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TRANSPORTATION SYMPOSIUM

AI Current and Potential Future Use Cases

Artificial Intelligence in FDOT

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Transportation Symposium Website

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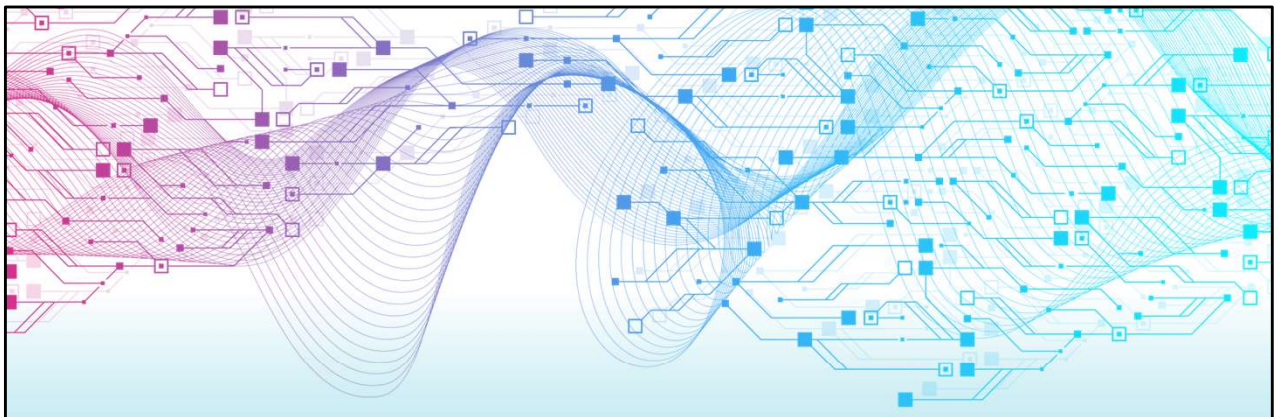
Today's Roadmap:
Understanding AI in FDOT

1. AI Overview
2. FDOT's AI Policy and Governance
3. FDOT's AI Meeting Assistant
4. Current AI Considerations and Use Cases
5. FDOT's AI Research
6. Future AI Use Cases - How to Get Involved

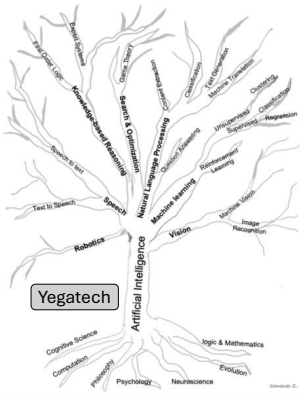
AI Overview



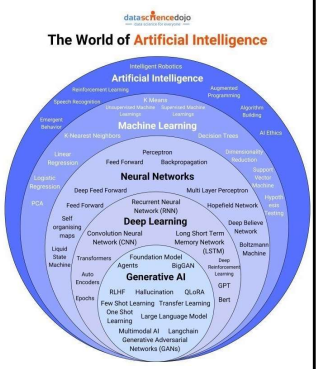
What is Artificial Intelligence (AI)?

- **AI** refers to technologies that enable machines to mimic human intelligence.
- **Includes:** Machine Learning (ML), Natural Language Processing (NLP), Computer Vision (CV), Robotics.
- **Applications:** automation, prediction, anomaly detection, decision support.

Fields of AI

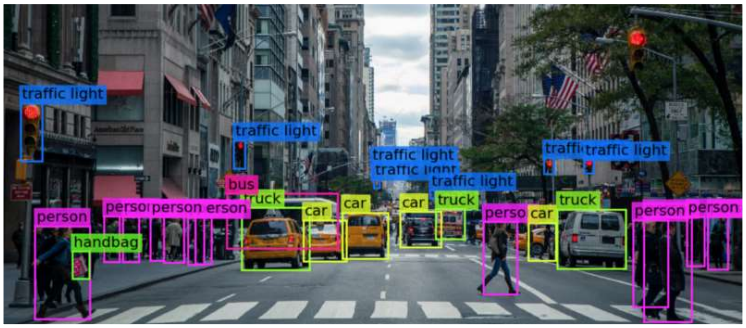


- **Natural Language Processing** – human to machine interface
- **Expert Systems** – emulating human experts
- **Neural Networks** – weights and matrices meant to mimic human neurons
- **Machine Learning** – algorithms to perform tasks without specific instructions
- **Fuzzy Logic** – account for uncertainty in decision making
- **Computer Vision** – understand visual information
- **Generative AI** – create content using learned patterns



