



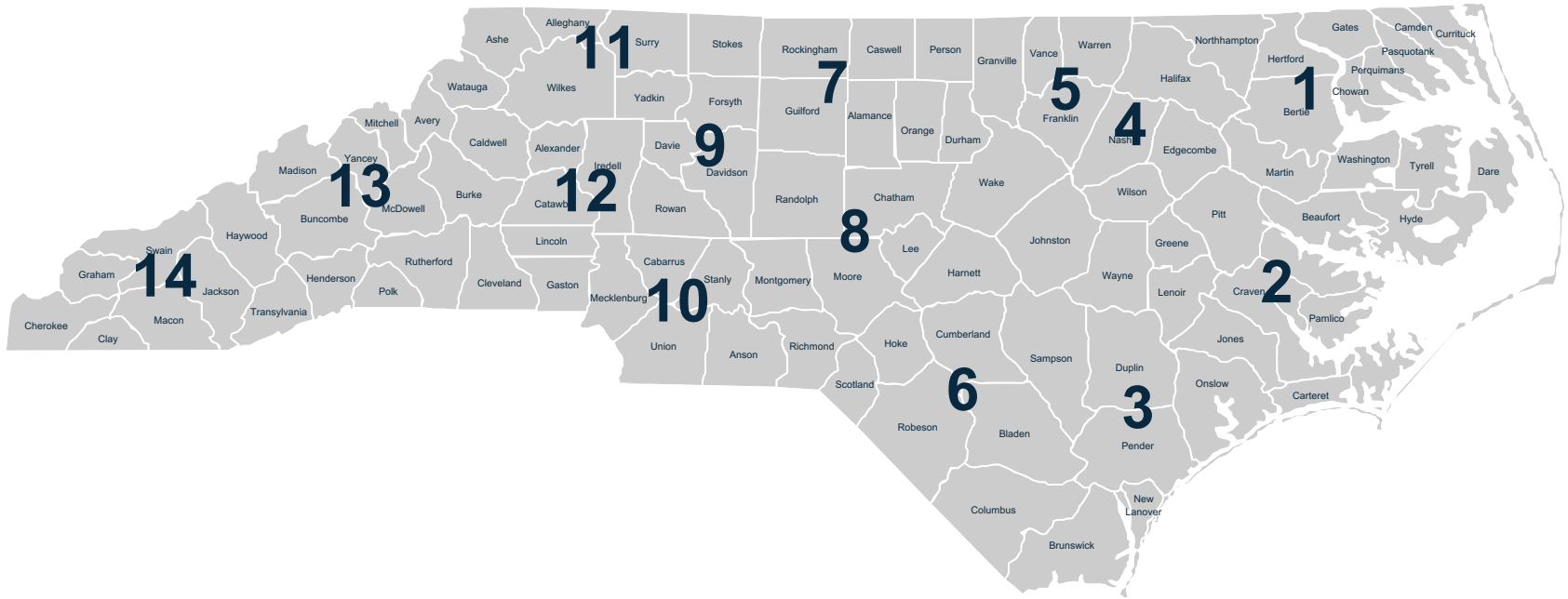
**NORTH CAROLINA**  
Department of Transportation

