AI-ITMS
The Next Phase of Delaware Department of Transportation's Integrated Transportation Management Program

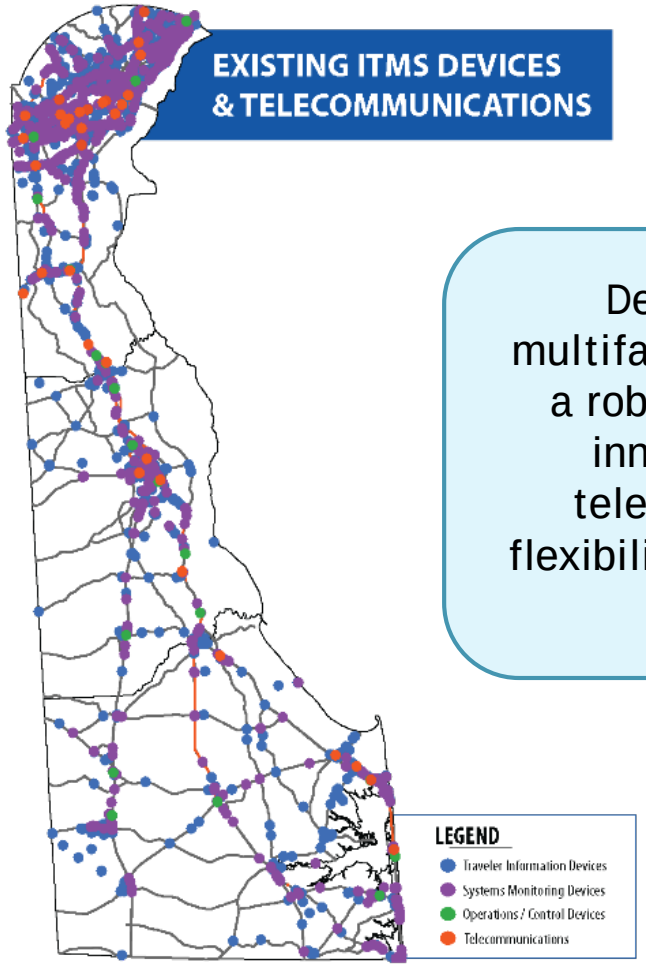
Raising Awareness of Artificial Intelligence for Transportation System Management and Operations

Delaware Department of Transportation (DelDOT)

Gene S. Donaldson, DelDOT TMC Operations Manager

https://deldot.gov/programs/itms

DelDOT's Integrated Transportation Management System (ITMS)



DelDOT's existing multifaceted ITMS provides a robust foundation for innovation built on telecommunications, flexibility and an adaptable system

