How UAS technology supports the modern railroad network

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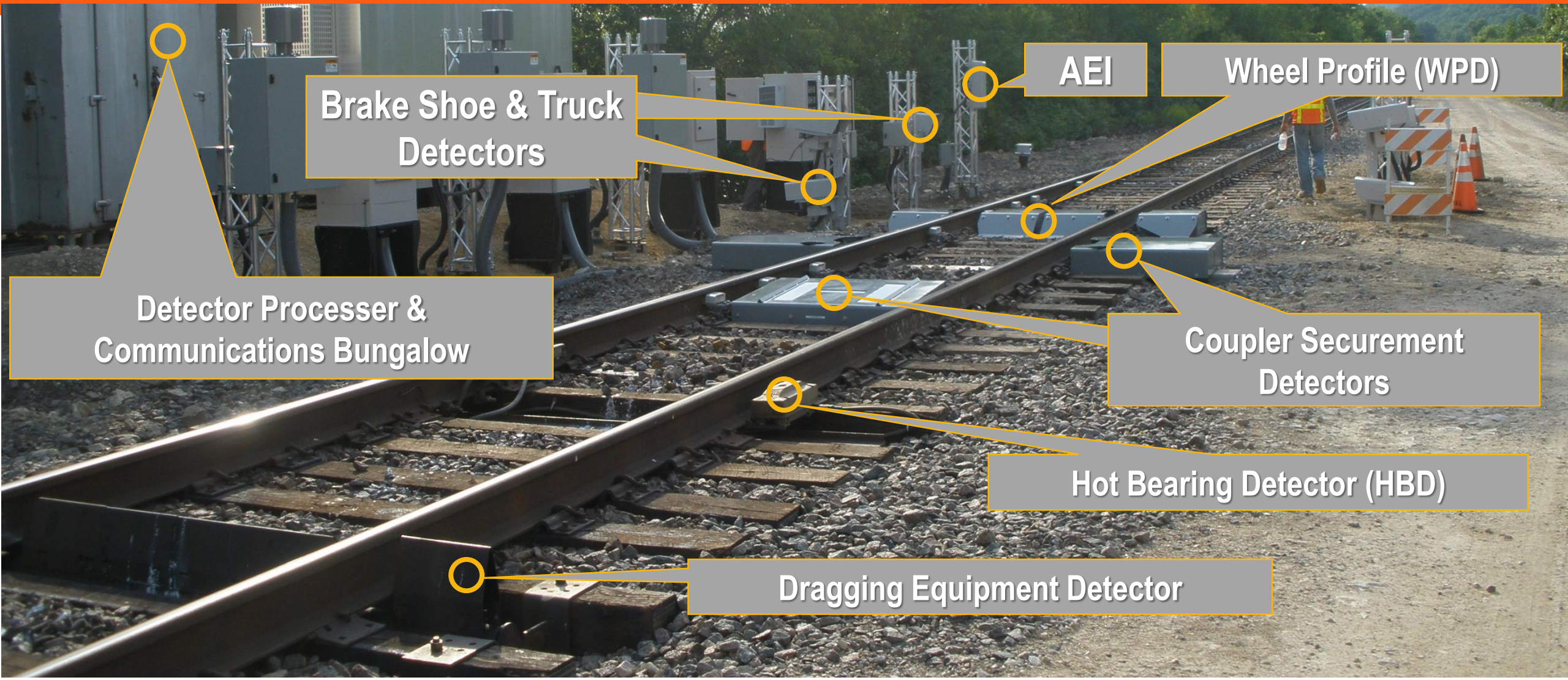
Overview

Corridor and gateway

- 32,000 miles of track
- 28 Western states, 2 Canadian provinces
- Serves 40+ ports, 30+ intermodal facilities
- Averages 1,600 trains/day
- Last yr.: more than 10 million carloads

