

Autonomous Trucking in North Dakota – Prospects and Challenges

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Complemented by UGPTI resources and industry collaborators

Preparing for Autonomous Trucking in Rural and Tribal Areas

Contents

Motivations

Current Deployments

Near-Term Prospects

Long-Term Study Plan

Goals and Timelines

Strategies

Autonomous Truck (AT) Considerations

Motivations

- Driver shortages
- Cost savings
- Reliability
- Capacity
- Service to rural areas
- Crash avoidance

Benefits

- Labor reallocation
- Labor cost savings
- Fuel efficiency
- Emissions benefits
- Insurance savings
- Supply chain benefits

Motivations for AT in Agriculture



Agriculture depends on trucking

80%+ of ag. tonnage

50%+ of ag. ton-miles

\$ High driver costs

Severe driver shortages

Safety

Seasonal drivers

HOS waivers

Driver fatigue/pressure

Older trucks

Time-concentrated movements

Vision: Autonomous Ag Supply Chain

- On-farm autonomous tractors, loaders, carts
- On-farm or local storage movements to subterminal elevator or plant
- Non-hazardous cargo
- Platoons and autonomous trucks

Current Operating Models

Hub-to-hub (H2H)

- Long haul
- Interstate or OPA highways
- May involve drayage

Business-to-business (B2B)

- Shorter haul
- Middle mile
- May require drayage
- Dock-to-dock (D2D) shipments

Industrial Ops

- Mine trucks
- Carts
- Yard tractors

More Challenging Deployments

First/last mile

- Urban
- Remote rural

Rural roads

- Geometry
- Signing
- Traffic
- Localization

Winter driving

- Surface conditions
- Visibility

Levels of Autonomous Trucking

Level	Automation
2 – <i>Partial Driving Automation</i>	<ul style="list-style-type: none">✓ Sustained execution by ADS of lateral and longitudinal vehicle control✓ Driver supervises ADS✓ Driver responsible for OEDR
3 – <i>Conditional Driving Automation</i>	<ul style="list-style-type: none">❖ Sustained ODD-specific performance by ADS❖ Driver is receptive to ADS-issued requests to intervene
4 – <i>High Driving Automation</i>	<ul style="list-style-type: none">➤ Sustained ODD-specific performance by ADS of all driving tasks➤ No expectation a driver will respond to a request to intervene

Automated Platooning



- Navigation data transmitted from human-driven *Leader* to driverless *Follower*
- Precision navigation – Simultaneous RTK GPS for cent.-level accuracy
- Current configuration (1 to 1); more followers per leader are possible

Platooning in North Dakota

- *Sugar beets (right)*
- *Grain: CHS (2023)*
 - 4-lane highways
 - Gap: 50-200 ft
 - Gap up to 1,600 ft
 - M-F (1 trip/day)
 - 350+ distance
- *Other possibilities*
 - Corn/oilseeds
 - Oil industry inputs



- Minn-Dak Farmers Cooperative (above)
- Approved in fall of 2022
- Short hauls from piling stations to plants
- Driver currently in 2nd vehicle to be removed soon

Evolution or Revolution?

- I-70 Truck Automation Corridor
 - Columbus OH to Indianapolis IN
- Staged approach
 - AV readiness (highways and transporters)
 - Truck platoons (Leader-Follower)
 - Goal: L4

Goals/Strategies

Build collaborative partnerships

Information sharing (conferences)