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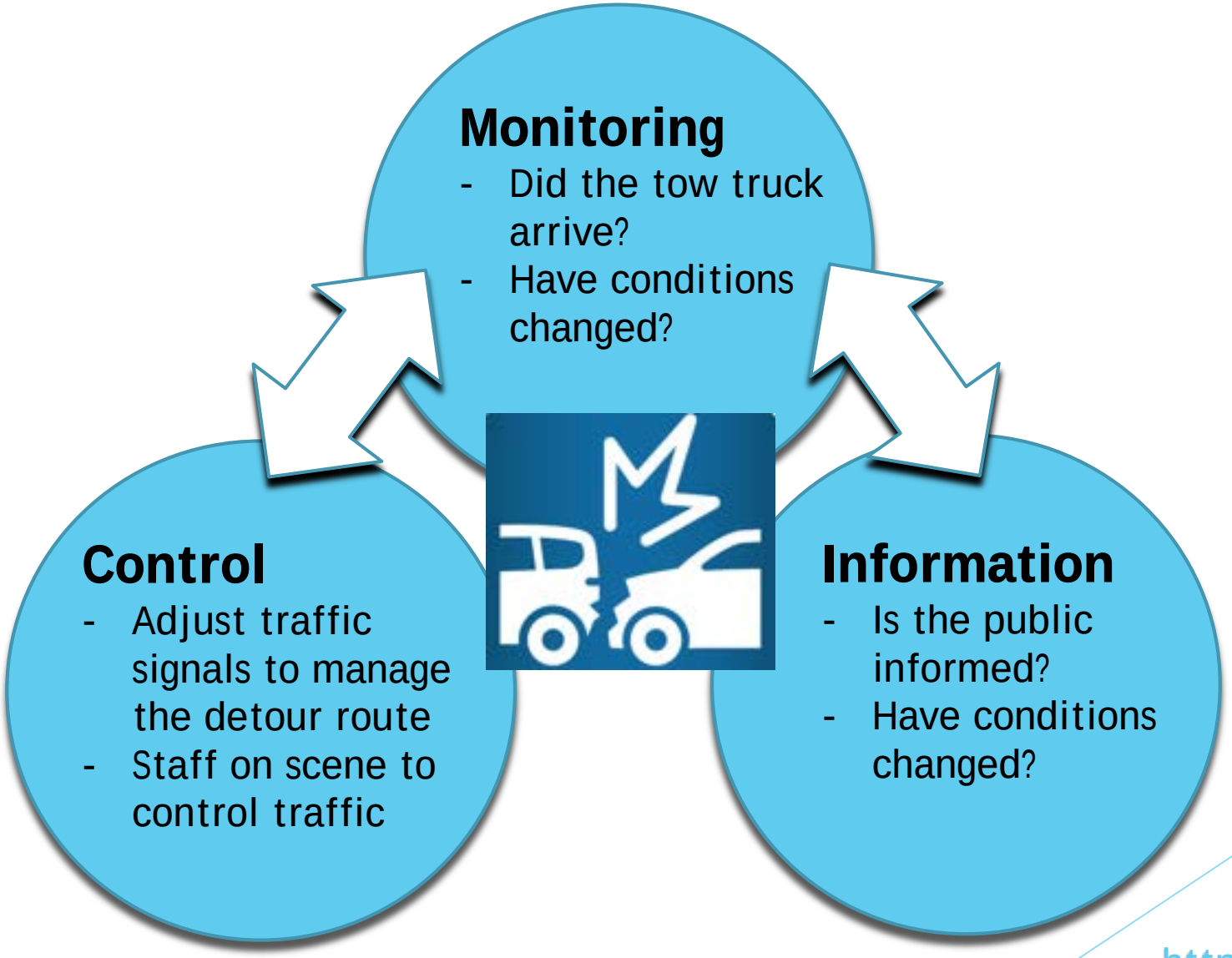
Critical Functions of ITMS



DelDOT ITMS Strategic Plan

https://deldot.gov/Publications/index.shtml

- 2017 update to the ITMS Strategic plan
- Addresses emerging technologies and DelDOT's existing leverage for implementation:
  - Telecommunications Network
  - Traffic Signal and Intelligent Transportation System (ITS) Device Integration into Transportation Management Center (TMC)
  - Transit Integration
  - DelDOT Mobile Application
- The next phase of ITMS will incorporate Artificial Intelligence (AI) and Machine Learning (ML)

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Artificial Intelligence-enhanced ITMS Objectives

- **Create** and **maintain** an enhanced ITMS that will predict traffic anomalies and adapt management and operations in real-time for current and predicted traffic conditions.
- Adopt and deploy **AI and ML** technologies to **automate** multimodal system tasks (e.g. data collection, analysis, decision support, and solution evaluation processes)
- **Monitor** all components of DelDOT's ITMS and **optimize** performance to improve **safety, mobility, sustainability, economic vitality, and air quality**
- Prepare DelDOT's TMC to integrate **emerging transportation technologies** more efficiently and effectively