FDOT's Common AI Use Cases

- Incident detection and response
- Meeting summarization and transcription
- Asset inspection (e.g., bridge/road imagery)
- Customer service automation
- Predictive maintenance and traffic forecasting



FDOT's AI Policy and Governance

FDOT's AI Policy Overview

Policy Key Points:

- Applies to all AI tools used by FDOT staff, vendors, consultants, and contractors
- Requires **IRR submission** and approval before implementation
- AI use must be:
  - Safe, ethical, and transparent
  - Supported by a **human-in-the-loop**
  - Respectful of public records and privacy law
- No AI-generated content may be used without validation
- Prohibits unauthorized use of AI on FDOT systems or with sensitive data

Note: Full policy available via FDOT Tech Portal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ARTIFICIAL INTELLIGENCE (AI) POLICY

Schedule for AI Policy preparation:

August 2023 – Initial Draft Policy
October 2023 – First Internal Edits
December 2023 – Second Round Edits
January 2024 - Responses

FDOT's AI Policy Highlights

Human in the Loop

Must supplement or complement work accomplished by human

Must engage human throughout the process

Human are fully responsible for the work and product involving AI

Transparency and Accountability

Must be transparent and disclose if the products are generated partially or fully by an AI tool

Ethics

Must be ethical and comply with all applicable laws, rules, regulations, and policies

Privacy and Data Protection

Must protect people's privacy and comply with all applicable data protection regulations

Human validation of the AI data and output

Must protect information that is exempt from public disclosure per FL public records laws

Security

Employees, vendors, consultants, and contractors are prohibited from attempting to gain access to AI applications not approved by the Department

FDOT's AI-Meeting Assistant

FDOT's AI Assistant Framework Overview

- **Supports** AI-assisted meeting notes in alignment with FDOT's AI Policy
- **Improves** accuracy, compliance, and efficiency in documentation
- **Promotes** innovation while upholding public records and privacy standards

This framework ensures we remain compliant with public records laws while increasing productivity and consistency in our documentation processes.

When to Use AI Assistants

Tiered Implementation Plan

Public Meetings: AI Assistants allowed with proper notice

Internal/Operational: Allowed with discretion; avoid sensitive content

Privileged/Confidential: AI use prohibited (e.g., HR, legal)

Note: *Consult OGC when classification is unclear.*

We've developed a tiered meeting structure to guide AI usage. AI is suitable for public meetings, permitted with caution in internal ones, and strictly avoided in privileged or legally protected settings. OGC consultation is encouraged when classification is unclear to ensure we mitigate legal risk.

Our objectives are clear: improve efficiency, ensure transparency, and protect sensitive information. We're not just automating tasks — we're modernizing how we communicate and collaborate while staying compliant with the law and aligned with FDOT's innovation agenda.

Current AI Consideration and Use Cases

Balancing Risk and Reward in AI Use

REWARDS
Improved efficiency, proactive insights, scalable decision-making

vs

RISKS
Data privacy, model bias, over-reliance, transparency gaps

How FDOT manages it:

- Risk/Reward Assessment Tool
- Oversight Plan
- Human-in-the-loop enforcement

AI Trends in Transportation

Suggested Title: "FDOT Pilots and National AI Trends"

Tools Being Piloted: CoPilot 365, Gemini, Mistral, LLaMA

Techniques:

- RAG (Retrieval-Augmented Generation)
- Embedded AI
- Vision-language pairing

FDOT Constraint: Only OIT-approved tools allowed

Note: Trend is hybrid AI + automation in ops/inspection

Where AI is Already Making an Impact

- **Safety:** Near-miss detection (N-MISS, DANIEL)
- **Traffic Ops:** Incident detection
- **Data/Analytics:** CLAIRE, ServiceNow, CV-DEP
- **Cybersecurity:** MDE/Defender – threat detection
- **Planning:** Socioeconomic + signal planning

Everyday AI:
Embedded in FDOT Operations

AI supports FDOT in key areas such as:

- Crash detection
- Cyber threat monitoring
- VRU safety
- Flooding, wrong-way detection

District Examples:
Targeted AI Innovations

- Near-miss identification safety system
- Wrong-way detection
- Intersection monitoring for safety hazards
- PedSafe phase II: Aim to improve ped safety
- Near-miss crash identification
- Bike-ped safety project
- Advanced video analytics (AI-driven) for incident detection
- Testing detection accuracy of AI cameras compared to road sensors
- AI and DIVAS platform for real-time weather and road condition analysis
- Evaluating AI solutions for post-disaster assessment

Central Office | District 1 | District 5 | District 7 | City of Gainesville | FTE