Network Operations Center

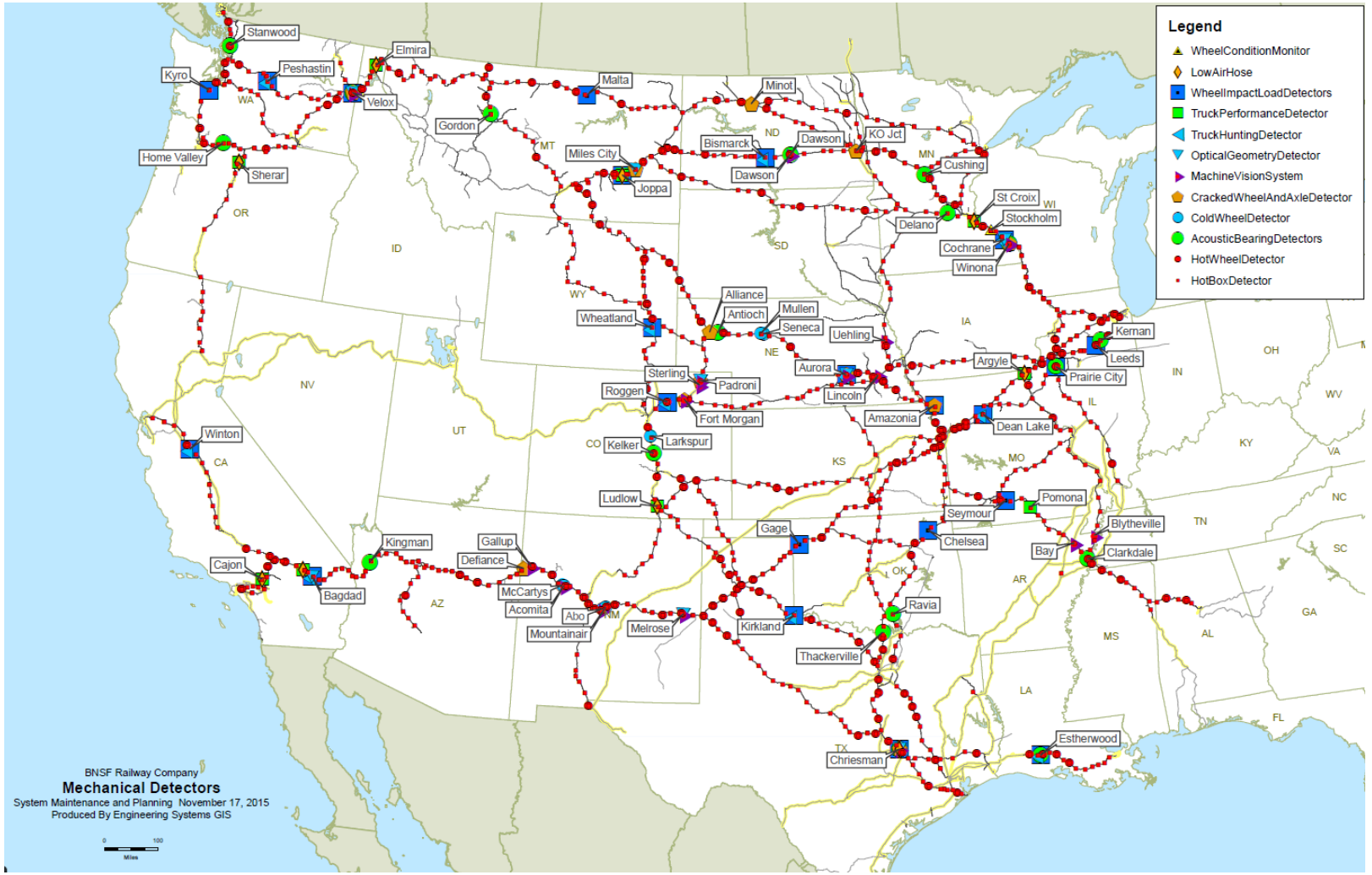
Wayside detectors



Detector network

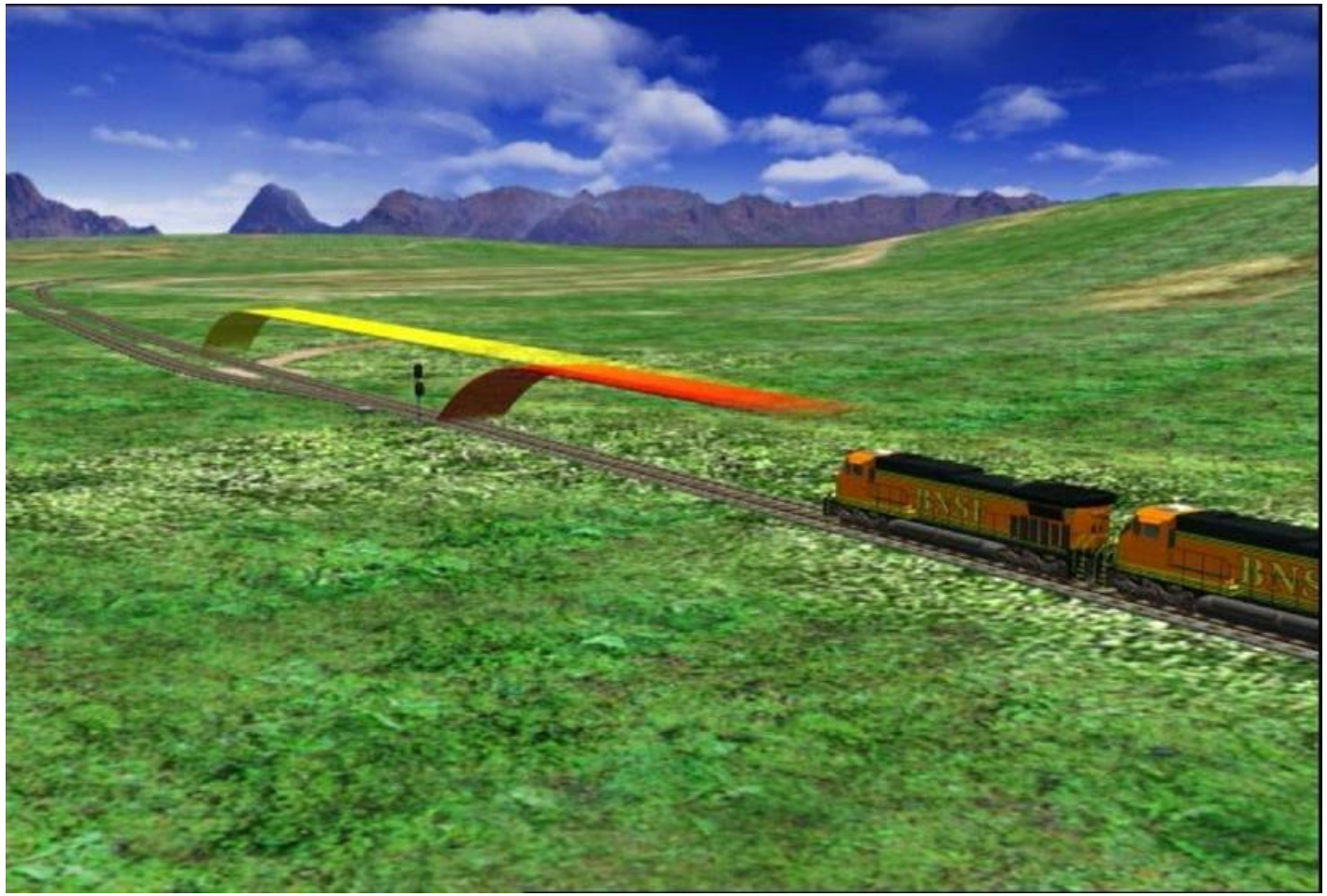
Prevention Technology

- Hot Box Detector (HBD)
- Wheel Impact Load Detector (WILD)
- Acoustic Bearing Detector (ABD)
- Sonic Cracked Wheel/Axle Detector (CWAD)
- Machine Vision Systems
- Optical Geometry Detector (OGD)
- Warm Bearing Detection System (WBDS)
- Hot Wheel Detectors (HWD)
- Truck Performance Detectors (TPD)



