



# Data-Exchange Platform (DEP)

## As-Built Summary

FEB 1, 2023

Regional Multi-Modal Mobility Program

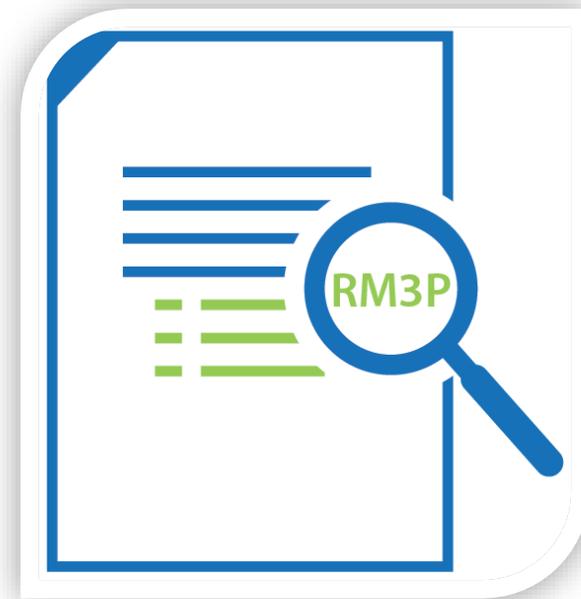
Founding Partners:



In Partnership With:



**RM3P Overview**  
**DEP Introduction**  
**Accomplishments**  
**Challenges**  
**Looking Ahead**



# RM3P Overview

***RM3P's Mission*** is to leverage the collaborative use of real-time data to improve travel safety, reliability, and mobility; as well as to give the public effective tools to make better informed travel choices.

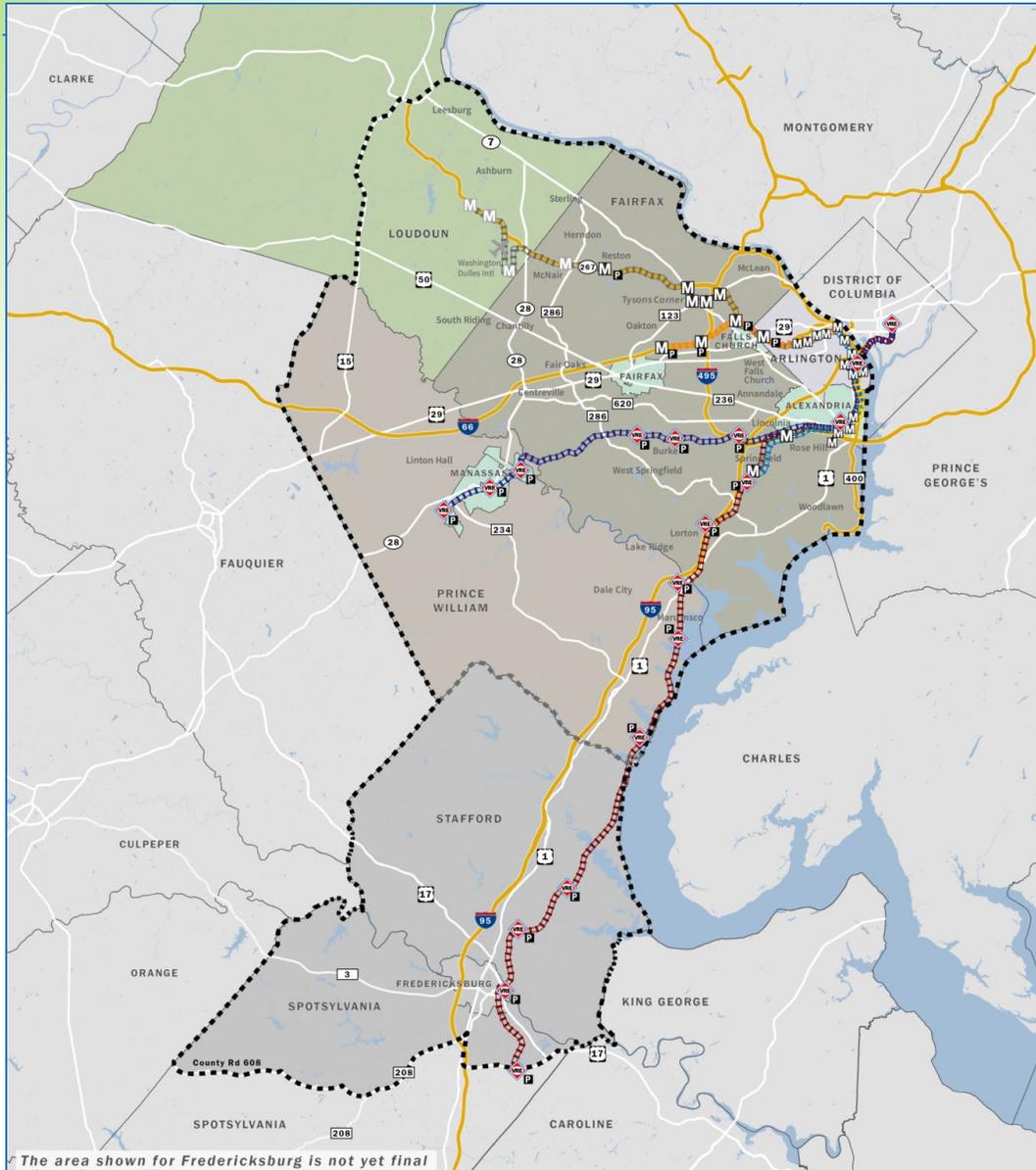
## Regional ICM/RM3P

- ❑ Builds on prior VDOT studies on ICM.
- ❑ The Northern Virginia Transportation Authority (NVTA), responsible for project planning and funding in Northern Virginia, identified ICM as key to meeting the vision of *TransAction*, its long-range strategic plan.
- ❑ NVTA and VDOT jointly developed a plan/approach for RM3P and obtained Innovation Funding.\*
- ❑ RM3P is led by VDOT, NVTA, and the Virginia Department of Rail and Public Transportation (DRPT).
- ❑ Federal funding (ATCMTD grant) enabled the expansion of selected RM3P functions southward to Fredericksburg.

\* The Innovation and Technology Transportation Fund is funded by the Virginia General Assembly.

Regional agency partners and stakeholders actively guided and shaped plans for RM3P service delivery and the framework for cooperative agreements.

