AEROSPACE” TARGET MARKETS

$68 Billion
Global advanced air mobility market by 2032

$421 Billion
Global MRO market by 2030

$7 Billion
Global flight simulator market by 2030

$642 Billion Aircraft manufacturing market by 2033

$23 Billion
Global satellite manufacturing & launch systems market




OUR CAPITAL PROJECTS PIPELINE

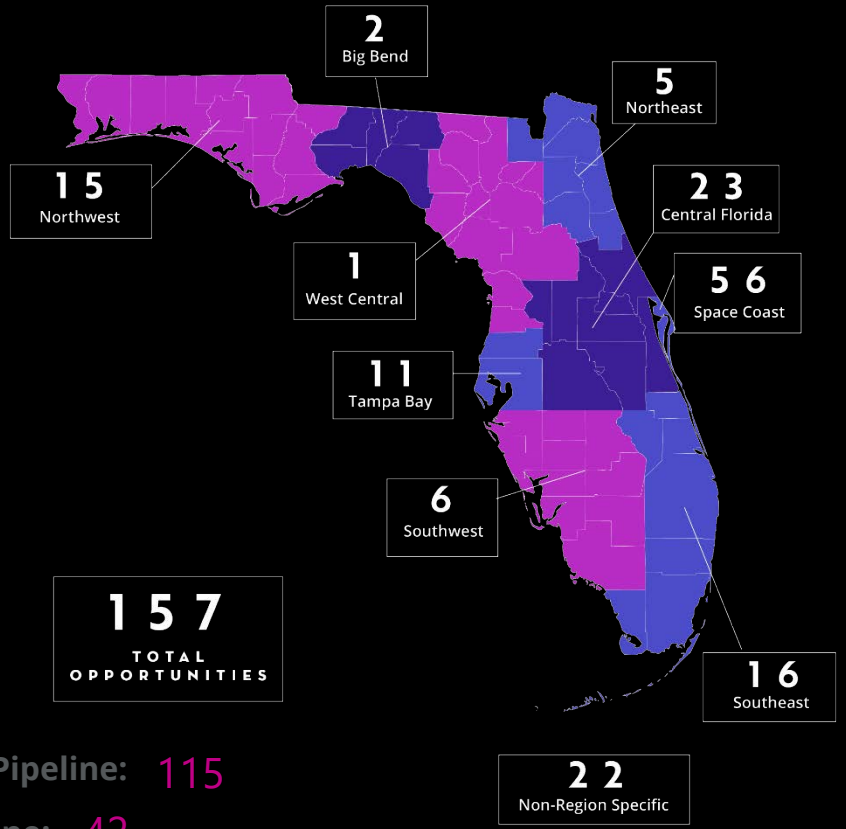
Southeast: 16 Projects
Southwest: 6 Projects
Central Florida: 23 Projects
Space Coast: 56 Projects
Tampa Bay: 11 Projects
Northeast: 5 Projects
West Central: 1 Project
Big Bend: 2 Projects
Northwest: 16 Projects
No Specific Region Selected: 21 Projects

107 Leads, 40 Opportunities, 10 Closing

Total Non-Spaceport Opportunities in Current Pipeline: 115

Total Spaceport Opportunities in Current Pipeline: 42

STATEWIDE ECOSYSTEM

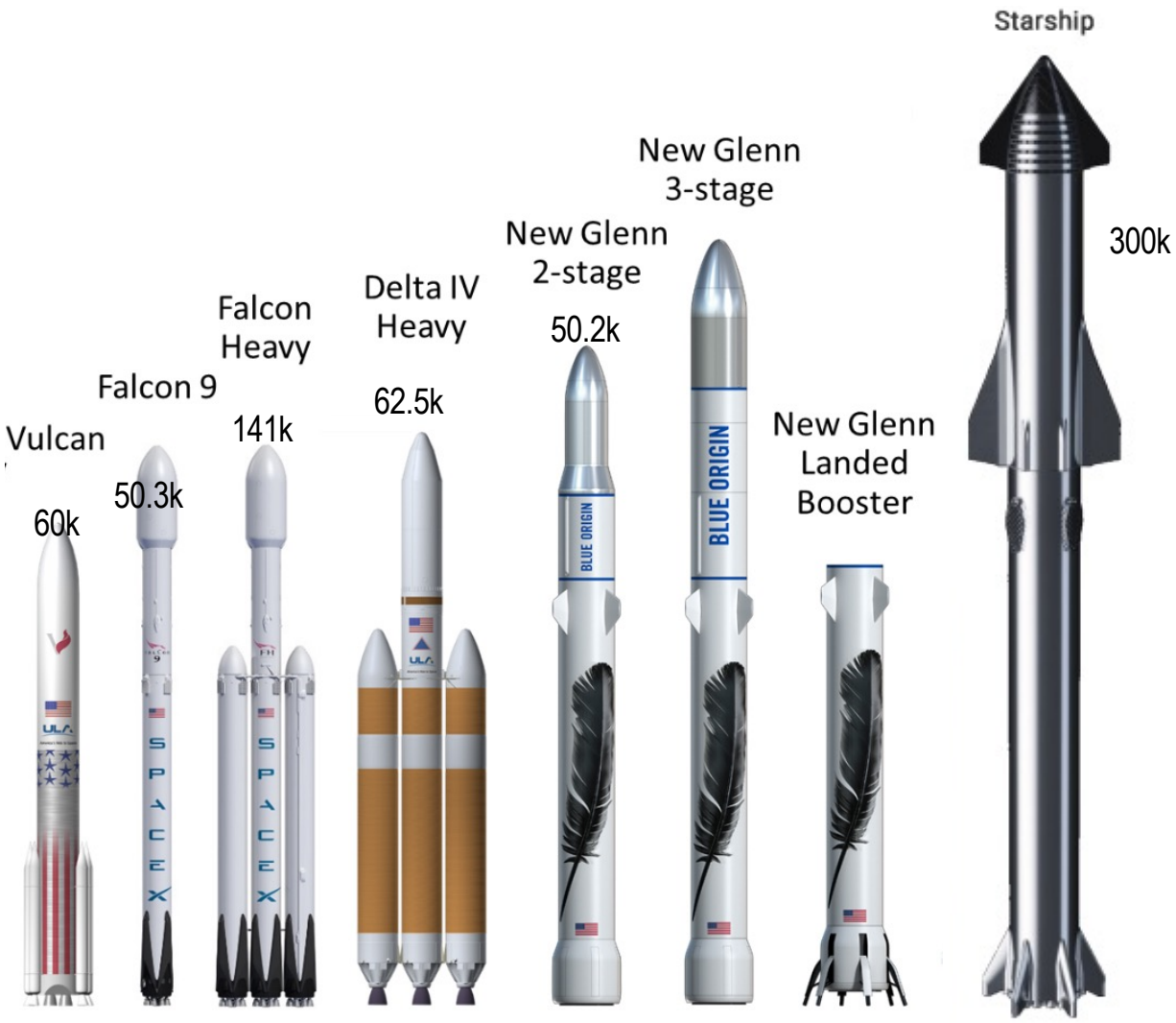


INTEGRATED SPACE-EARTH ECONOMY

SPACEFLORIDA
BE WHERE NEW IDEAS TAKE OFF™

THE INTEGRATED SPACE-EARTH ECONOMY ENCOMPASSES ECONOMIC ACTIVITIES AND ADVANCEMENTS THAT OCCUR BETWEEN EARTH AND THE MOON. WE ARE APPROACHING A FUTURE WHERE EVERYTHING FROM ENERGY PRODUCTION TO TOURISM WILL BE HAPPENING IN SPACE AT SCALE. AND THAT REQUIRES CRITICAL INFRASTRUCTURE SYSTEMS— SIMILAR TO TERRESTRIAL TRANSPORTATION NETWORKS—THAT ARE MULTI-MODAL AND INTERCONNECTED TO SUPPORT THIS ECONOMIC ACTIVITY. FLORIDA IS WELL POSITIONED TO BECOME THE GLOBAL FOR THE CISLUNAR ECONOMY, DRIVING GLOBAL INTERPLANETARY AEROSPACE COMMERCE FROM THE STATE.