Positive Train Control

Predictive, advanced train control safety technology



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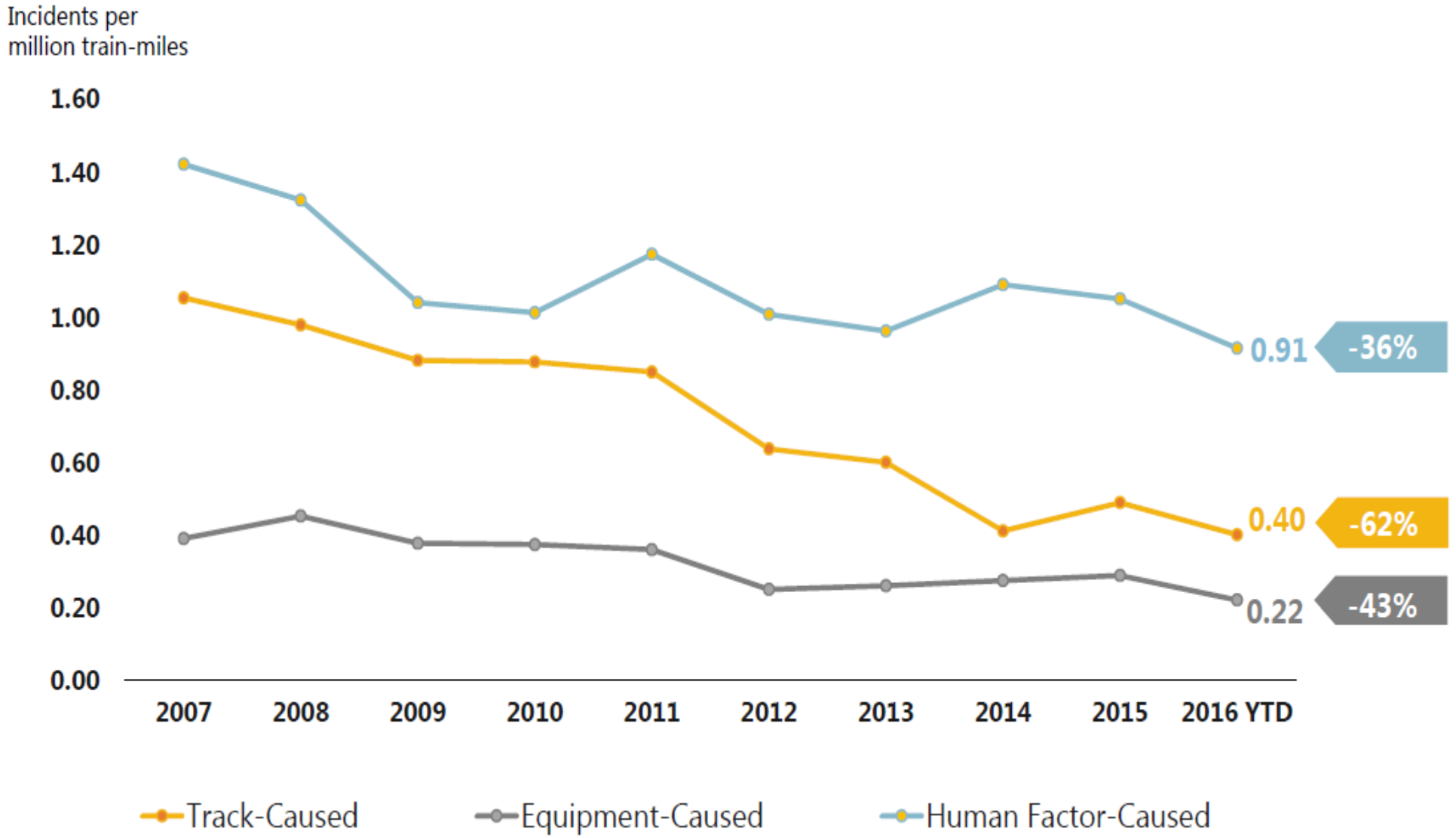
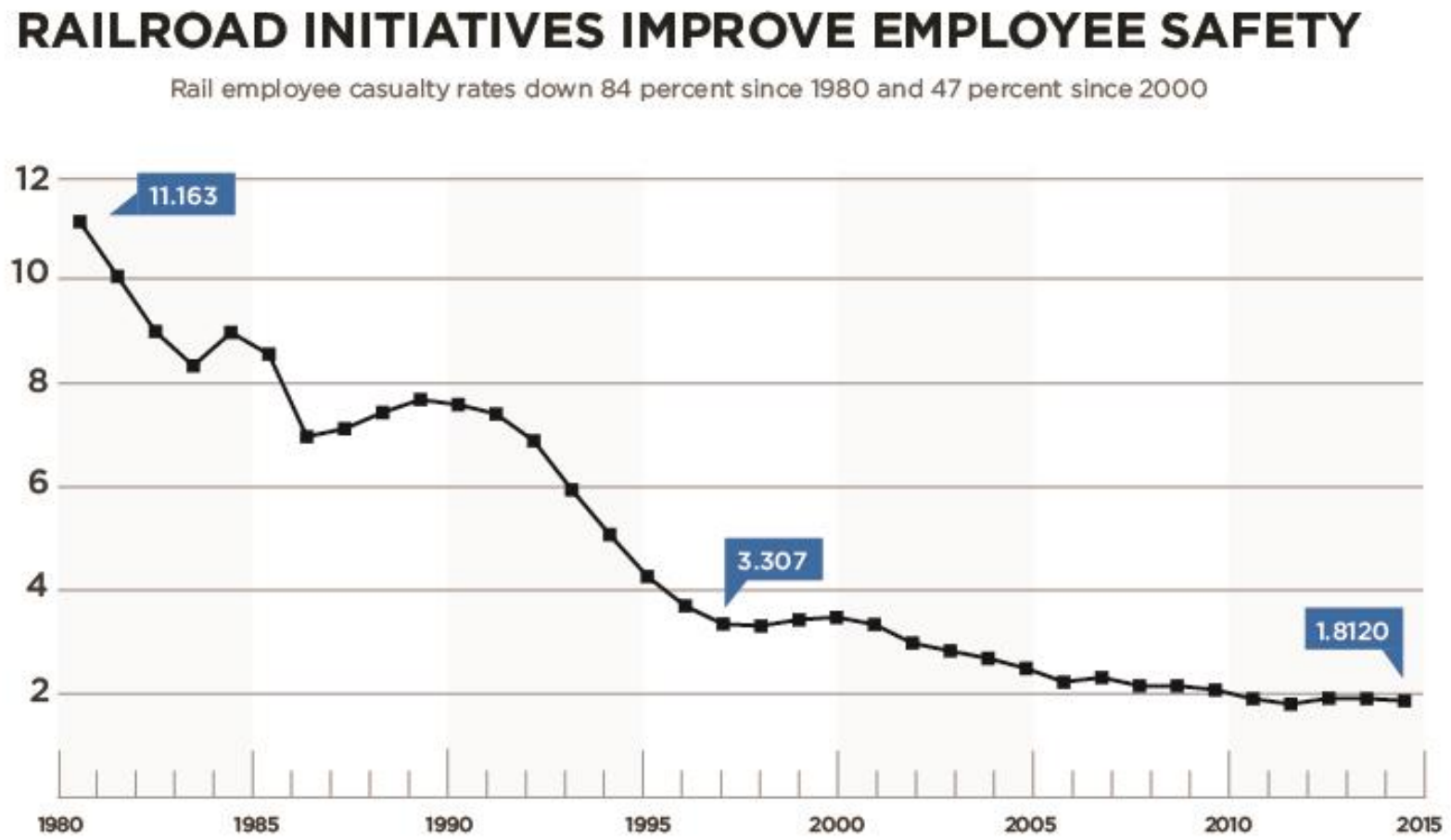
Consistent improvements in safety