# RM3P Overview: Geographic Boundaries



This *data-driven, multi-modal* mobility program, serving Northern Virginia and Metropolitan Fredericksburg, is comprised of 4 active projects:

❑ Data-Exchange Platform (DEP)

❑ Artificial Intelligence-Based Decision Support System (AI-DSS)

❑ Commuter Parking Information System (CPIS)

❑ Dynamic Incentivization (DI)

## Data-Exchange Platform



The Data-Exchange Platform (DEP) will be a reliable, continuously updated, cloud-based data storage and exchange system. It will be used by regional partners and third-party providers to capture, process, and exchange information on real-time and historic multi-modal travel conditions. This platform will feed necessary data to other RM3P program elements and disseminate value-added and mature data by these elements.

## AI-Based Decision Support System



The AI-Based Decision Support System (AI-DSS) will help predict the impact of disruptions to the transportation network and provide coordinated multimodal response options to agencies. The automated tool for operators will use travel data to monitor emerging conditions and recommend plans for coordinated, multi-agency responses to congestion, incidents, and events.

## Dynamic Incentivization

Dynamic Incentivization (DI) will be a data-driven system offering the public incentives to modify their travel choices and behaviors in response to real-time travel conditions. The incentives offered will aid in redistributing travel by dynamically managing demand.



## Commuter Parking Information System



The Commuter Parking Information System (CPIS) will provide historical, real-time, and predicted parking availability information, including reliable information about parking space availability at lots serving bus, vanpool, and carpool commuters.



# Game Changer

## Data, Data, & More Data



### Dynamic Incentivization

- Empowers commuters to contribute to the solution.
- Next-generation TDM – real-time & dynamic incentives.
- Reinforces positive changes in behavior with **challenges** and **loyalty** incentive programs.
- Applies a data-driven incentivization system to **dynamically manage demand** on the network.



### AI-Based Decision Support

- **Monitors** emerging conditions.
- **Predicts** the occurrence and impacts of disruptions to the transportation network.
- Provides **coordinated multi-modal response** options to transportation managers.
- **Shifts from reactive to proactive** operations for optimized response time and performance.