AI Capability Maturity Model (CMM): OVERVIEW

- **CMM** = tool to evaluate readiness and gaps before scaling
- **6 Dimensions:**
  - Culture & Organization
  - Collaboration
  - Business Process
  - Cybersecurity
  - Data & Infrastructure
  - Applications & Ops
- **Capability based on scoring from 1.0 (lowest) to 4.0 (highest)**

Level 4 – Systematic
Level 3 – Operational
Level 2 – Readiness
Level 1 – Exploration

- Business Processes
  - Formal scoping, planning, budgeting
- Organization & Workforce
  - Coordinated organizational functions and technical, qualified staff
  - Staff development, recruitment, retention
- Culture
  - Combination of values, assumptions, knowledge, and expectations
  - Technical understanding, leadership (champions), outreach, and program authority
- Collaboration
  - Coordinated performance of each partner
  - Regular, effective collaboration across partner organizations
- Systems & Technology
  - Use of systems engineering, systems architecture standards, interoperability, and standardization for design and implementation of systems
- Performance Measurement
  - Measures definition, data acquisition, and utilization for transportation

planning/engineering
- Using performance measures to make business case for operations

CMM Evaluation Dashboard Example

Dimensions	Business and Relationship Dimensions			Technical Dimensions			
Subdimensions	**Culture and Organization**	**Collaboration**	**Business Processes**	**Cybersecurity**	**AI Data and Infrastructure**	**AI Models and Applications**	**AI Integration and Operations**
	Knowledge, Skills, and Abilities	Peer Cooperation	Business Case and Performance	Threat Awareness	Data Governance	Discovery and Understanding	Requirements Management
	Sponsorship and Leadership	Building Partnerships	Strategy, Policy, and Roadmapping	Scenario Planning	Data Selection and Sources	Model Development	System Design
	Value, Expectation, and Risk	Roles and Responsibilities	Budgeting for AI	Posture and Hygiene	Data Acquisition and Transmission	Model Evaluation	System Integration
	Fostering Innovation	Intra-agency Collaboration	Privacy and Trust	Infrastructure Protection	Data Quality Assurance	Application Deployment	Test and Evaluation
	Ethics and Equity	Effective Data Sharing	Process Transformation	Information Assurance	Data Storage and Curation	Human-AI Interactions	System Launch
	Organizational Structure	Use Case Alignment	Procurement	Resiliency and Recoverability	Data Processing and Enrichment	Application Performance Measures	Operational Feedback

Visualizing capability dimensions to identify strategic focus areas

AI-Enabled ITS CMM:
National Model for AI Readiness

Developed for USDOT ITS-JPO by a team including:

- Florida International University (FIU)
- Leidos
- TrustThink

Based on 2020 ITS-JPO AI Readiness Report

Provides a structured approach to assess:

- Agency readiness for AI integration in ITS
- Capability across 6 dimensions (e.g., workforce, data, infrastructure)
- 40+ priority applications across 5 transportation scenarios

Scoring includes:

- Quick scan (high-level maturity)
- Rigorous scoring (detailed assessment)

Outcome: Agencies define **target scores** and **close capability gaps** with a phased action plan

FDOT Government Efficiency

Ideas – Categories and Titles

Redirecting Federal Funds

- Redirecting Funding for Transportation Infrastructure
- Fueling Congestion Relief

Advancing Technology

- Environmental Studies Powered by AI
- Document Generation Powered by AI
- Roadway Inventory Tracking Powered by AI
- Real-Time Hazard Reporting
- Automating Traffic Counts
- Pavement Management Powered by AI