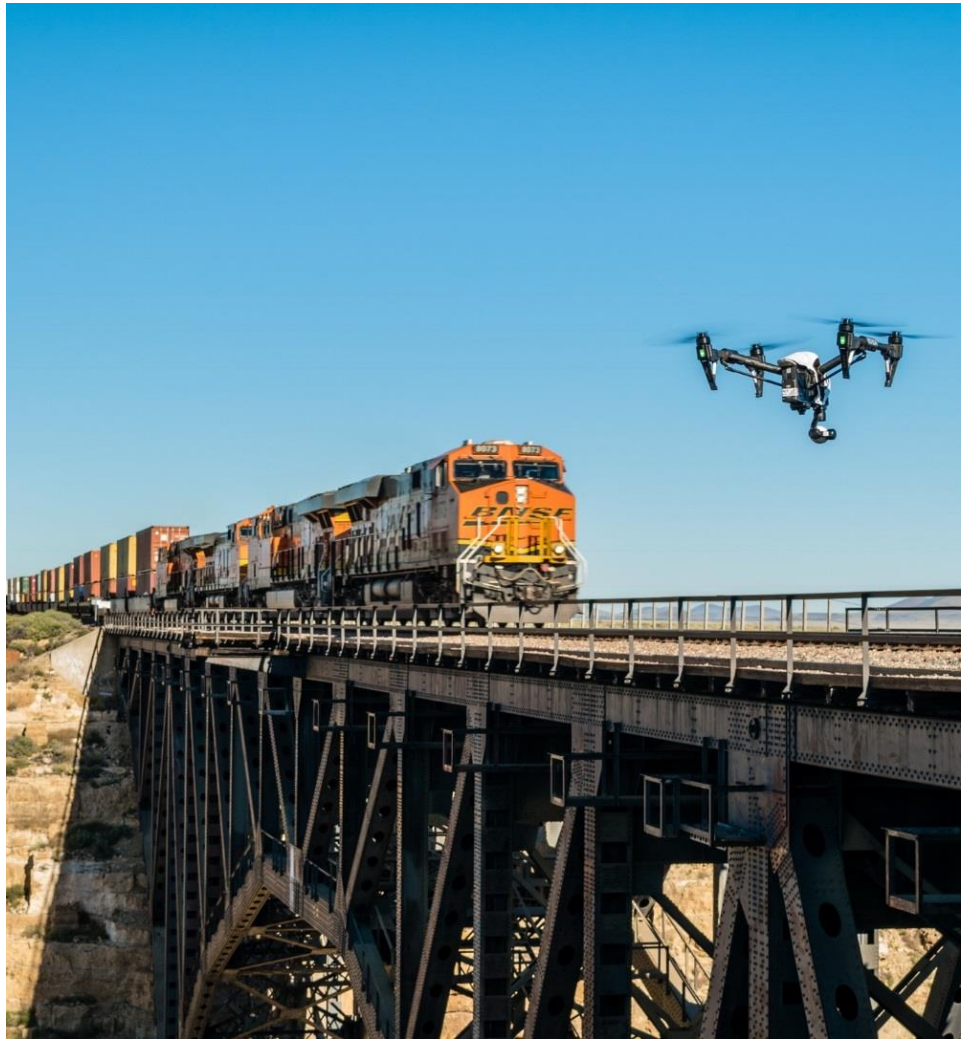
Decades of safety improvement



Source: Association of American Railroads

Unmanned aerial flights

Unmanned aerial vehicles



- Various FAA flight authorities (333, 107, SAC)
- Line of sight and non-line of sight
- Leading the industry in adoption and flight capabilities
- Applications: bridge inspections, track integrity, yard inspections, remote areas