REUSABILITY LOWERING
COST OF ACCESS TO SPACE



Increasing Cargo Capacity

Preparing for Lunar Transport and Operations

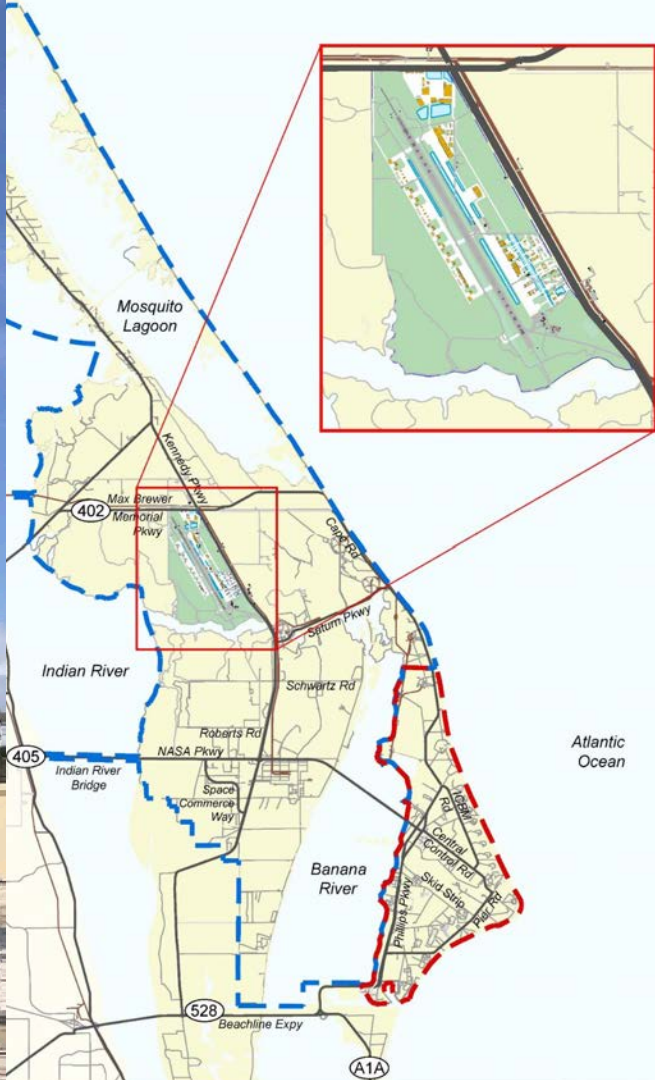
Spaceport Development

Spaceport Authority

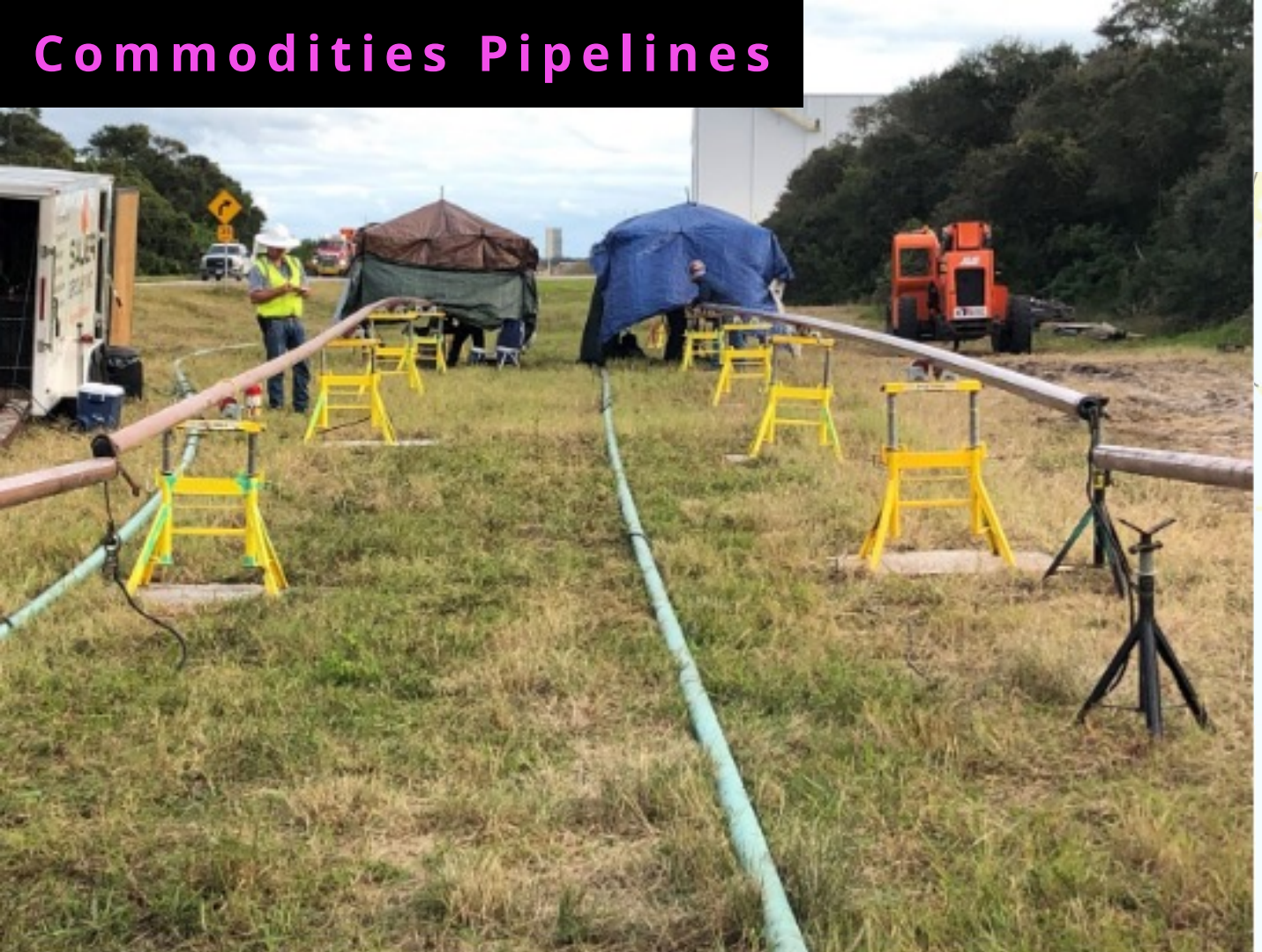
- Develop Infrastructure
- Statewide Planning
- Build, Own, Lease, & Operate
  - Launch Complex 46 and 20
  - Exploration Park
  - Launch & Landing Facility