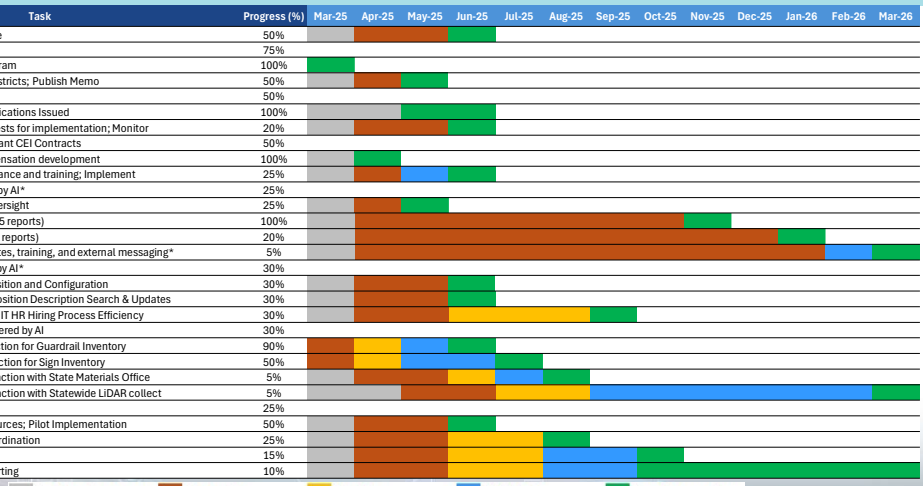
Development & Operations

- Reducing Permit Processing Time
- Bundling Projects
- Reducing Construction Time
- Adopting Results-Driven Consultant CEI Contracts
- NEPA Assignment
- Optimizing Material Testing
- Optimizing Consultant Services

FDOT Government Efficiency

Implementation Status and Timeline

#	Task	Progress (%)
1	Reducing Permit Processing Time	50%
2	Bundling Projects	75%
	Phase I: District Pilot Program	100%
	Phase II - IV: Engage All Districts; Publish Memo	50%
3	Reducing Construction Time	50%
	Phase I: Mandatory Specifications Issued	100%
	Phases II-III: Review requests for implementation; Monitor	20%
4	Adopting Results-Driven Consultant CEI Contracts	50%
	Phase I: Method of Compensation development	100%
	Phase II - III: Develop guidance and training; Implement	25%
5	Environmental Studies Powered by AI*	25%
	Phase I: Pilot AI for QC Oversight	25%
	Phase II: AI Pilot Projects (5 reports)	100%
	Phase III: AI expansion (all reports)	20%
	Phase IV: Develop templates, training, and external messaging*	5%
6	Document Generation Powered by AI*	30%
	OIT - Planning, Tool Acquisition and Configuration	30%
	Use Case I: Pilot Effort - Position Description Search & Updates	30%
	Use Case II: Pilot Effort - OIT HR Hiring Process Efficiency	30%
7	Roadway Inventory Tracking Powered by AI	30%
	Use Case I: Feature Extraction for Guardrail Inventory	90%
	Use Case II: Feature Extraction for Sign Inventory	50%
	Use Case III: Feature Extraction with State Materials Office	5%
	Use Case IV: Feature Extraction with Statewide LiDAR collect	5%
8	Real-Time Hazard Reporting	25%
	Phase I: Evaluate Data Sources; Pilot Implementation	50%
	Phase II: Stakeholder Coordination	25%
	Phase III: Scale Software	15%
	Phase IV: Real-Time Reporting	10%



FDOT's AI-Research

How FDOT is Advancing AI through Research

- FDOT conducts applied research using AI for safety, operations, planning, and maintenance
- Projects span HQ and Districts 4 and 5
- Research supports real-time operations, long-term planning, and innovation readiness
- Evaluated using the Capability Maturity Matrix (CMM) to guide deployment

AI for Safety and Operations

- **Dynamic Crash Prediction Models:** CV + signal-based AI for proactive crash reduction (TSM&O use)
- **Raveling Detection via ML:** Random Forest models identify surface degradation from LCMS images, enhancing pavement maintenance planning
- **Cybersecurity & CV-DEP:** AI used to detect threats and prepare CV data for future ML applications

AI for Safety and Operations

- **RADISH Project:** Integrates video, loop, and other data sources for real-time arterial/freeway management
- **Crash Prediction (I-95/Sunrise Blvd):** Pilot implementation of dynamic crash forecasting
- **Decision Support:** Boca Raton + FIU collaboration for AI-based arterial ops strategy

Real-Time Safety and Signal Management

- **TUSHER + ATTAIN:** AI improves incident detection and signal performance with zero new field equipment
- **LiDAR & Ped Safety:** Edge-AI and computer vision enhance VRU safety at intersections
- **Socioeconomic Time Series Modeling:** Planning-support AI integrating ATSPM and regional data
- **Signal Timing Optimization:** AI algorithms tested for dynamic policy adjustments

Future AI Use Cases

How to Get Involved

Framework for Shared Success

- Initiative will be led by your office/team
- Emerging Technology office will provide support
- Developing a framework to support reasonable risk taking
- Prioritizing project based on informed judgement

Your Role in FDOT's AI Strategy

- Bring forward your AI ideas or challenges
- Join a pilot or propose a use case
- Engage with the Emerging Technology Office and OIT early in the process
- Promote safe, responsible innovation in your team

Next Steps

- Champion safe, compliant AI adoption across the agency
- Empower teams through training and consistent procedures
- Support pilot projects and feedback loops
- Collaborate with OGC, OIT, and operational teams to scale responsibly

Contact Us

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Safety Message