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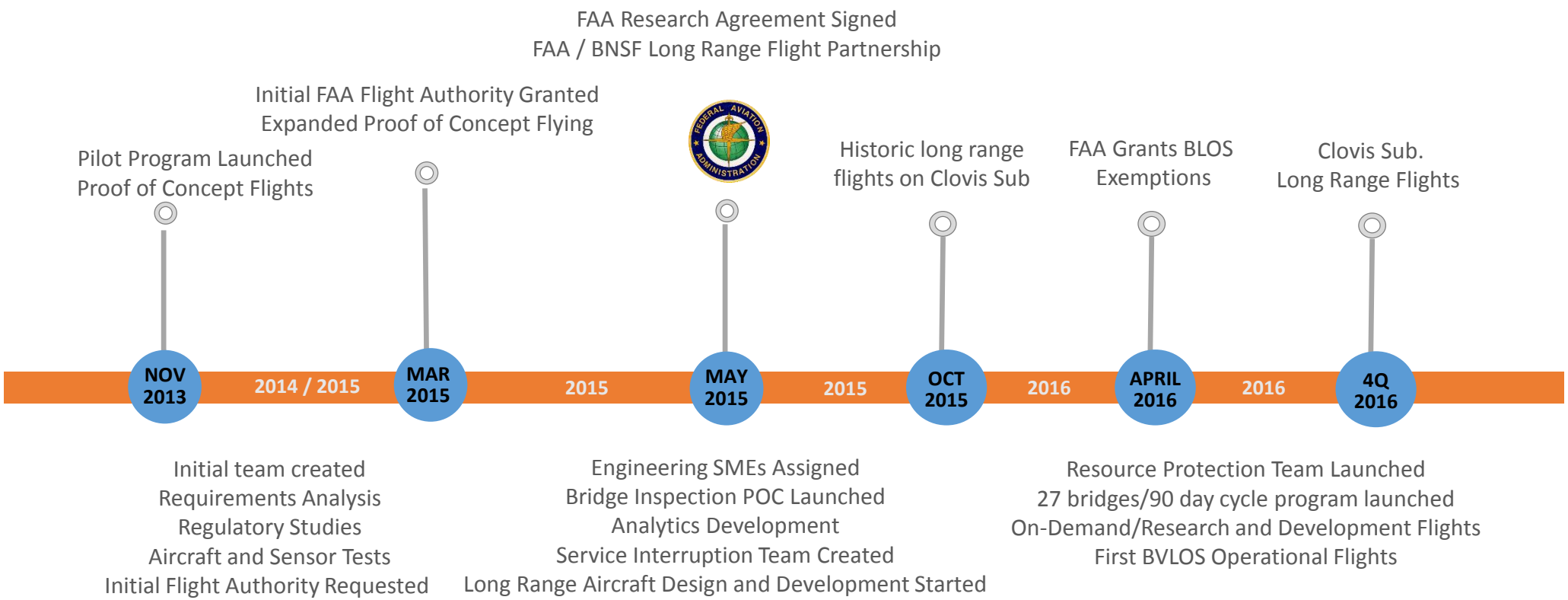
Purpose