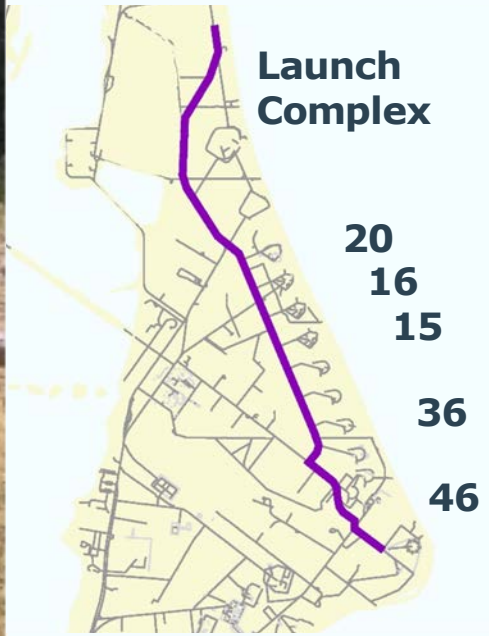
Supporting Quinti-Modal Transportation

Power Capacity



Commodities Pipelines





FDOT Spaceport Improvement Program
12 Year Snapshot

Spaceport Improvement Program (SIP)
Active and Pending Projects

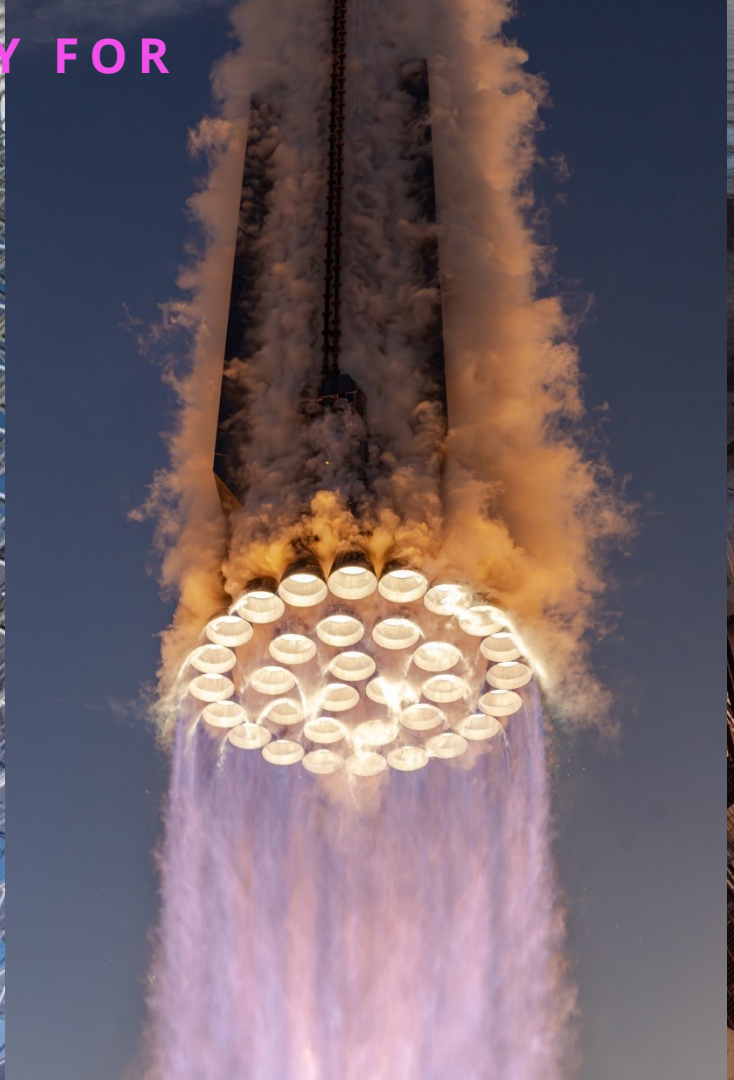
1. Roberts Road Corridor Development
2. Spaceport LLF East Area Development
3. Cecil Spaceport Infrastructure Improvements
4. Aerospace Manufacturing Facility
5. Launch Complex 20 Improvements
6. Next Gen Space Vehicle Launch Site Infrastructure
7. CCS Power Improvements Ph 2: Saturn Substation
8. LLF Airfield Improvements
9. Cecil Spaceport Utility Corridor
10. Area 57 West Facility Improvements
11. CCS Commercial Growth Wastewater System Improvements
12. Astronaut Training Facility
13. Lunar Production Facility
14. Satellite Payload Processing Facility at the LLF
15. Spaceport Transportation & Energy Common Use, Phase 1
16. Spacecraft Manufacturing & Operations Center at the LLF
17. Space Coast Spaceport Access Roadway
18. Spaceport Commodities Pipelines Extension
19. CCS On-Site Liquified Natural Gas Generation
20. LLF Surface Revitalization
21. Spaceport LLF East Area Development, Phase 2

Maritime Intermodal Study

Bridges Bridge Area of Influence Study

Consider factors in the replacement of the two bridges supporting NASA Parkway over the Banana River