**Cohesive Transportation Systems Management and Operations (TSMO)**

# RM3P Executive Committee



**Cathy McGhee**  
Chief Deputy  
Commissioner, VDOT



**Monica Backmon**  
Chief Executive Officer, NVTA



**Jennifer DeBruhl**  
Director, DRPT



**Bob Osmond**  
Chief Information Officer,  
VITA



**Kevin Gregg**  
Chief of Maintenance &  
Operations, VDOT



**Hari Sripathi**  
Director of Innovation, VDOT



**Bill Cuttler**  
NoVA District Deputy  
Engineer, VDOT



**Marcie Parker**  
Fredericksburg District  
Engineer, VDOT



**Ian Ollis**  
Director of  
Transportation, GWRC



**Iris Vaughan**  
Performance Mgmt  
Team Leader, FHWA



**Karen King**  
ITS/Operations/Safety  
Engineer, FHWA

# RM3P Management Team

## Program Management Team



**Amy Tang McElwain**  
VDOT  
RM3P Program Manager  
DEP & CPIS Project Manager



**Candice Gibson**  
VDOT  
RM3P Deputy Manager  
AI-DSS Project Manager



**Joel Ticatch**  
Kapsch  
RM3P Consultant Manager



**Aafiya Shah**  
Kapsch  
RM3P Consultant Deputy Manager

## Program Management Support Group (PMSG)

**Keith Jasper**  
NVTA

**Paul Szatkowski**  
VDOT  
Traffic Operations Division

**Tiffany Dubinsky**  
DRPT  
Statewide Transit Planning

**Mackenzie Love**  
NVTA

**Halie Mitchell**  
VDOT  
Northern Virginia District  
DI Deputy Project Manager

**Chris Arabia**  
DRPT  
Statewide Mobility Program  
DI Project Manager