DelDOT ATCMTD Grant Award

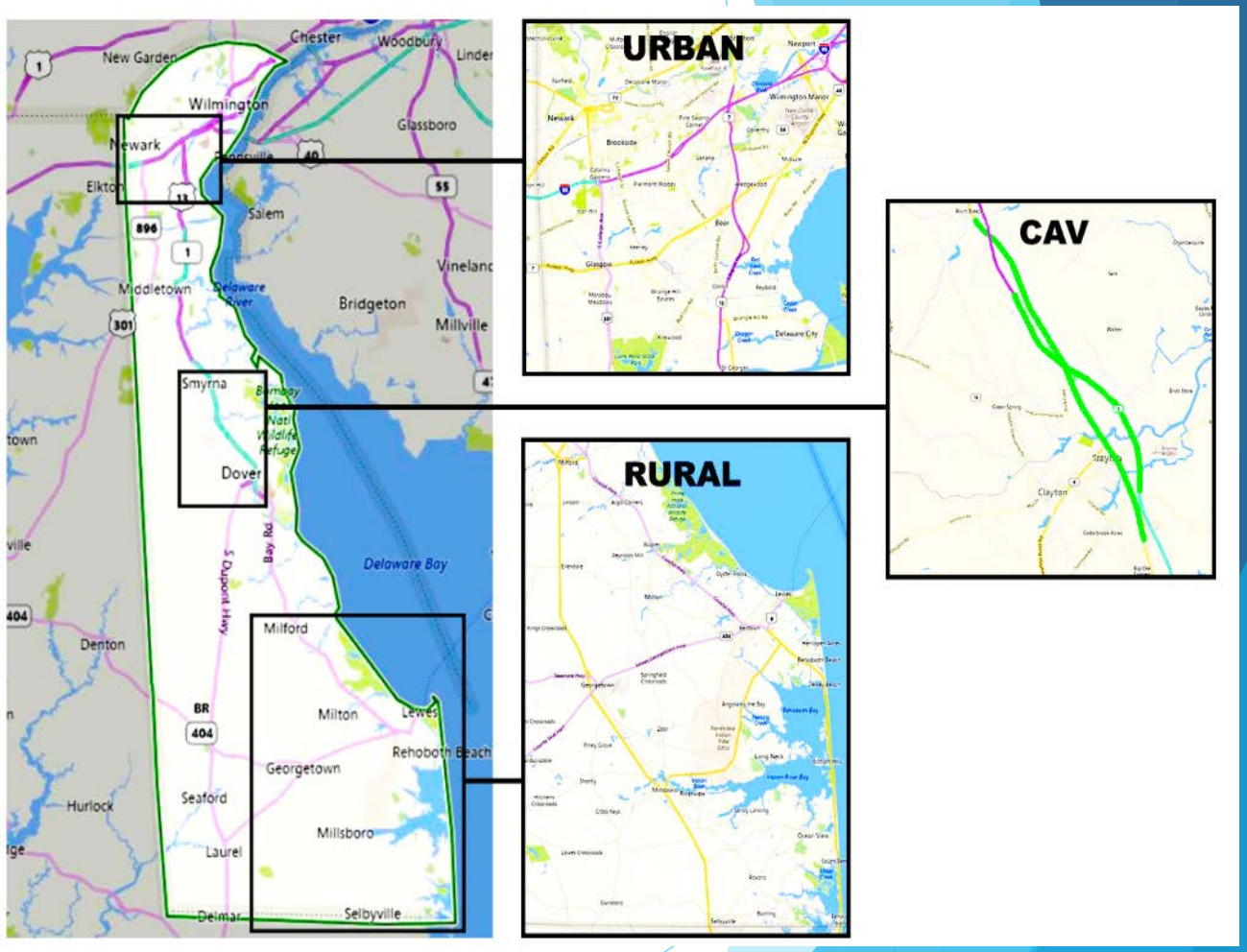
- Advanced Transportation and Congestion Management Technologies Deployment (ATCMTD) Grant program:
  - Established under the Fixing America's Surface Transportation (FAST) Act to create competitive grants to deploy advanced transportation technologies with the goal of improving safety, efficiency, system performance, and infrastructure return on investment.
- DelDOT proposed the AI-ITMS for the FY 2018 ATCMTD Grant Program
  - After reviewing 51 applications, FHWA selected 10 to receive grant funds
  - DelDOT was awarded a $4.9M ATCMTD Grant in April 2019.
  - The State of Delaware matched grant award for a total project cost of $10M.