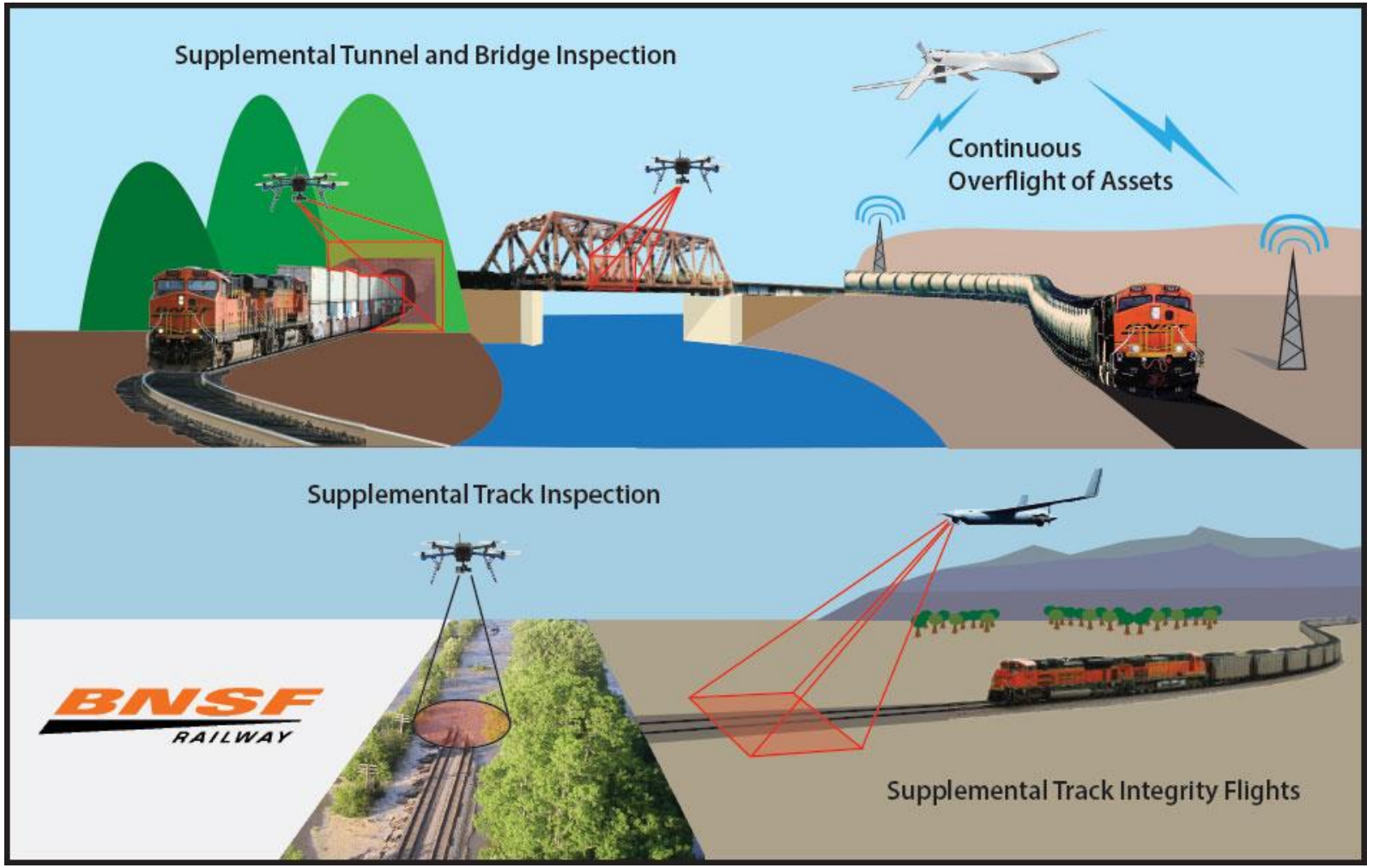
Project timeline



Line of sight aircraft

Long range aircraft

Applications



Inspecting structures

Challenges: bridge inspections, accessibility

Solutions: remote inspections, increased