# ArTEMIS Road Digital Twin

AI/ ML in Asset Management

MAY 2023

# North Carolina Department of Transportation



**81K**  
miles of road

**18.5K**  
Structures

**72**  
Airports

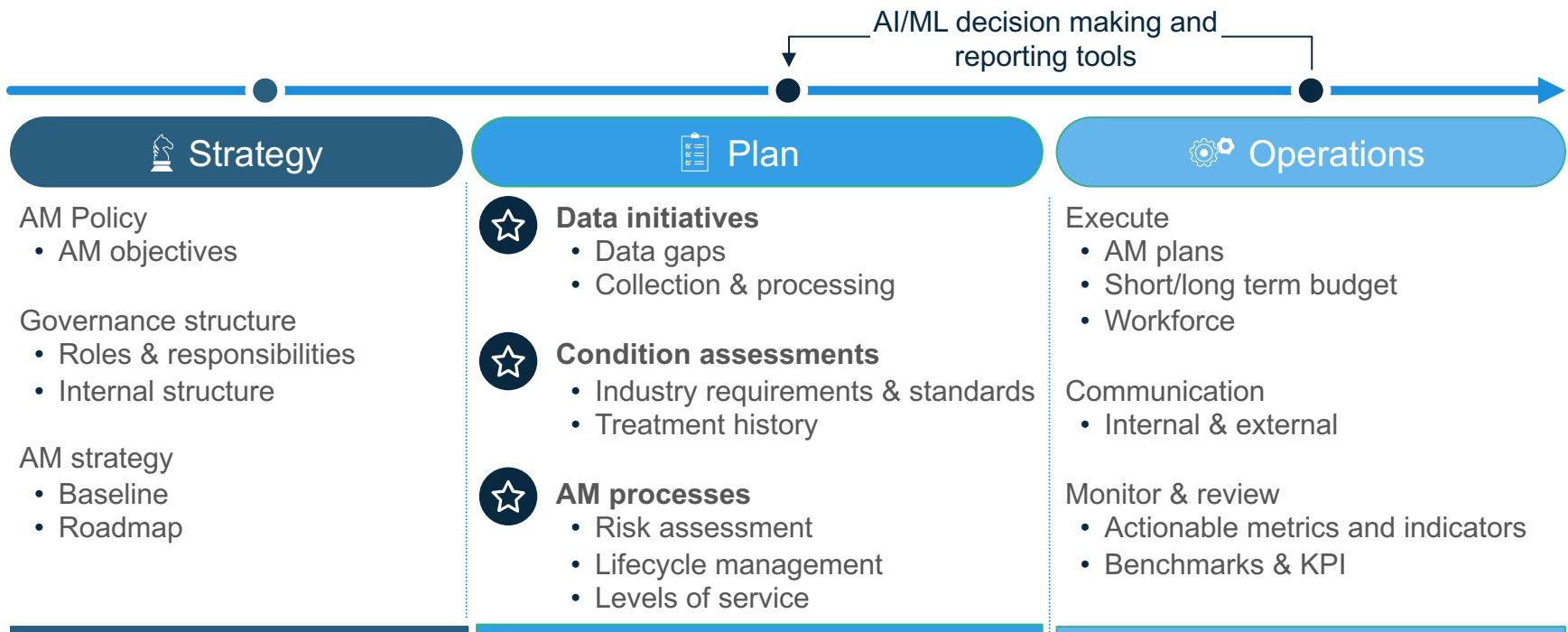
**3.6K**  
miles of railroad

**3K**  
miles of bicycle routes

**22**  
ferries,  
8 routes

**2**  
Deep-water Ports

# Expanding Asset Management with AI/ML



# Data Initiative & Condition Assessment

## Road Digital Twin

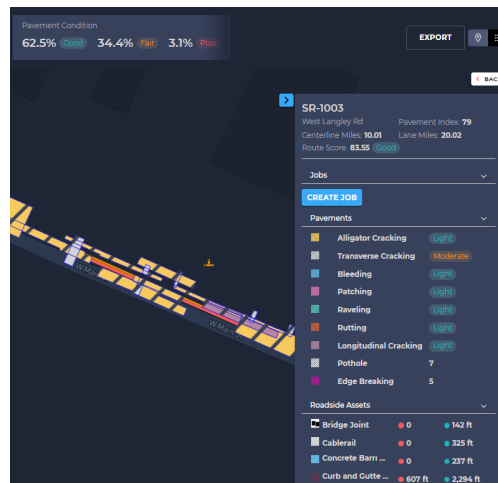
### Fence to Fence asset data capture

Automatic detection and precise point-location of 40+ assets and defects fence to fence



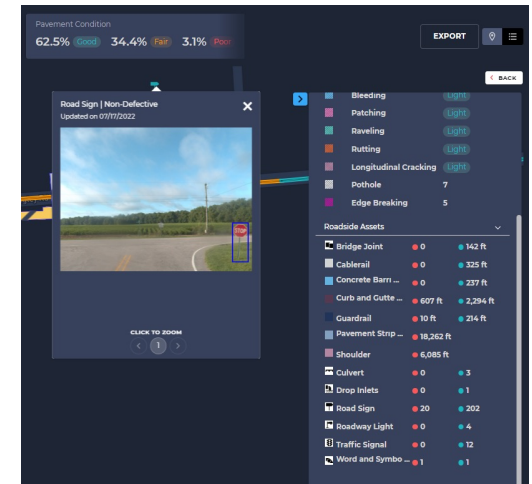
### Consistent condition classification

Uniform evaluation and classification of defects according to their severity level