FLORIDA IS READY FOR THE FUTURE



SPACEFLORIDA

BE WHERE NEW IDEAS TAKE OFF™

THANK YOU

Steven Bostel

sbostel@spaceflorida.gov

Remote Monitoring & Control of AV Fleets

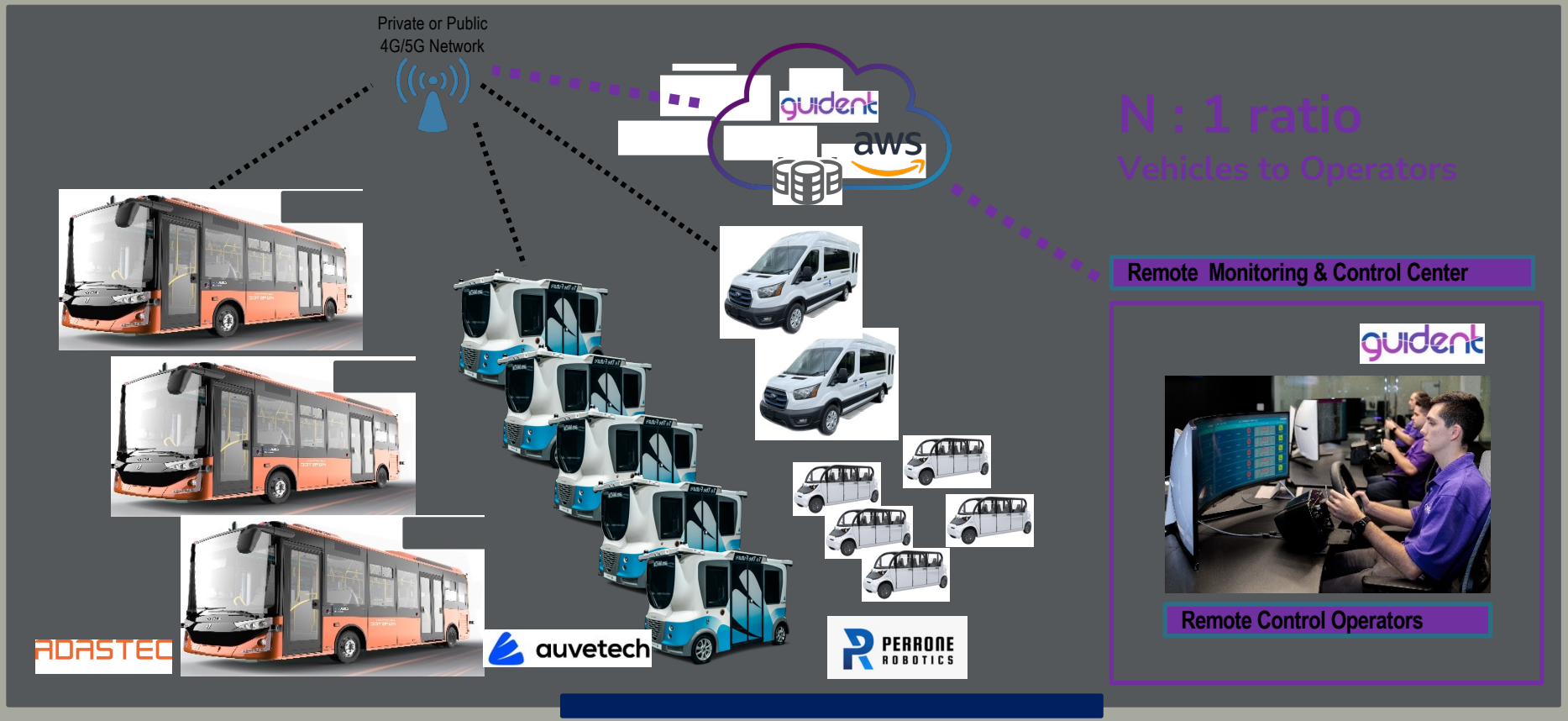
at customer site, or as a service

Towards AV Commercial Deployments

The Value of Teleoperations

Navigation Edge Cases	The magnitude of AV Navigation edge cases is significant.
AV Uptime Performance	Up to 10% gap to complete the mission.
True L4 Autonomy	The Safety Driver must be removed!
Multiple AV form factors	Bespoke & FMVSS Buses – Shuttles – Vans – Street Legal LSV

Remote Monitoring & Control
Fleets of AVs



Wireless Connectivity

Quest for real time

Ultra Low Latency - Glass to Glass

Public Wireless

verizon

Private Wireless

Airspan

Satellite

SPACE FLORIDA

NOVELSAT

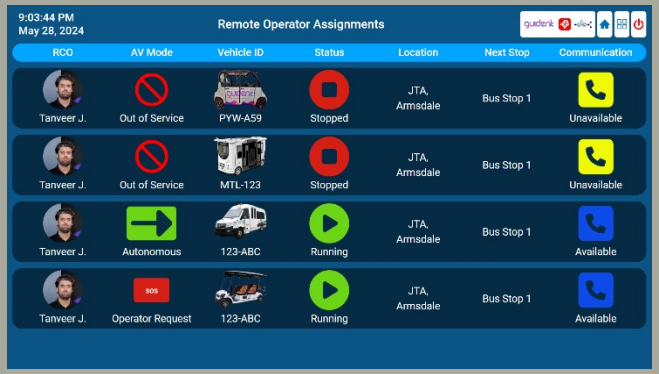
Satellite Communications

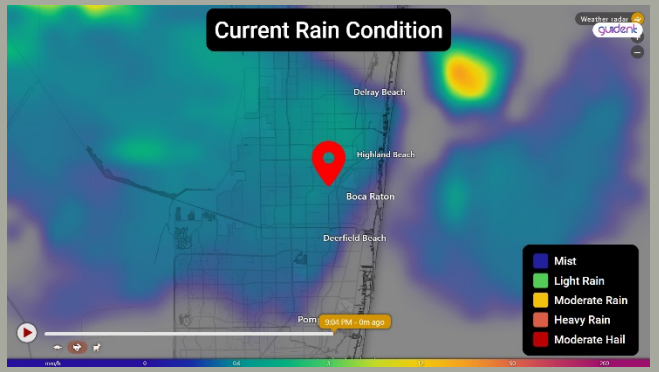
Space Florida Grants

Ubiquitous Communications	Rural & Low Wireless Coverage.
International Cooperation	Space Florida & IIA.
2023 Grant – GEO Satellite	VTU integration to Satellite Communications.
2024 Grant – LEO Satellite	Lower Orbit.

Remote Monitoring & Control Center
at customer site, or as a service

- ✓ Software Stack
- ✓ Agnostic to AV / ADS
- ✓ Integrated to ADS
  - ▪Cloud Integration
  - ▪VTU H/W