safety, improved access, wide range of outputs

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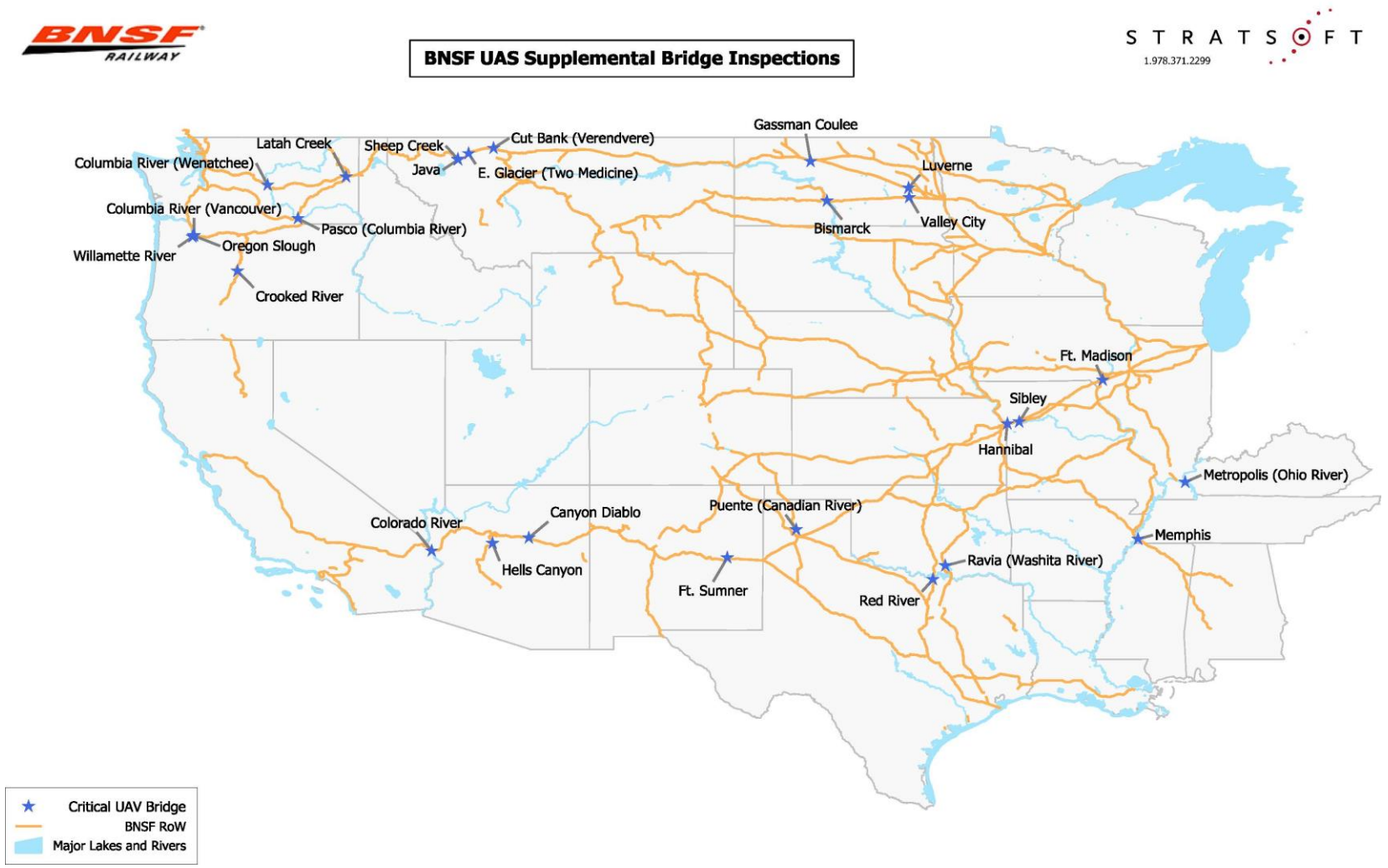
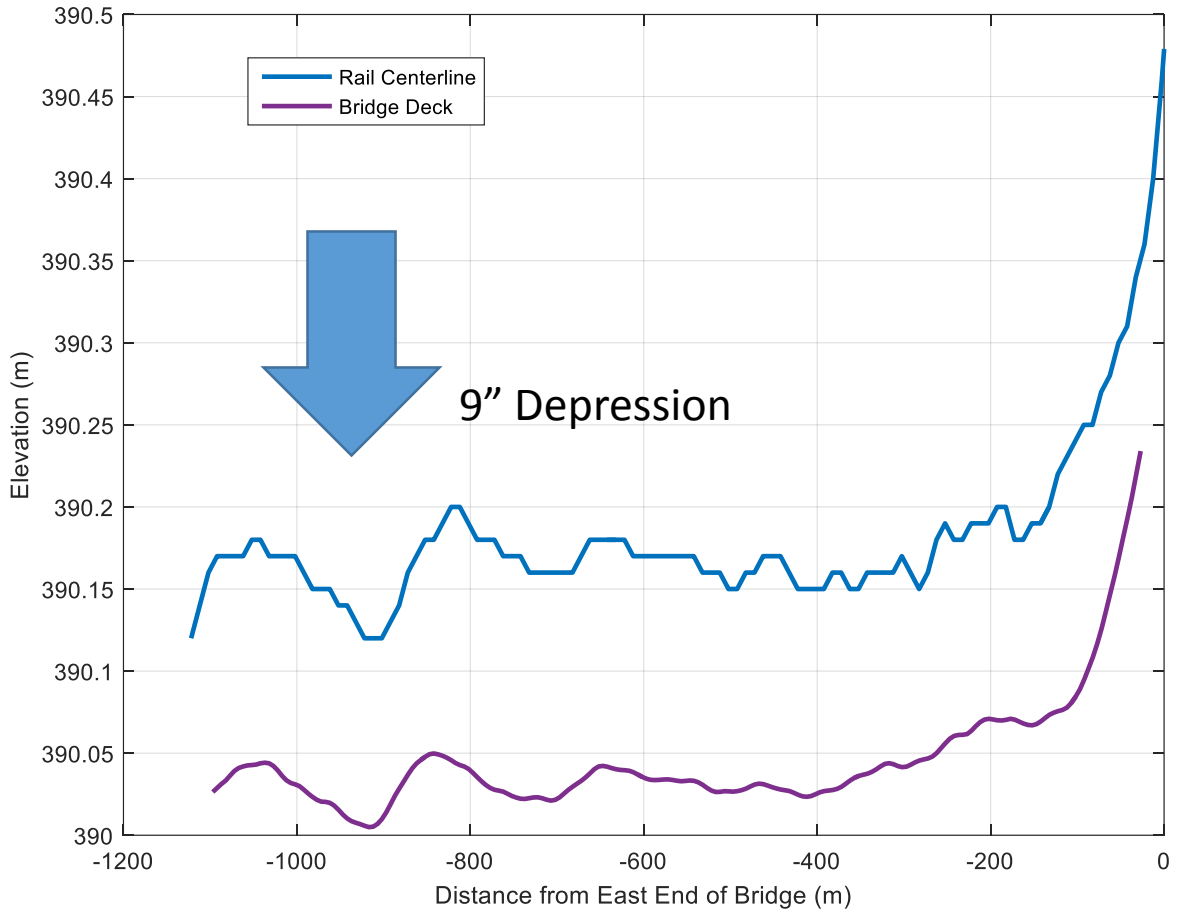
Supplemental structure inspections