**Leigh Anderson**  
GWRC

**Michelle Shropshire**  
VDOT Fredericksburg District

## Consultant Technical Lead

**Jeff Adler**  
Kapsch  
AI-DSS

**Nu Rosenbohm**  
Kapsch  
DEP

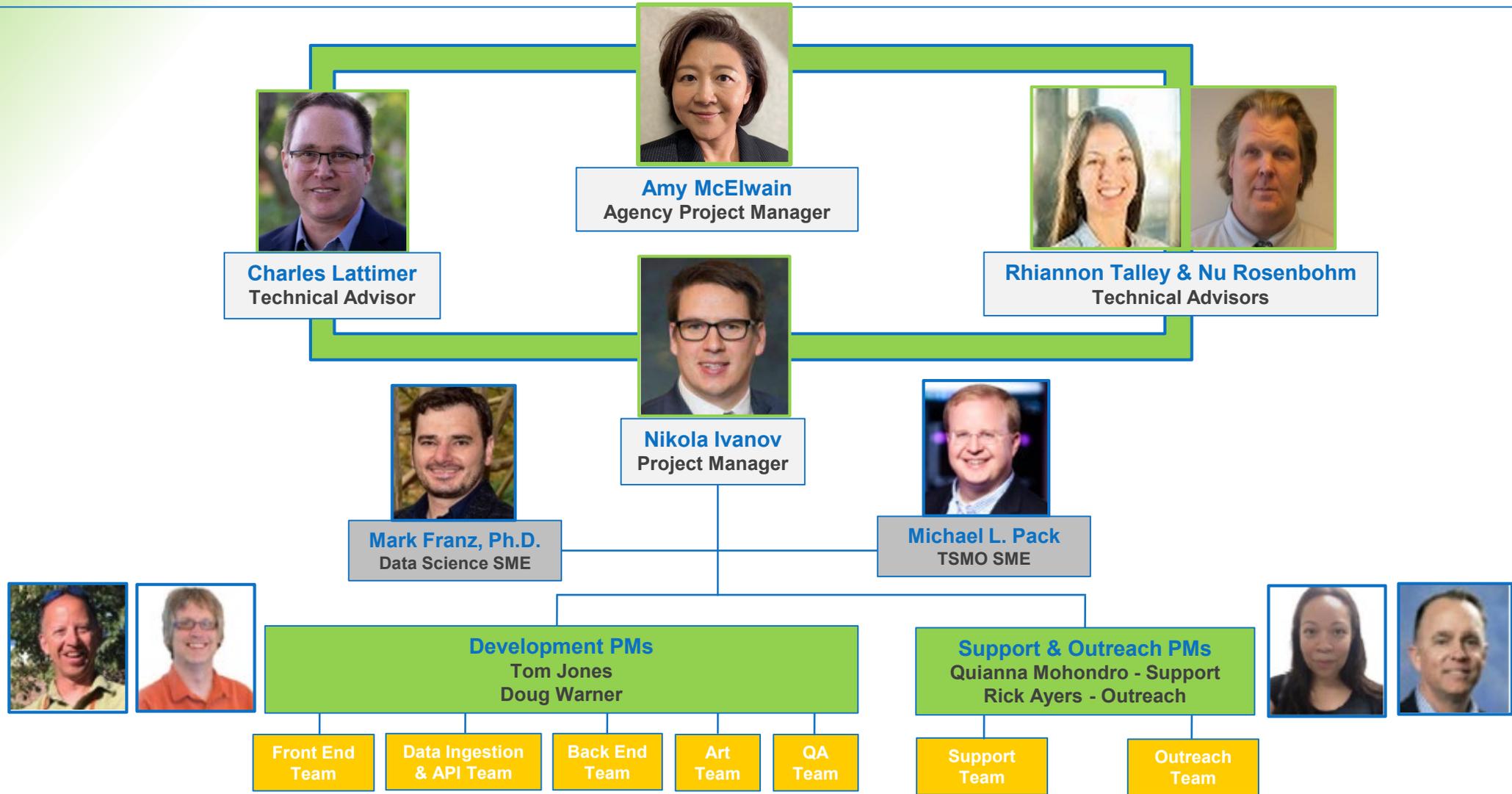
**John Horner**  
Kapsch  
DI and CPIS

**Imran Inamdar**  
Kapsch  
CPIS

# DEP Introduction



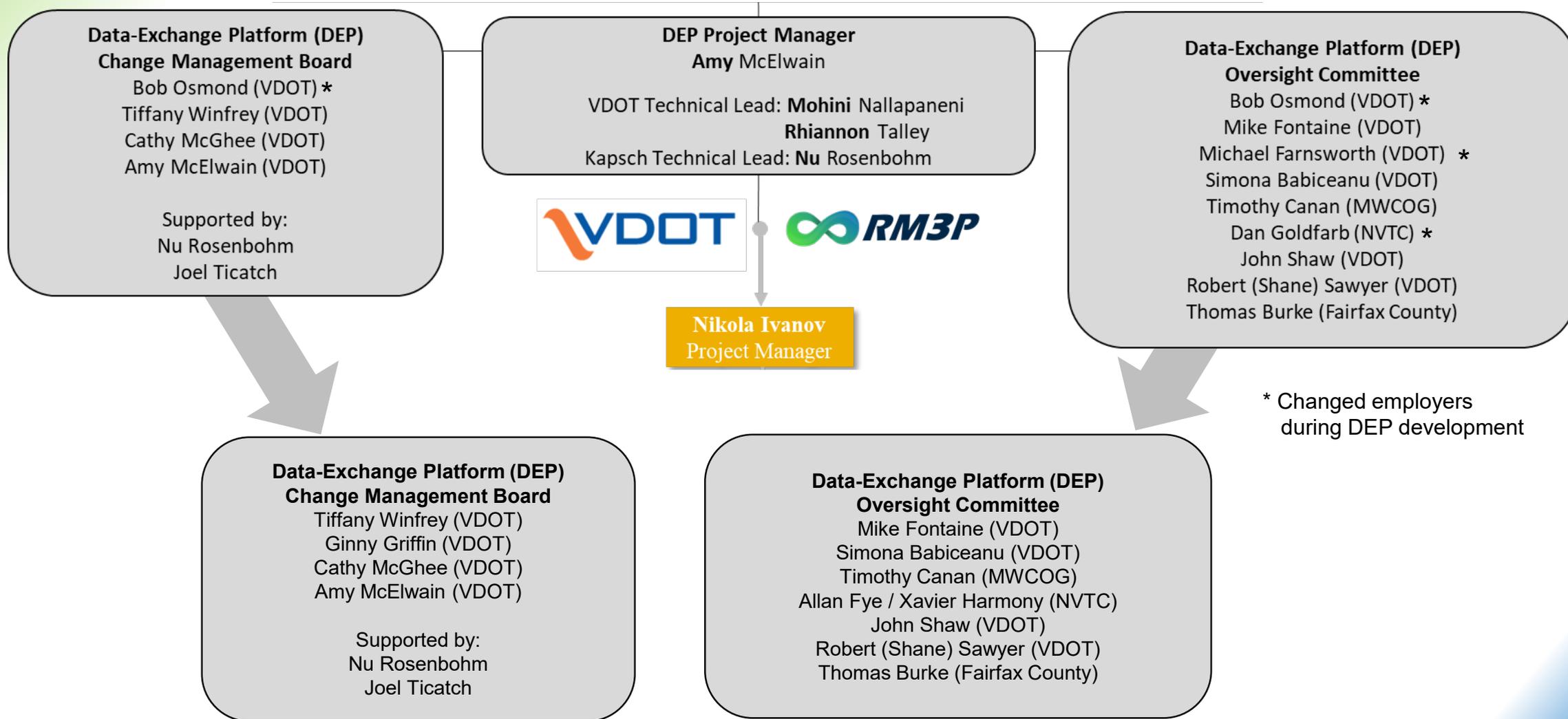
# DEP Project Team – Behind the Scene



# The DEP Oversight

*Beginning of the Project*

*End of the Project*



# The DEP Journey



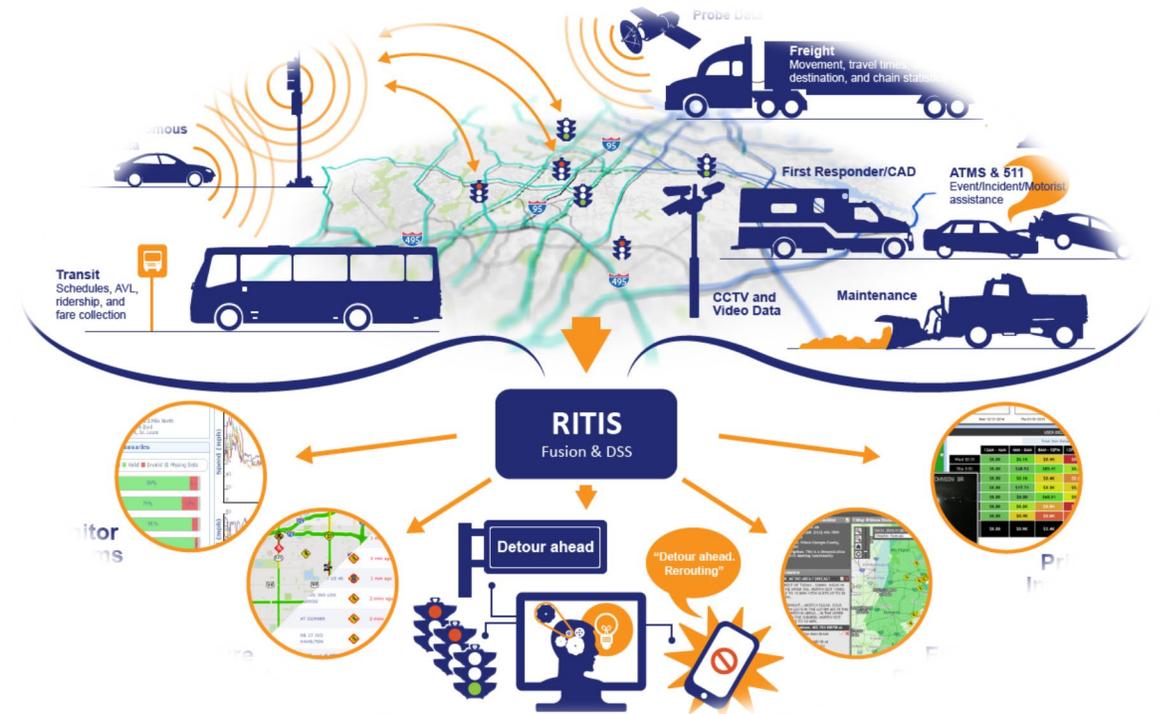
# The DEP Approach – Leverage RITIS

## What is RITIS?

RITIS is a situational awareness, data archiving, and analytics platform used by transportation officials, first responders, planners, researchers, and more. RITIS fuses data from many agencies, many systems, and even the private sector—enabling effective decision making for incident response and planning.

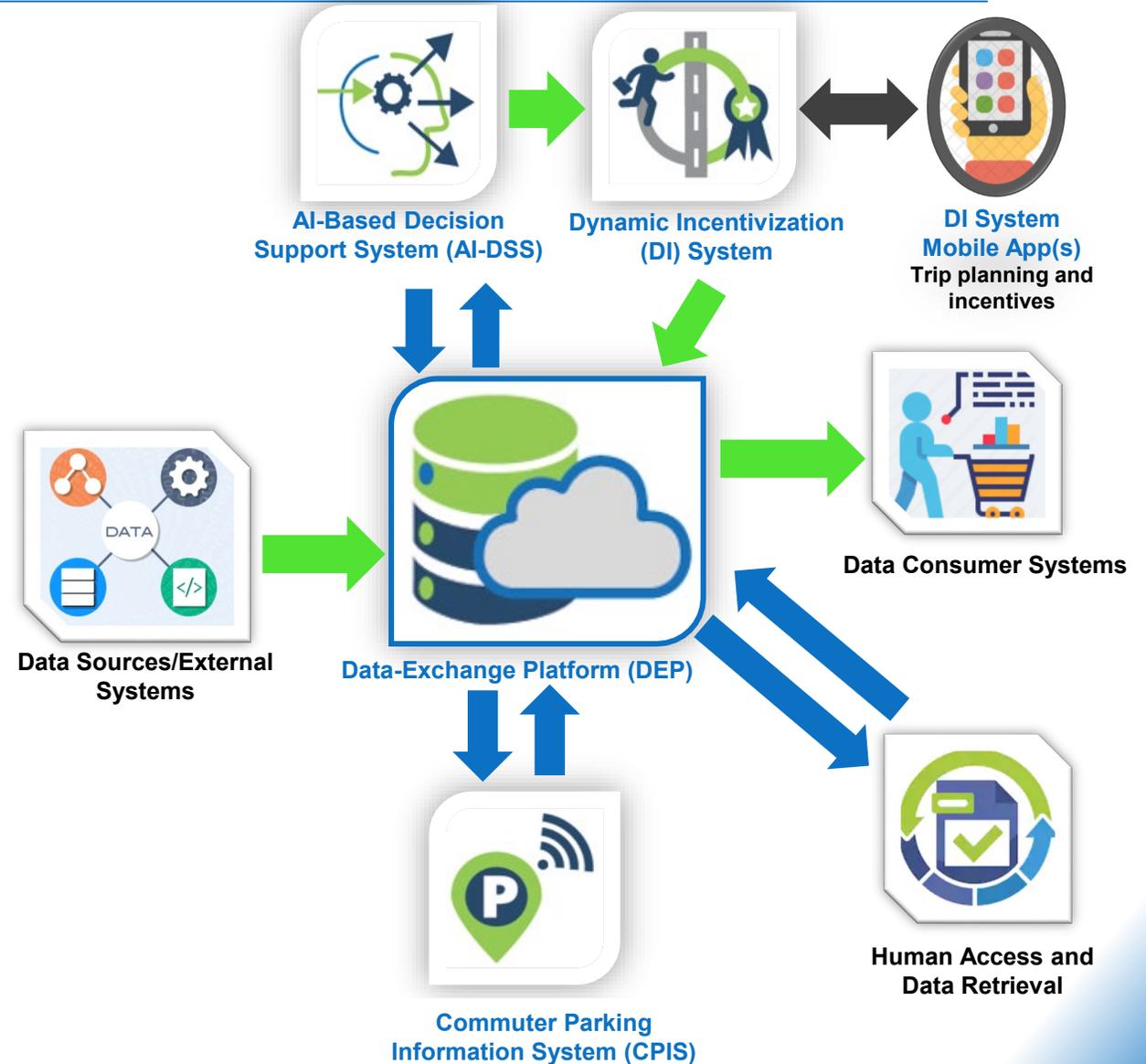
## Leverage a State-to-State MOU with UMD/CATT Lab to tailor RITIS to DEP. Why?

- RITIS already contains a significant volume of pertinent regional data.
- RITIS supports multi-modal/multi-agency data ingestion.
- The real-time data in RITIS is predominantly incident/event-centric.
- RITIS has extensive experience in the region ingesting and integrating a range of data format.
- RITIS has existing processes & relationship in place.
- Virginia has a large number of existing RITIS users.