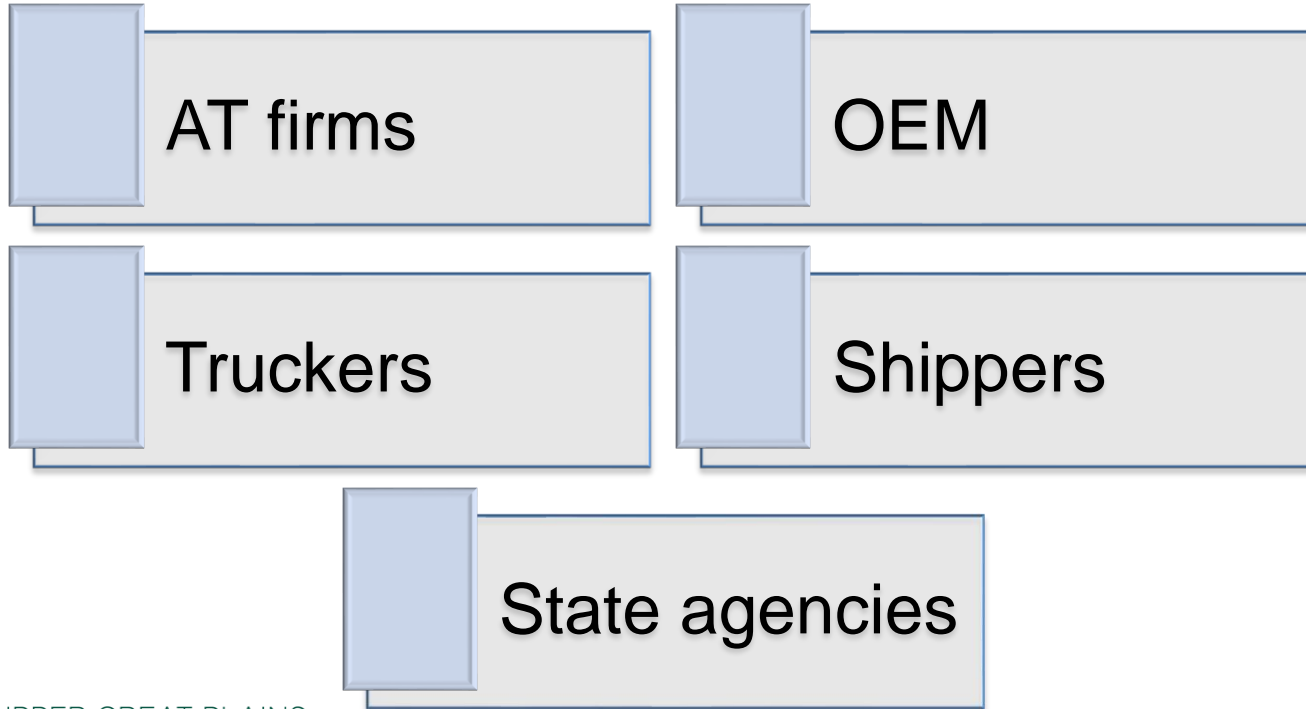
Clarity of rules and regulations

Facilitate demonstrations & deployments

Edge case research

Tracking/transparency

Key Decision Makers



Autonomous Trucking Collaborators

Initial partners

- Kratos Defense
- Kodiak Robotics

Conference Panelists

- Gatik
- Forterra

Potential

- Torc Robotics
- Komatsu

Conference: Oct 16-17

AT firms

NDMCA

Agriculture

Ethanol

State agencies

Local government

FMCSA, FHWA

State patrol

CVSA

University partners

Conference Sessions

- Our Future with Autonomous Trucking
- The Autonomous Trucking Industry
- Autonomous Trucking in Ag. Logistics
- Policies and Regulations Affecting Autonomous Trucks
- Safety Planning and Enforcement
- Infrastructure Planning for Autonomous Vehicles
- Challenges to Autonomous Trucking in Rural and Northern Regions
- Cybersecurity

Next Steps

- Edge case research
- Autonomous hubs (multimodal)
- Tracking/data analysis
- Public awareness/acceptance
- Conference in summer of 2025
 - Cross border autonomous trucking
 - Deployments in oil and lumber industries
 - AT in mineral logistics
 - OEM roles

Thank you!

Conference information and
presentations

<https://www.ugpti.org/events/atc2024/>