Lidar bridge deck elevation profile

A simple way to evaluate the profile of the bridge deck though color notation

Lidar bridge deck elevation profile



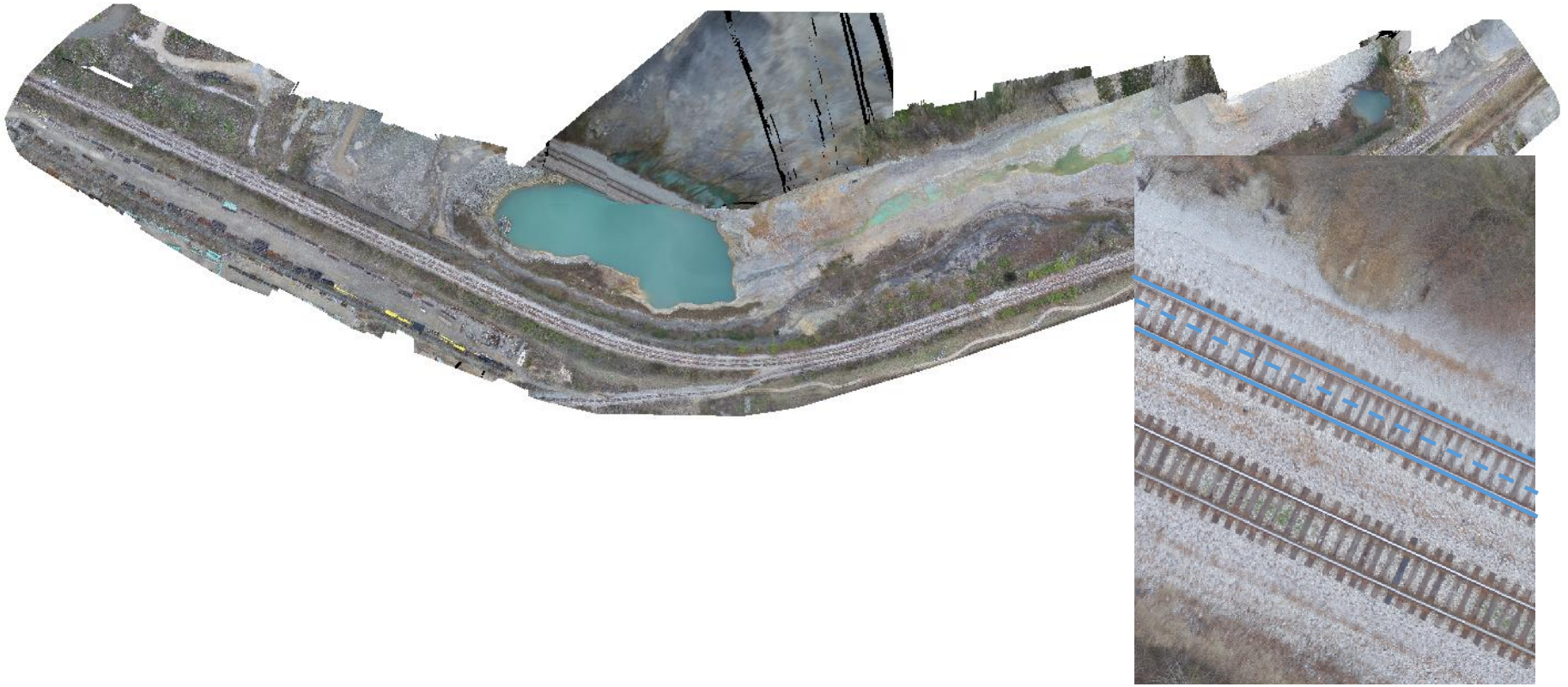
Bridge alignment profile

Right of way change detections

Stitching of UAS imagery to provide a complete view

Alignment profile change detection

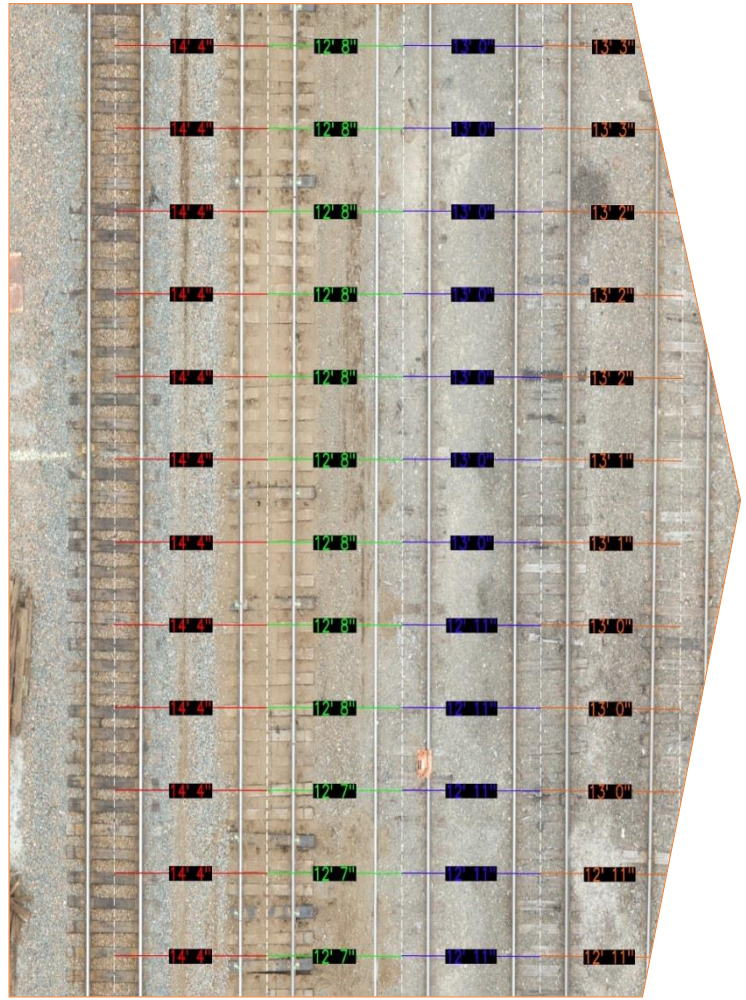
Method creates graphs of track section for monitoring



Close clearance inspections

Challenges: identify track movement over time

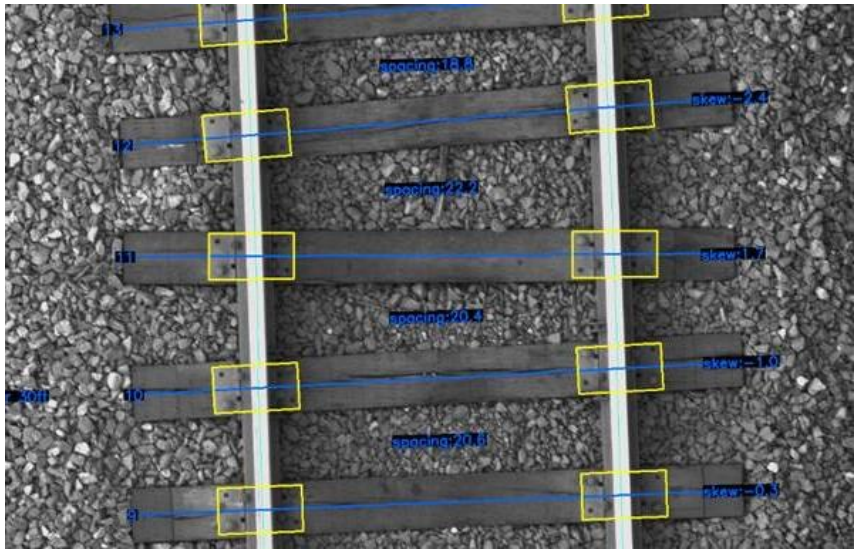
Solutions: modeling tool highlighting centerline, products highlight additional factors



Supplemental track integrity

Challenges: current process requires extensive track occupation

Solutions: analytics developed for FRA visual criteria, additional products – heat patrols, load defect detection, tie counts



Locomotive inspections

Challenges: stored locomotives require regular inspections to ensure exhaust covers are in place

Solutions: simplified inspection methodology – 1,100 locomotives inspected in less than 7 hours

Resource protection

Challenges: trespass, theft, property recovery, tampering with equipment

Solutions: increased safety, efficiency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