# The DEP Background

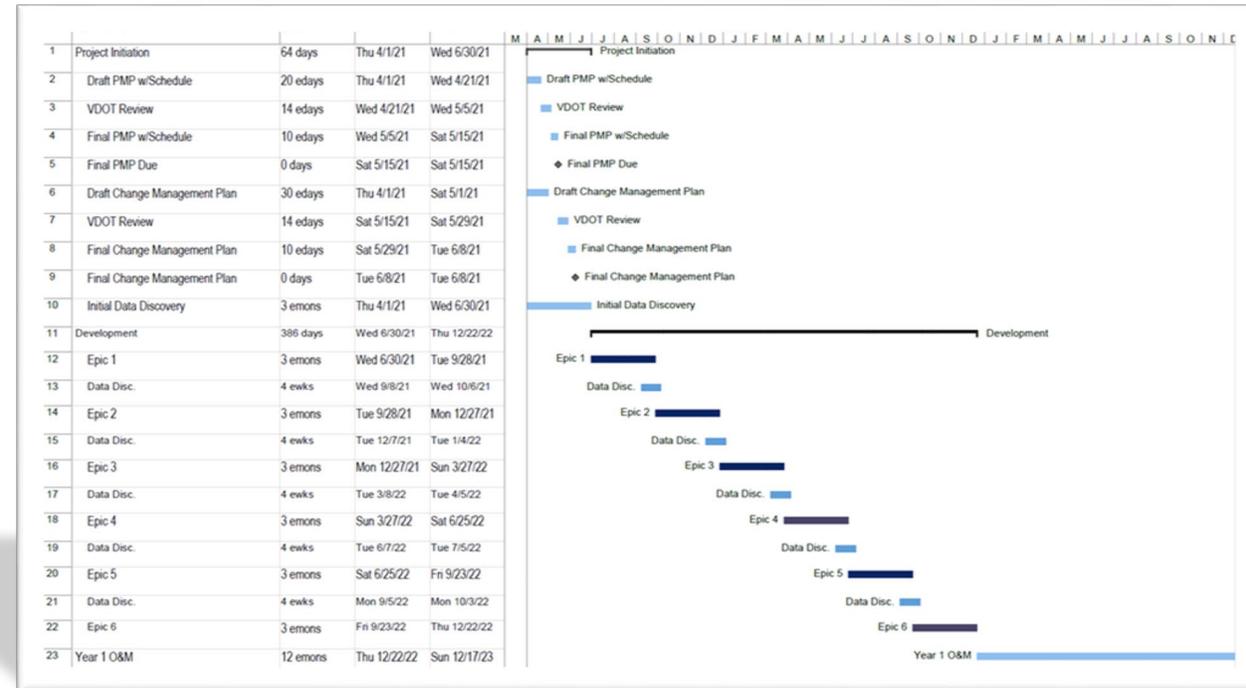
- Data-Exchange Platform (DEP) is RM3P's data ingestion, data consolidation, data storage and data distribution system.
- Interfaces with all other RM3P systems to provide and receive data.
- Interfaces with other Data Consumers to provide RM3P data