"These highly innovative projects offer high-tech solutions to relieve congestion and improve safety and efficiency on the nation's highways,"

- Elaine L. Chao, U.S. Transportation Secretary

AI-ITMS Deployment

- Implementation will occur over a duration of **three** years in **three** project areas.
- The project team is led by the **DelDOT Division of Transportation Solutions,** supported by:
  - **Jacobs Engineering** – Program Management Consultant
  - **Intelligent Automation, Inc. (IAI)** – Technical Consultants
  - **Voice4Impact** - Crowdsourcing
  - **University of Delaware** – supporting program evaluation by monitoring and reporting on project and program benefits



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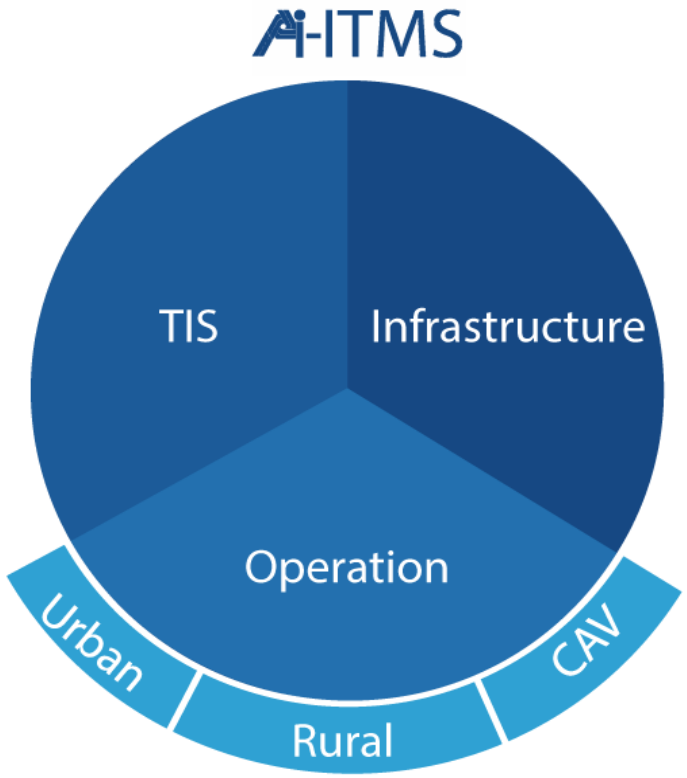
AI-ITMS Deployment

Traveler Information System

Update the DelDOT website and mobile application to better inform the public of the information generated by the AI-ITMS program. Enhance crowdsourcing capability



Infrastructure

Upgrade and deploy advanced sensors, video cameras, connected infrastructure, and transportation management system hardware and software to support the deployment of AI-ITMS.

Operation

Development, integration, deployment, and testing of the AI-based software; includes three subprojects in distinct traffic networks: **Urban**, **Rural**, and **CAV**.