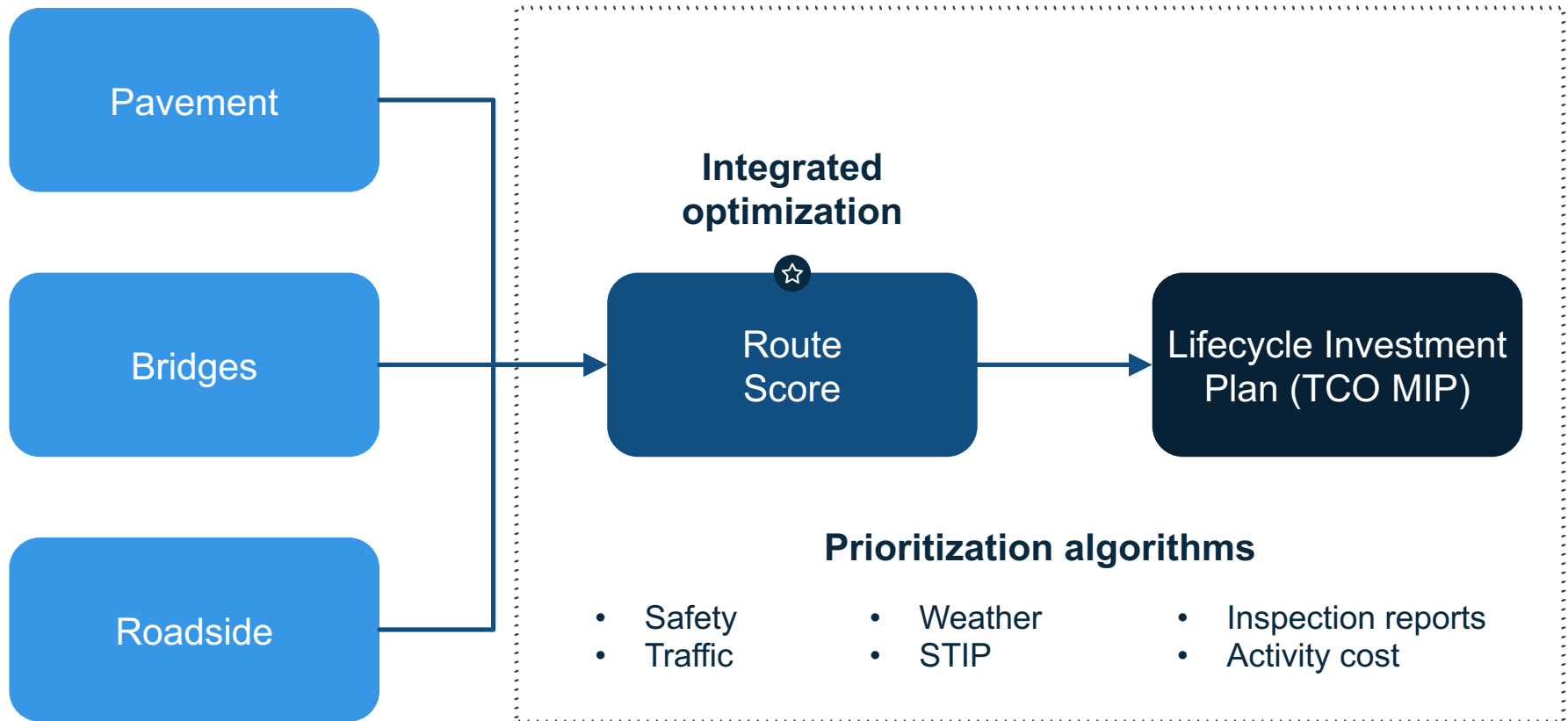
### Fast and accurate assessment

Swift processing with instant access to high-resolution images and validated geo-location data