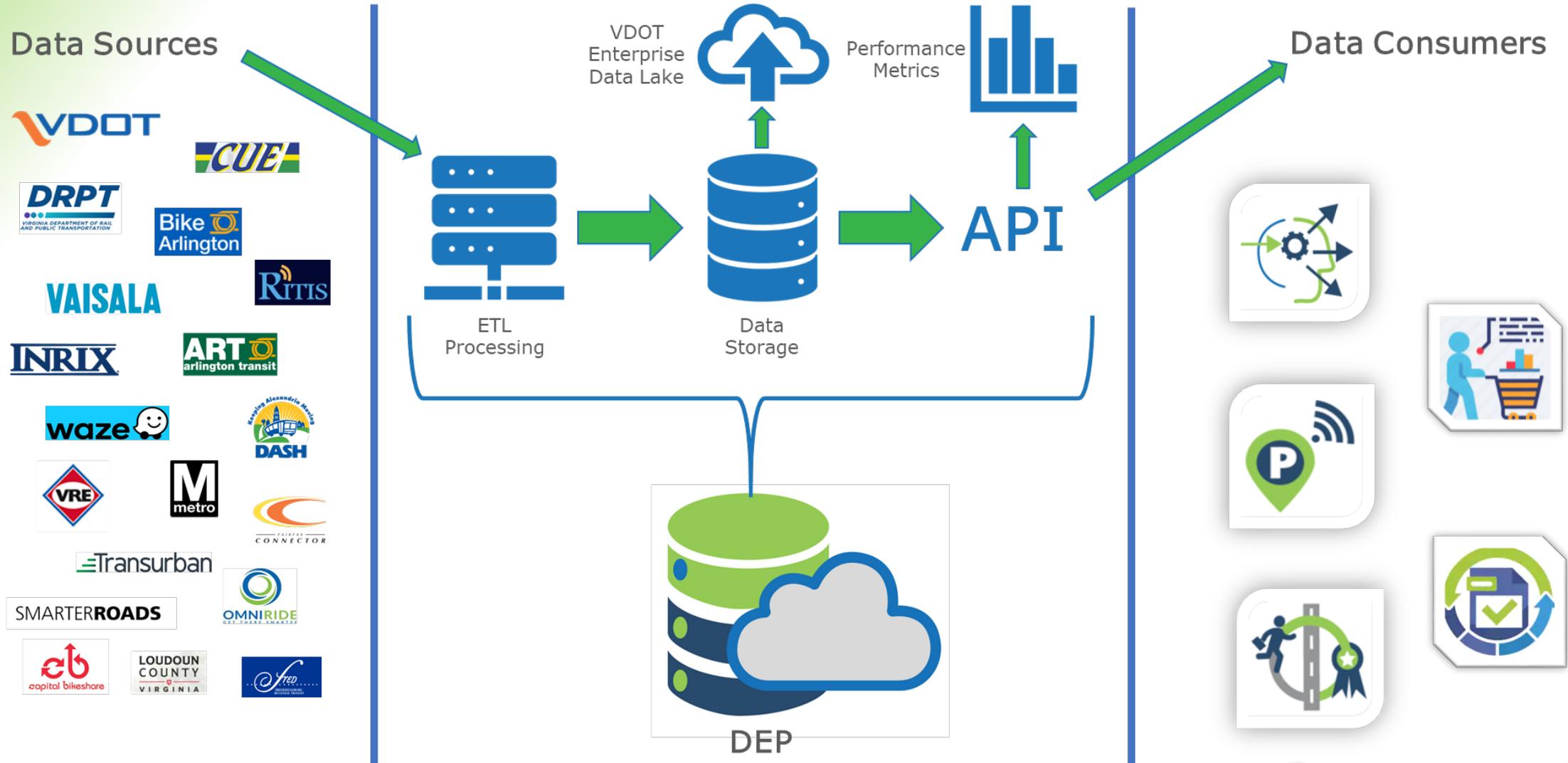
# The DEP Project Approach

- Total development schedule: **21 months**
- **Hybrid agile** development process
- **Project Initiation** during the first 3 months –
  - PM Planning
  - Data Discovering
  - High-level requirements update
  - Solution Elaboration → product backlog  
→ prioritize and assigned to Epics & Sprints
- **Six Epics** – 3 months each
- 5 one-year **O&M** after development
- Contract allows for **Optional DEP Enhancements** after the 21-mo development phase – need & priority driven and funding-constraints

**Contract Execution: March 19, 2021**  
**NTP: March 29, 2021**  
**Development Completion: December 19, 2022**



# DEP High Level Architecture



# What is DEP?

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- ✓ **Expandable data ingestion system.**
- ✓ **Automated data consolidation and storage system.**
- ✓ **Powerful API for real-time and near real-time data provision.**
- ✓ **Core data exchange platform supporting all other RM3P systems.**



DEP

# What DEP Isn't?

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- X** It is not an analytical tool.  Try RITIS Analytics Tools or upcoming AI-DSS analytical capabilities for operators
- X** It is not designed for mega project download.  Try RITIS Event Query Tool, Detector Tools & PDA Massive Data Downloader.
- X** It is not designed for users to open files using common MS Office suites such as Excel.  Developers need to understand and integrate API with existing software. Coding knowledge is required.
- X** It is not a document storage system.  But there are documents explaining about the data
- X** Not all data is available to all.  Some data has license constraints or sharing limitation based on data source owners' instructions.

# What Sets DEP Apart from other Data Exchange Platforms?

*No data exchange platform is perfect, but what sets DEP apart from others is a strong commitment to its mission:*

	<b>Data</b> ↓	<b>Exchange</b> ↓	<b>Platform</b> ↓
<b>RM3P DEP</b>	Variety of prioritized data sets supporting key use cases	Powerful API, raw data download, and associated tools	Flexible, expandable, and evolving
<b>Other DEPs</b>	Either overly focused on one use case, or so broad that may not be useful to any	Either a data “dumping ground” or too human oriented requiring manual effort to use effectively	Either “one-and-done” deployment, or overly constrained by standards or specific use cases

# Access DEP

**Now**



**RM3P  
Procurement  
Awards**



**After All RM3P Procurement Ends**

- **VDOT Users**
- **Affiliate Agency Users (federal, state, regional and local public transportation agencies)**

- **AI-DSS Vendors upon award**
- **DI Vendors upon award**
- **Smart Parking Vendors upon award**

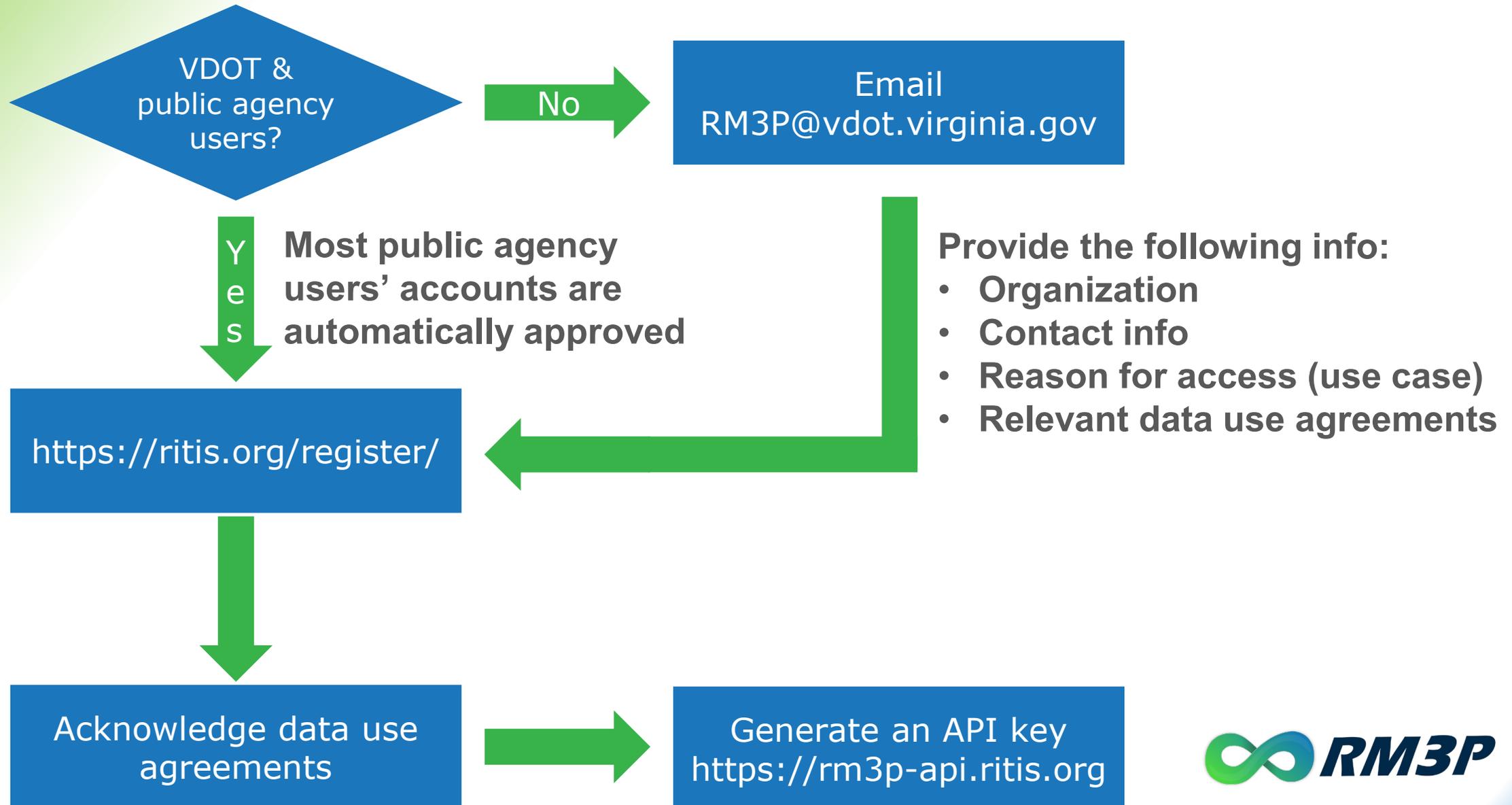
- **RM3P Targeted 3rd Party Vendors**
- **Contractors that use data from DEP to benefit VDOT's projects with proven use case**
- **Contractors that use data from DEP to benefit affiliate agencies' projects with proven use case**
- **Other App developers with proven use case**
- **University research personnel with proven use case**