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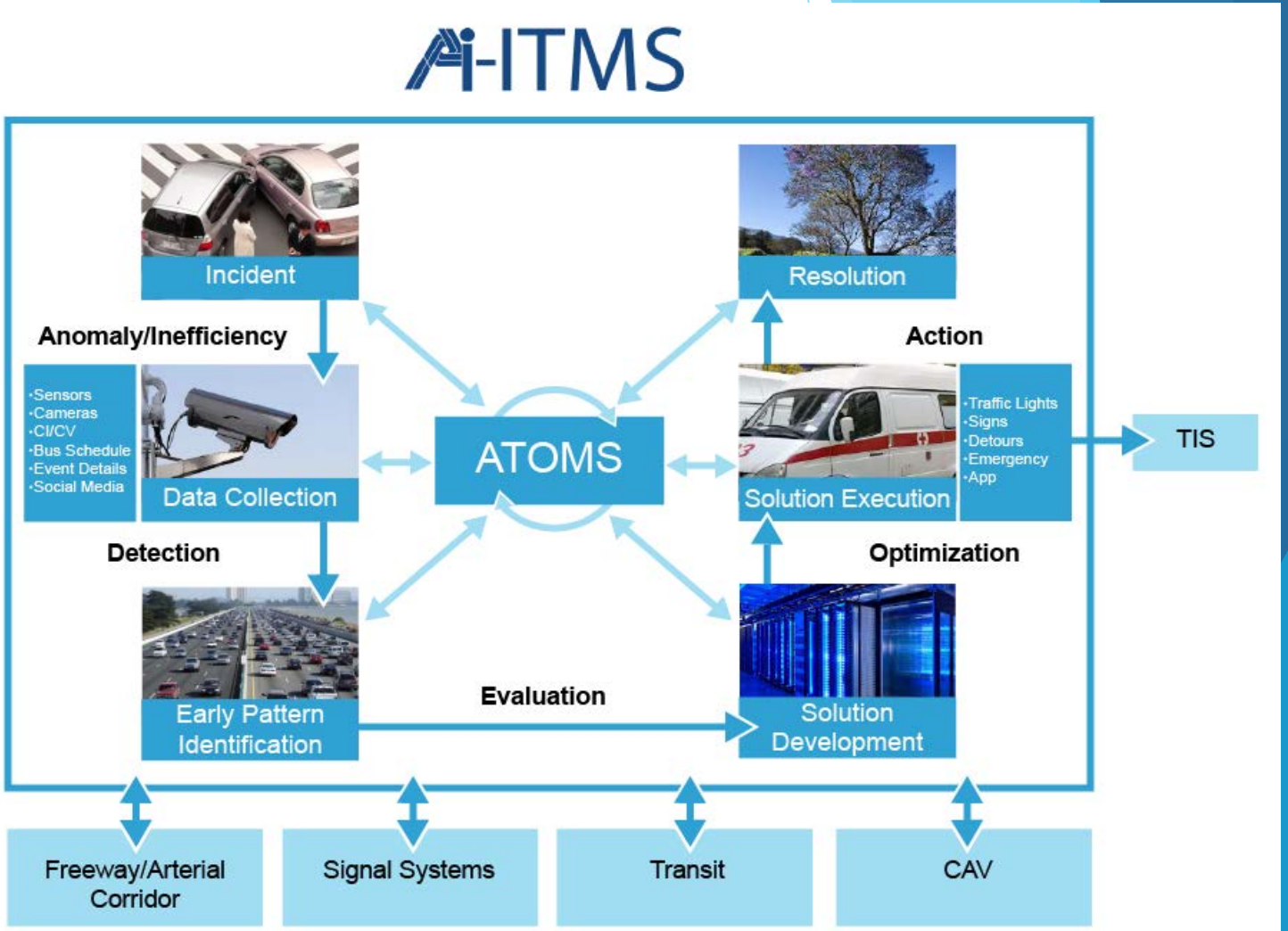