Real Time 3D Dashboard

Geofenced domain

Remote Driving
HITL

Slow Speed Drive / Short Distance

ADS Request

Situational Awareness

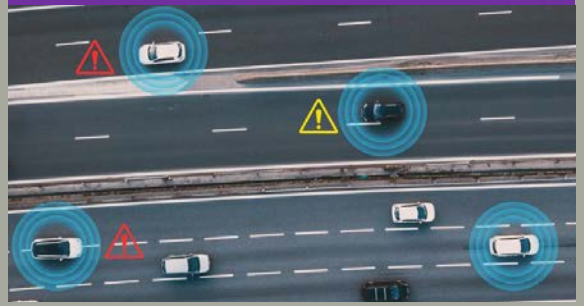
Remote Drive

Remote Control Options

HITL

Human-in-the-Loop

Remote Monitoring



Remote Assist

Remote Drive

Remote Control

Communications Modules

Human touch

Always in Communication

Passenger A / V Communications

Motion Alert Signaling

Pedestrian Interaction

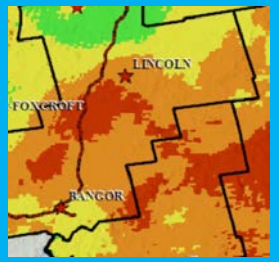
AI Predict & Prevent Module

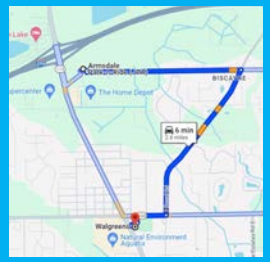
Impactful Alerts

Incident Risk Level

Real Time Data Source Integration

Weather & Traffic





Work Zones

First Responders

Public Acceptance of Autonomous Vehicles

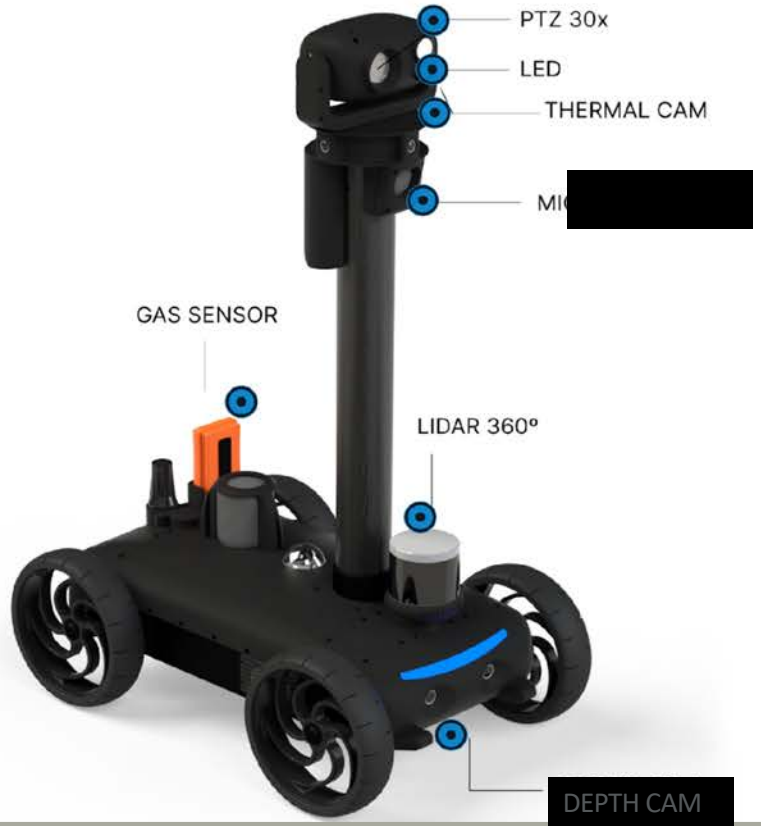
Value of Teleoperations

- Compact – 8 seats
- Cruising speed electronically limited up to 20 mph
- Daily operating uptime: 22 hours
- Fast charging time: 55 min
- Cameras: 360° view with 10 external cameras
- LiDARs: 360° sensing system with 7 LiDARs


To the future
BRiC
BRiC
auvetech
Monitored and Teleoperated by
guident
guident
Autonomous Intelligence
guident

Autonomous Surveillance / Inspection Robot

Outdoor / All Terrain



Autonomous Surveillance Robot

Scheduled Missions

guident

Public Acceptance of Autonomous Vehicles

Value of Teleoperations

ROUTE REPORTS

Technological Trust	Human-in-the-Loop and passenger communications.
Job Displacement	Work force development path to move operators from the “**bus to the desktop**.”
Safety Concerns	**Most important**, move AV to side of the road to prevent traffic obstruction.

Public-Private Partnership Innovation

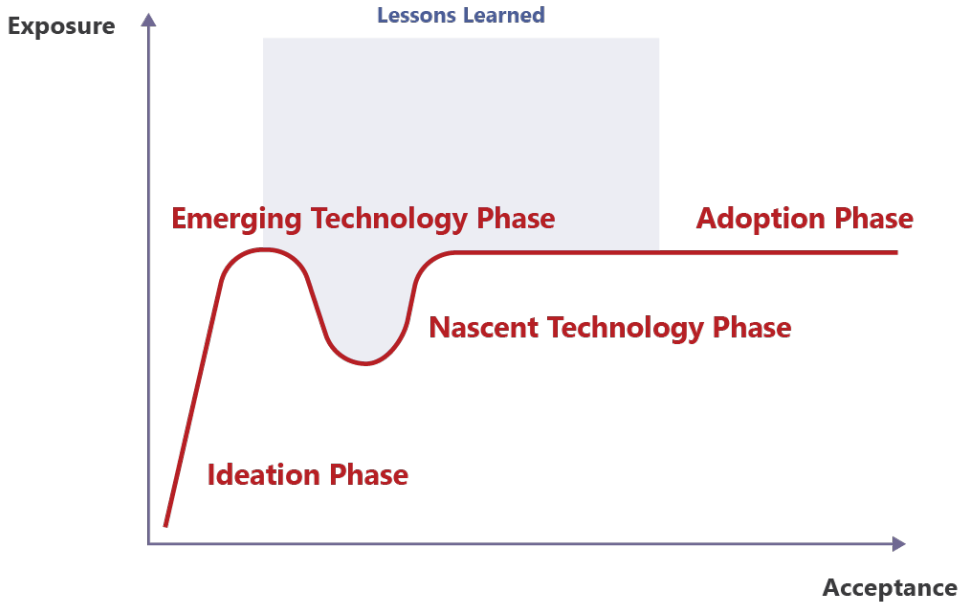
Session: Empowering Innovation – Bringing Concepts to Reality

September 5, 2024

Cavnue aspires to be the world's leading smart road developer

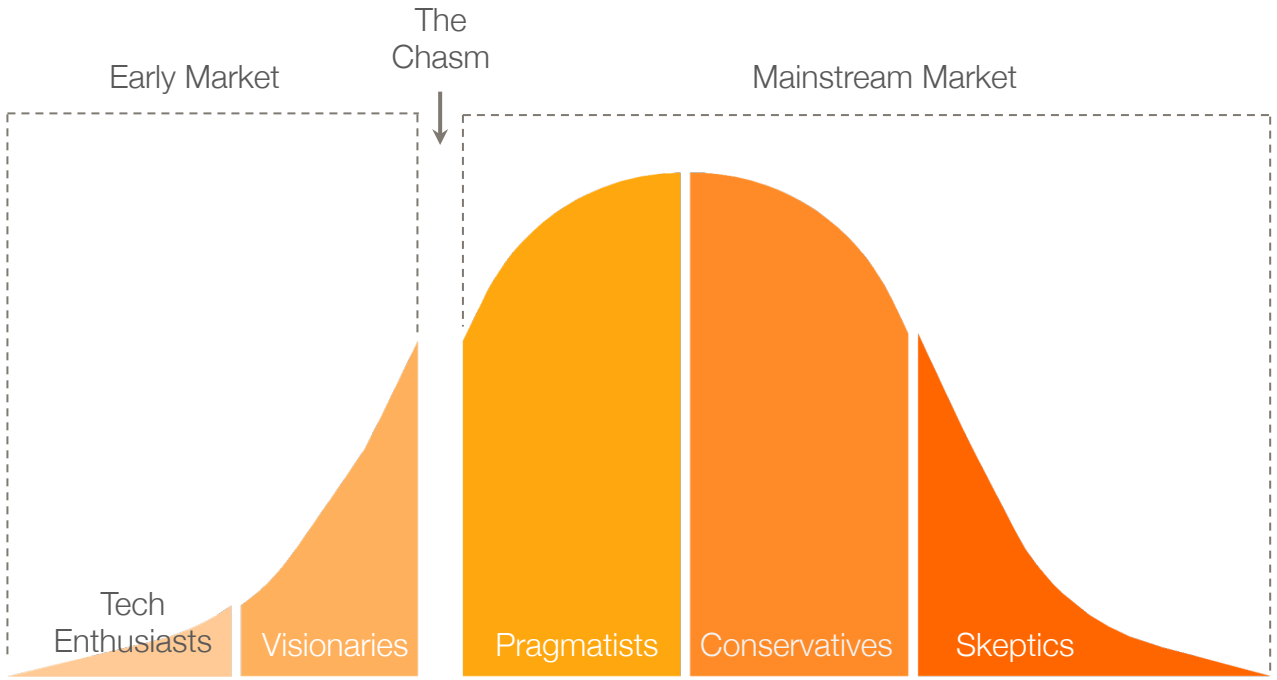
Through performance-based road management contracts, we deliver digital and physical infrastructure improvements that enable the **safe**, **efficient** and **automated** transportation of goods and people.

From the private company point-of-view



From the private company point-of-view

Why is it so difficult to “cross The Chasm” in the government transportation market?