**Support  
Public  
Agencies**

**Support  
RM3P**

**Support repackaging of pertinent data for  
delivery to travelers.  
Support researchers and planners**

# How to Get Access to DEP



# Accomplishments



# Project Success

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- On-Time & Within-Budget
  - DEP built to ingest, process, store, and disseminate real-time and historical data from multiple sources within budget
  - Project goals met, on schedule, in 21 months of development split into six 3-months long development Epics
- Approach
  - Thorough project documentation and update at the end of each development Epic
  - The architecture is designed to allow future expansion for new data sources and data consumers to meet VDOT's requirement of a scalable data-exchange platform.

# Project Success

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- Approach (Cont'd)
  - Agile and collaborative approach to identify key data sources, definitions, develop custom output, API capabilities, permissions, and functional and performance testing - at the end of each development Epic, a set of data sources and functions was deployed and made available to authorized users
  - Weekly project team meetings - identify and remove/resolve barriers and issues, prioritize data ingestions per Epic, and identify path forward promptly
- Added Value
  - Enhanced RITIS data, user authentication and permissions controls
  - Monthly data exports to VDOT's Enterprise Data Lake
  - Usage and reliability statistics

# Project Completion Assessment

- Data discovery challenges
  - Result in continuous data discovery throughout 21 months
  - Constant update and reprioritize data feeds
- Historical data API endpoint limitations
  - Offer other ways for accessing large set of historical data
- System monitoring and data outage protocol
  - Experienced data gap
  - Formalize work protocol in addressing gaps
- DEP training
- Data feed traceability matrix
  - Data sets successfully integrated into DEP
  - Data sets unavailable for integration
  - Data sets were determined duplicated, otherwise integrated

*Data feed traceability matrix*

Category	Item	Availability	Notes
Incident Data	Planned Special Event Data	No	Data set not provided by VDOT
Traffic Data (speed and volume)		Yes	Only speed and travel time have been provided by VDOT
OT Operations	Device Status (DMS, Gates)	Yes	
Incidents	Congestion		
Special Events	Work Zones		
Bus/Tram	Bus Schedule Data	Yes	GTFS RT
Static Data		Yes	Included data from both the Valiata system with all WIDE Crowdsourced events
OT RWIS		Yes	Included with incident data feed
OT Incidents		Yes	GTFS
OT Workzones		Yes	GTFS RT
DATA Bus Station Data		Yes	GTFS RT
DATA Bus Vehicle Location Data		Yes	GTFS RT
DATA Rail Station Data		Yes	GTFS RT
DATA Rail Station Arrival Data		No	Data set not available prior to the end of the 2022 development phase
SP DMS Response Plans		No	Found to be not relevant for DEP stakeholders
Proposic Model Speed Contour Impacts		No	Found to be not relevant for DEP stakeholders
Proposic Model Speed Impacts		No	Found to be not relevant for DEP stakeholders
OT LIS		No	Data set not available prior to the end of the 2022 development phase
OT Parking (Playmarket)		No	Data set not available prior to the end of the 2022 development phase
SP Parking Information Mgmt. System		No	Data set not available prior to the end of the 2022 development phase
SP Incentivization		No	Data set not available prior to the end of the 2022 development phase
Real Bikeshare		Yes	Station metadata, bike status, and free bike status
Real Bikeshare		Yes	Updated quarterly
Real Bikeshare		Yes	Typical occupancy values updated quarterly included with Parking Lot Inventory data set
Real Time Occupancy Data		No	Data set not available
Real Time Incident Data		No	Data set not available
InterRoads Portal Express Lanes Pricing		Yes	Same data obtained directly from source
InterRoads Portal Speeds & Travel Times		Duplicate	Same data obtained directly from source
InterRoads Portal Detector Data		Duplicate	Same data obtained directly from source
InterRoads Portal Detector Data		No	Data set not available prior to the end of the 2022 development phase
InterRoads Portal Traffic Signal		Duplicate	Same data obtained directly from source
InterRoads Portal Weather		Duplicate	Same data obtained directly from source
InterRoads Portal Incident MCongestion		Duplicate	Same data obtained directly from source
Region Co. Traffic Signal System Active Timing		No	Data set not available prior to the end of the 2022 development phase
Region Co. Traffic Signal System Timing Plan		No	Data set not available prior to the end of the 2022 development phase
Region Co. Traffic Signal System Road Network		No	Data set not available prior to the end of the 2022 development phase
Region Co. Traffic Signal System Detector Data		No	Data set not available prior to the end of the 2022 development phase

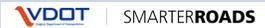
*System requirements traceability matrix*

Requirement ID	Description	Completion Status	Notes
DE-R1	The DEP shall integrate with the four RM3P PE systems fulfilling their requirements (see attached Needs/Features and Requirements docs for each of the other four PE systems).	Partial	DEP was built in anticipation of RM3P PE system needs. However, none of the RM3P PE systems are in place as of completion of this project. Once RM3P PE systems come online any new identified needs will have to be addressed via task orders during O&M phase.
DE-R2	The DEP shall be designed as an open and modular solution that can easily expand over time to support the full vision for the program element.	Yes	The DEP is capable of ingesting, processing, and disseminating new data sets when they become available.
DE-R3	The DEP shall meet the Virginia Information Technology Agency (VITA)'s Information Technology Resource Management (ITRM) Policies, Standards and Guidelines for information security, and successfully pass the ECOS certification, if required.	Modify	The CATT Lab was exempt from this requirement prior to start of this project.
DE-R3.1	The DEP shall authenticate users using the Lightweight Directory Access	Modify	DEP uses a robust user login and access control system equivalent to LDAP, but not LDAP specifically.