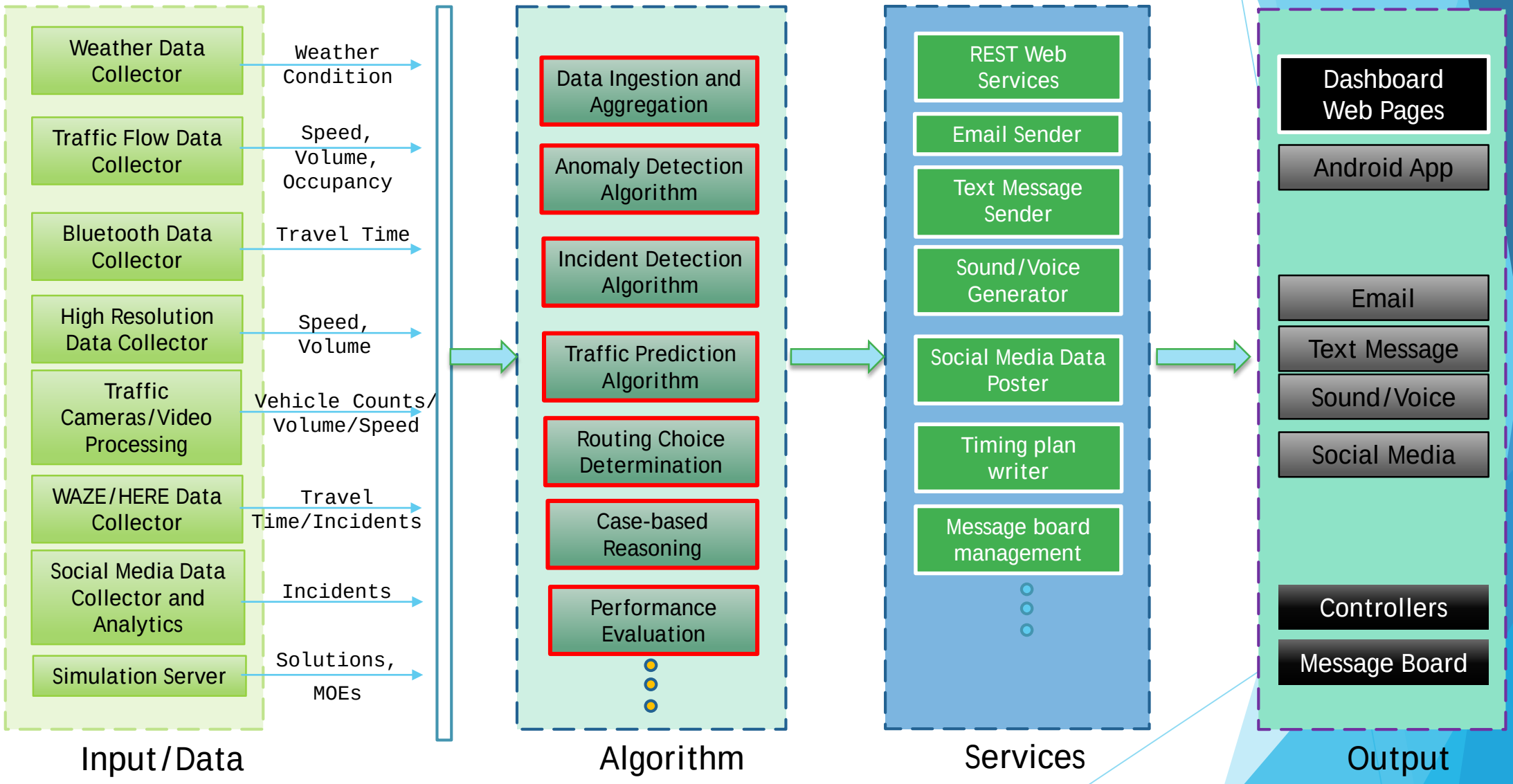
Expected Outcomes