Our path across The Chasm

Industry Problems

1. Rising maintenance costs & unsustainable funding source for roads
2. Deteriorating safety & congestion conditions on most trafficked roadways
3. Must “squeeze more from the lemon” - can’t build our way out of congestion

Proven Outcomes

- Automated detection has proven to reduce emergency response times and improve traveler awareness
- Active traffic demand management strategies involving driver guidance have proven effective
- Advanced driver assistance systems are improving safety and can go further with infrastructure awareness

However, all are limited in footprint and scale

Shared Incentives

1. Public agencies face challenges in funding (and even more so maintaining) technology projects
2. Private industry is motivated by long-term, sustainable opportunities
3. Public agencies must clearly deliver public benefits
4. Private companies can be incentivized based on performance outcomes

Are we clear on the problems that we're solving? And for whom?

We alert drivers and vehicles to:

- Hazards ahead (e.g. crashes, VRUs, stalled vehicles, queues)
- Recommended speeds
- Recommended lanes

We alert road operators to:

- Incidents (crashes)
- Hazards (e.g. stalled vehicles, debris, queues)
- Traffic conditions
- Emerging safety risk locations
- Road health conditions

We standardize the roadway environment with:

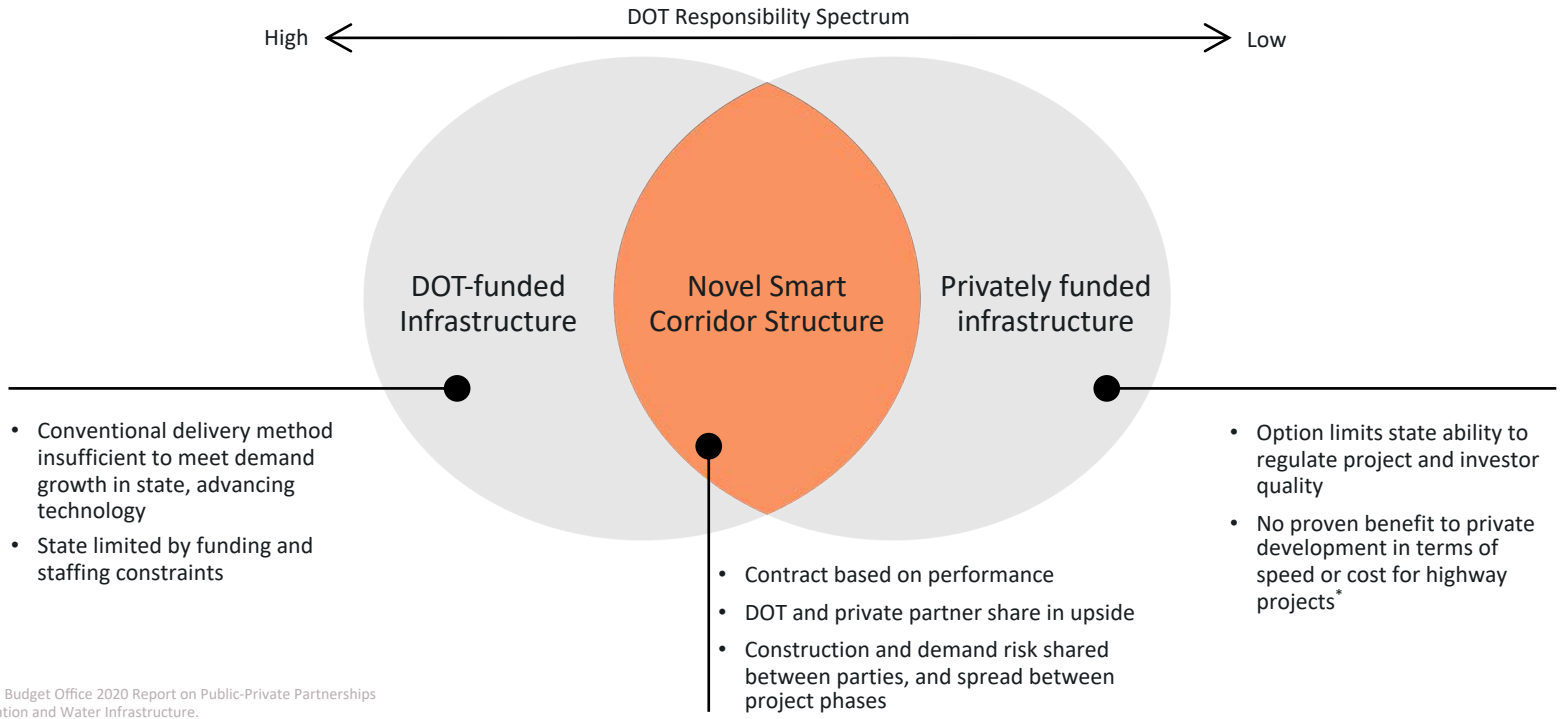
- Lane markings
- Lighting
- Pavement
- Lane separation

Are we clearly articulating (and proving) the outcomes and benefits?

	Digital Infrastructure		Civil Infra	
USDOT Safe Systems Principles	**Alert Drivers & Vehicles**	**Alert Road Operators**	**Standardize the Roadway**	**Indicative Public Benefit Outcomes[1]**
Safer People: Actionable alerts to drivers enables safer driving decisions. VRU detection reduces risk to workers and stalled vehicles.	●			▸ Reduce rates of distracted and aggressive driving by 10-20%.
Safer Roads: Standardized roadway. Faster removal of roadway hazards. Trend analysis and proactive roadway management.	●	●	●	▸ Reduce crashes and associated delay by 29%.
Safer Vehicles: Standardized operating environment for evolving fleet. Alerts to vehicles extend planning horizon and mitigates risk.	●		●	▸ Eliminate 1% per vehicle per year secondary crash risk.
Safer Speeds: Deliver speed advisory based on real time roadway conditions, encouraging safe speeds when approaching queues.	●	●		▸ Reduce non-recurring delay by 26% ▸ Reduce idling emissions by 35%.
Post Crash Care: Reduce crash detection time for road operators. Reduce non-recurrent congestion, improving EMS response times.		●		▸ Reduce detection time from national average of 15 min to <1 minute for crashes and incidents.

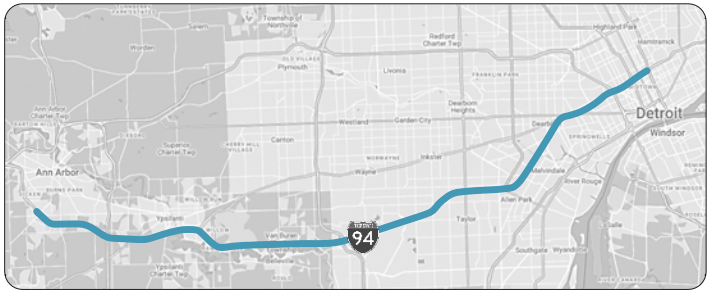
1 –These metrics are an early derivation of how Cavnue's solution can improve roadways and are purely based off the

Can we identify shared incentives?



* Congressional Budget Office 2020 Report on Public-Private Partnerships for Transportation and Water Infrastructure.