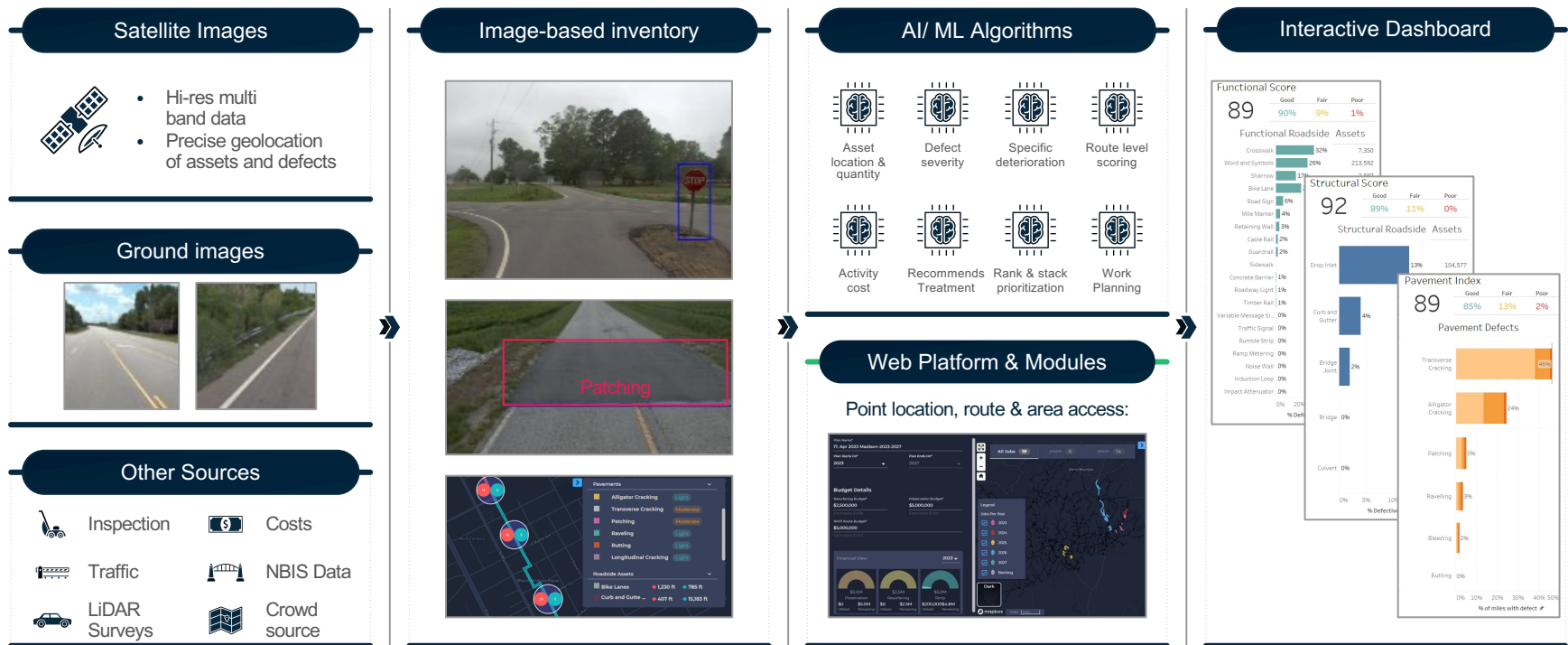


# AI/ ML enabling key decision making

Illustrative



# Key components



### Web Platform & Modules

Point location, route & area access:

# 40+ Assets and defects identified

## Pavement Defects



- Alligator Cracking
- Potholes
- Bleeding
- Transverse Cracking
- Longitudinal Crack (lane joint)
- Patching
- Raveling
- Rutting
- Seal Cracks
- Joint faulting
- Corner breaks
- Joint spalling: longitudinal
- Joint spalling: transverse
- Seal joint
- Shattered slabs

## Roadside Assets



- Shoulders
- Pavement Striping
- Pavement Markers
- Bike Lanes
- Sharrows
- Crosswalk
- Words & Symbols
- Rumble strips
- Curb and gutter
- Sidewalks
- Catch basins
- Open throat catch basins
- Drop Inlets
- Guardrail
- Cable Rail
- Timber Rail
- Impact Attenuators
- Concrete Barrier
- Noise Walls
- Retaining Walls
- Ground Mounted Signs
- Overhead Signs
- Traffic Signals
- Roadway light poles
- Mile marker
- Railroad Crossings
- Ramp Metering
- Bridge joints
- Induction Loops
- Dynamic Message Signs



An aerial photograph of a complex highway interchange. A multi-lane highway runs diagonally from the top-left to the bottom-right. A concrete flyover bridge crosses over the highway. To the left, a roundabout with a central island is visible. To the right, a road with yellow diagonal markings and a white ladder-like crossing pattern intersects the highway. Several cars are visible on the highway and at the roundabout. The surrounding area is green with grass and some trees.

# ArTEMIS Tool



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