- A truly predictive and adaptive self-monitoring transportation management system
- Automated operation and enhanced decision making
- Reduced incident detection time
- Enhanced Crowdsourced data integration
- Monitoring of CAV operation leveraging data for improved transportation management
- Getting smarter over time for transportation management and operations



AI-TOMS Software Diagram



Proprietary Information, Intelligent Automation, Inc.

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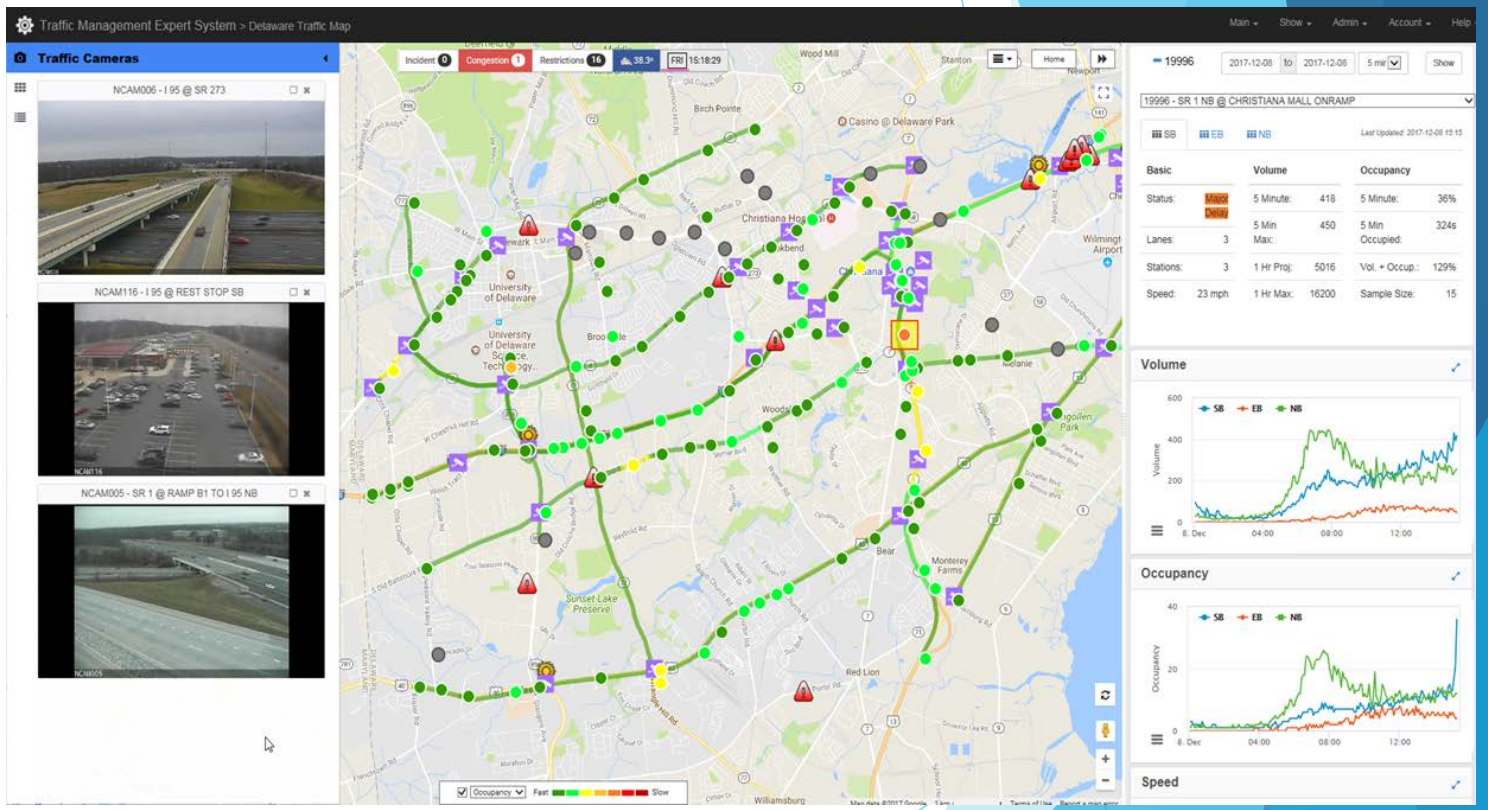
Current Project Status

- ATCMTD Program Start: October 1, 2019
- Working on System Engineering Documents and Project Evaluation Plan
- Computer hardware and software are being procured
- Development team is working on data collection, aggregation and analysis tasks
- Current software capabilities:
  - Process live traffic detector data (update every 5 minutes) for anomaly detection, will transition to 1 minute data
  - 24/7 continuous monitoring, instantaneous alert (email, message) and reporting the event
  - Automatic data visualization and CCTV camera video confirmation
  - Traffic flow prediction



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