Our path from Proof of Concept to Reality



Background

- Public-private partnership model driving transformation of the roadway to integrate with connected and automated vehicles (CAVs)
- Cavnue was selected by the Michigan Department of Transportation (MDOT) to develop a delineated lane on I-94 between Detroit and Ann Arbor
- Gov. Whitmer announces “landmark project and partnership” in 2020

Initial Project Overview

Initial Route	Initial Length	Total Traffic	Primary Use Case	Economic Model
INTERSTATE 94	**27** Miles	**~100k** Daily Vehicles	PassCar	**Tolled CAV Lane**

Project Outlook

- Completed development of initial 3-mile proof of concept (“POC”) in May 2024
- Implementing POC testing with MDOT and automotive OEM partners in 2024-25
- Project phased for strategic alignment to reconstruction and maintenance plans

Thank you

Chris Armstrong
Vice President, Product
chris.armstrong@cavnue.com

ROUTE REPORTS

Route Reports

Empowering Innovation, Bringing Concepts to Reality

About Route Reports

- Route Reports is a technology company based in London
- Route Reports monitors over 22,000 miles of road and 20,000 miles of rail across the UK, Channel Islands, and the USA.
- Route Reports has extensive experience in helping our customers adopt technology to simplify manual processes.

Road intelligence for:

Surrey County Council
Kent County Council
Central Florida Expressway Authority
Peterborough City Council
Conway
Government of Jersey
Milestone Infrastructure
Department for Infrastructure
Pierce County

Rail intelligence for:

Network Rail
porterbrook
GTR
ScotRail
Southern
Gatwick Express
Thameslink

Central Florida Expressway & Route Reports

CFX's **125 mile** user-funded system includes:

- 815 center lane miles
- 72 interchanges
- 19 mainline tolling facilities
- 74 ramp tolling facilities
- 342 bridges
- 8 named expressways

- CFX currently has **4 devices fitted to vehicles travelling this network** to maximise efficiency within their workforce

Why have CFX deployed Route Reports?

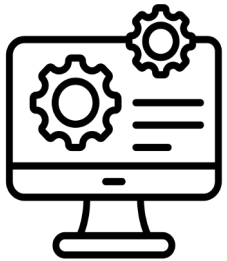
Previously:

- Inspectors have to step on to the road, creating **unsafe conditions** when measuring defects
- Responding to road user concerns requires **lengthy driven inspections**
- Difficult to know the **entire state of the road network** at any given time

Innovation Overview

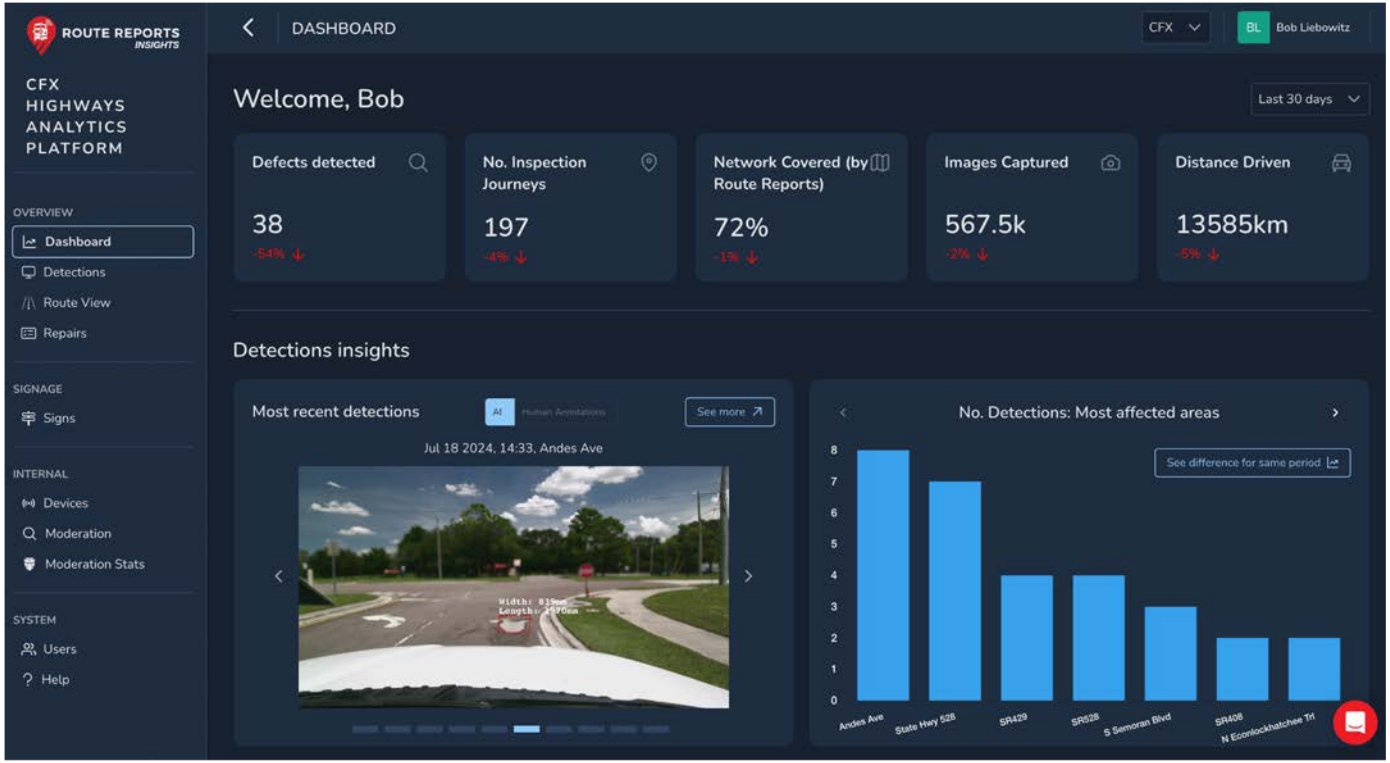
Purpose built devices and cameras analyse and transmit live data and anonymised imagery from your vehicles over 4G.

Data is displayed instantly on our online platform.

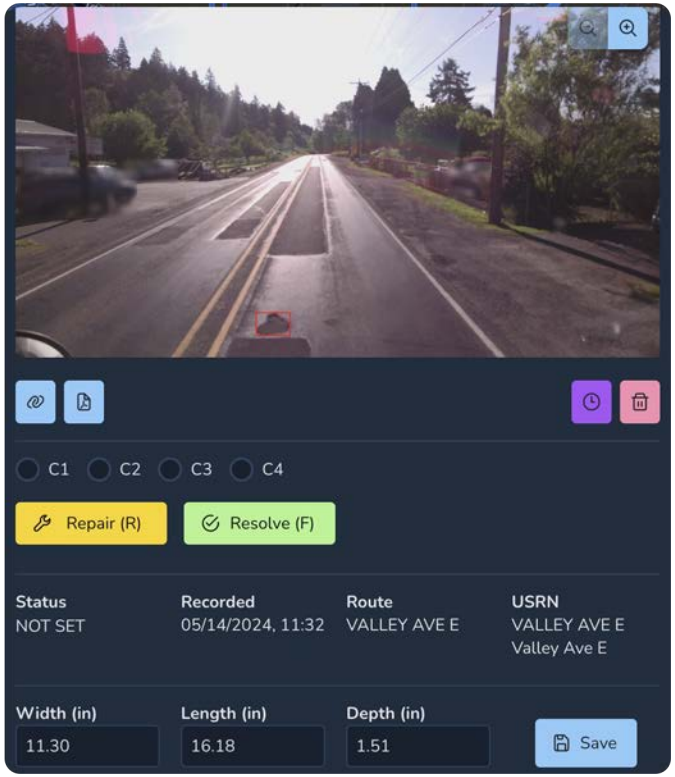


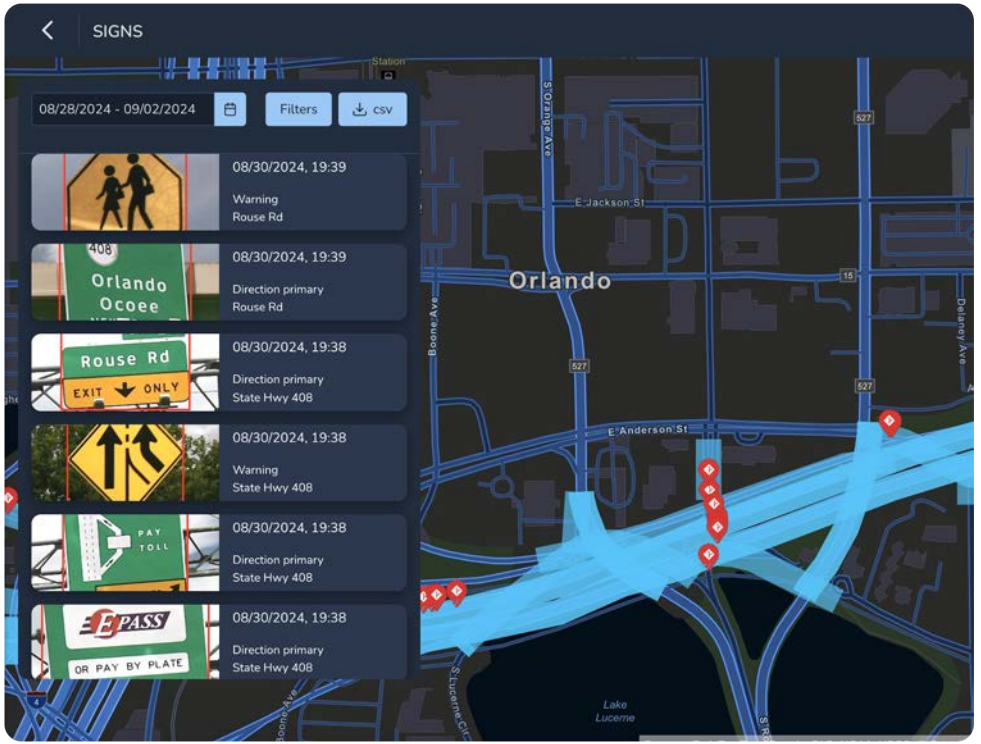
CFX are then able to send detailed reports to their contractors

One location for all highway data

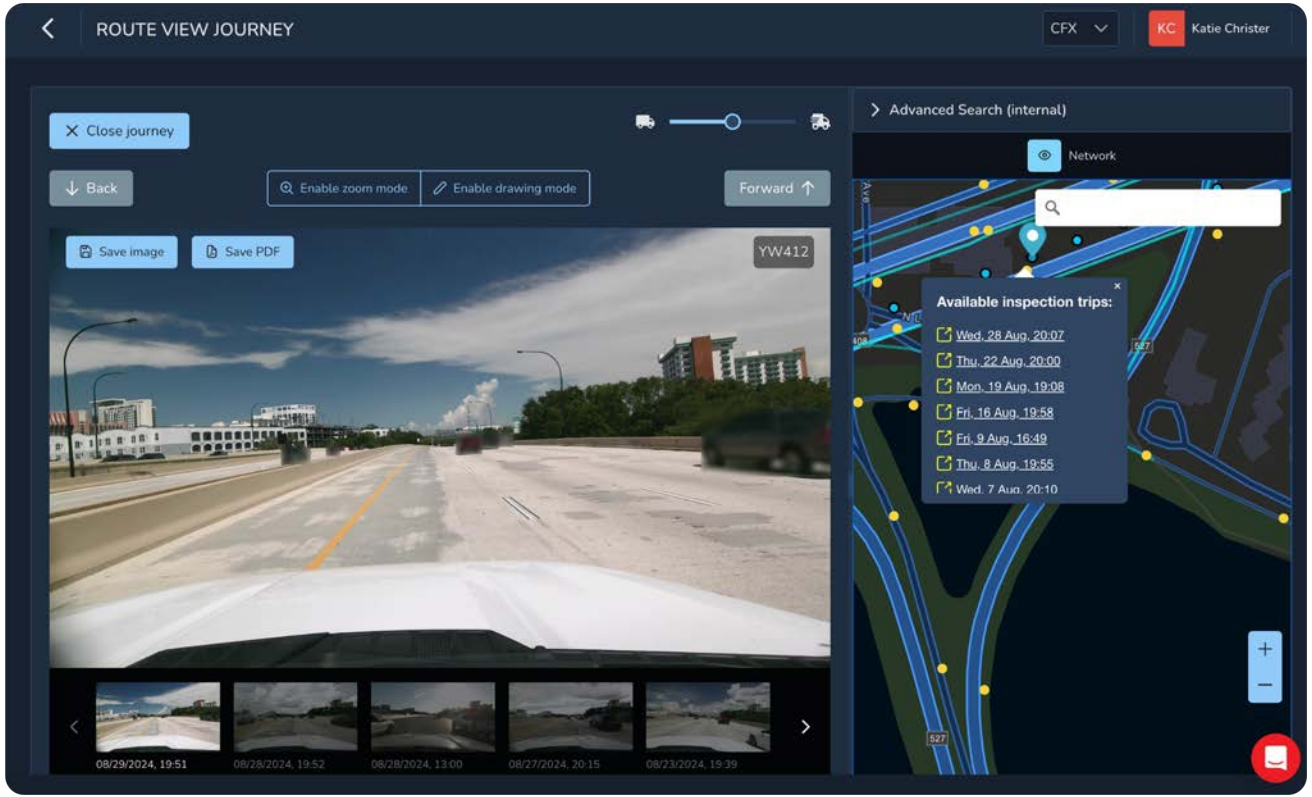


Automated Detections for defects & signs





Route View


ROUTE VIEW JOURNEY
CFX
KC
Katie Christer
Close journey
Back
Enable zoom mode
Enable drawing mode
Forward
Save image
Save PDF
YW412
08/29/2024, 19:51
08/28/2024, 19:52
08/28/2024, 13:00
08/27/2024, 20:15
08/23/2024, 19:39
Advanced Search (internal)
Network
Available inspection trips:
Wed, 28 Aug, 20:07
Thu, 22 Aug, 20:00
Mon, 19 Aug, 19:08
Fri, 16 Aug, 19:58
Fri, 9 Aug, 16:49
Thu, 8 Aug, 19:55
Wed, 7 Aug, 20:10
527

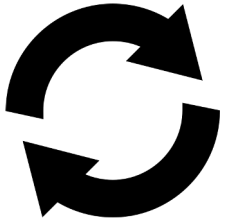
Benefits

Time and cost saving

Less manual work is required to log basic defect & sign information.

Safety

Defects can be recorded at traffic speeds



Repeatability & Efficiency

Quicker inspections and responses to hazards

Questions/Discussion

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