# Project Accomplishments – Data Sources Integrated

Roadway Data:

<https://rm3p.ritis.org/data/sets>

Data Source		Data Types	
VDOT OpenTMS		<ul style="list-style-type: none"> <li>• Device Status (DMS, Gates)</li> <li>• Incidents</li> <li>• Congestion</li> <li>• Special Events</li> </ul>	<ul style="list-style-type: none"> <li>• Work Zones</li> <li>• Detectors</li> <li>• TMS Wavetronix Detectors</li> </ul>
Waze thru VDOT		<ul style="list-style-type: none"> <li>• Incidents</li> </ul>	
INRIX thru VDOT		<ul style="list-style-type: none"> <li>• Real-Time &amp; Historical Speed</li> </ul>	<ul style="list-style-type: none"> <li>• Real-Time &amp; Historical Travel Time</li> </ul>
Transurban		<ul style="list-style-type: none"> <li>• Incidents and Events</li> <li>• Gate Controllers</li> </ul>	<ul style="list-style-type: none"> <li>• DMS</li> <li>• Detectors</li> </ul>
VDOT Counts		<ul style="list-style-type: none"> <li>• TMS QA/QC-ed Archived Count</li> </ul>	
Arlington County Counts		<ul style="list-style-type: none"> <li>• Traffic Counts</li> </ul>	
SmarterRoads		<ul style="list-style-type: none"> <li>• Toll Rates: I-66 ITB (VDOT)</li> </ul>	<ul style="list-style-type: none"> <li>• Toll Rates: I-95/495 (Transurban)</li> </ul>
RITIS thru VDOT		<ul style="list-style-type: none"> <li>• CCTV Streams for human consumption</li> </ul>	
VDOT RWIS		<ul style="list-style-type: none"> <li>• ESS Measurements</li> </ul>	

# Project Accomplishments – Data Sources Integrated

<https://rm3p.ritis.org/data/sets>

## Multimodal Data:

Data Source	Data Types
Capital Bikeshare 	<ul style="list-style-type: none"> <li>Station Metadata and Bike Status</li> <li>Free Bikes Status</li> </ul>
Bike Arlington 	<ul style="list-style-type: none"> <li>Northern VA bike Eco-Counters</li> </ul>
VDOT Bike 	<ul style="list-style-type: none"> <li>Static Bike Facilities Inventory</li> </ul>
VDOT Parking 	<ul style="list-style-type: none"> <li>Parking Lot Inventory</li> <li>Parking Lot Typical Occupancy</li> </ul>
DRPT Ridership 	<ul style="list-style-type: none"> <li>Aggregated statewide archived transit ridership</li> </ul>
VRE 	<ul style="list-style-type: none"> <li>Rail GTFS</li> <li>Rail GTFS-RT</li> <li>Parking Occupancy and Capacity</li> </ul>
WMATA 	<ul style="list-style-type: none"> <li>Bus and Rail GTFS</li> <li>Bus and Rail GTFS-RT</li> <li>Bus, Rail, Station Incidents</li> <li>Parking Lots Capacity</li> </ul>
PRTC  Alexandria DASH  Arlington Transit  Fairfax Connector 	<ul style="list-style-type: none"> <li>Bus GTFS</li> <li>Bus GTFS-RT</li> </ul>
Loudoun County Transit  Fredericksburg Transit  City of Fairfax CUE 	<ul style="list-style-type: none"> <li>Bus GTFS</li> </ul>

# Project Accomplishments

In addition to data ingestion and API output ...

	Epic 1 (Jul – Sep 2021)	Epic 2 (Oct – Dec 2021)	Epic 3 (Jan – Mar 2022)
Data Export	✓ Established data export connection with VDOT Enterprise Data Lake (Azure container)	✓ Began data export to VDOT Enterprise Data Lake (and continued throughout Epics)	✓ Continued
Website	✓ Completed the first phase of DEP landing web page	✓ Launched DEP landing webpage ( <a href="https://RM3P.RITIS.org">https://RM3P.RITIS.org</a> )	✓ Updated list of available data sets
RM3P RFP Support	✓ Support for other RM3P RFPs	✓ Continued support for other RM3P RFPs	✓ Support AI-DSS RFP: temporarily hosted sample historical data sets for Offerors
API Enhancements	✓ Designed and deployed the first phase of RM3P dedicated API	✓ API performance and documentation improvements	✓ Continued API enhancements: historical data requests, mode filtering, combine detectors output regardless of vendor
Training	✓ Provided existing documentation for existing APIs (RITIS Filter and PDA API)		✓ Training to VDOT data scientists

# Project Accomplishments

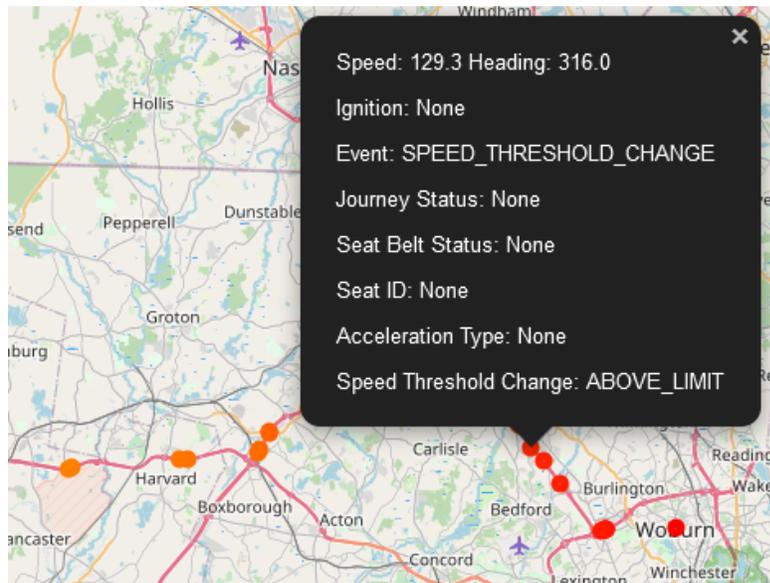
In addition to data ingestion and API output ...

	Epic 4 (Apr – Jun 2022)	Epic 5 (Jul – Sep 2022)	Epic 6 (Oct – Dec 2022)
Data Support	<ul style="list-style-type: none"> <li>✓ Backfilled historical RWIS data</li> <li>✓ Addressed WMATA API rate limiting issues</li> </ul>	<ul style="list-style-type: none"> <li>✓ Backfilled OpenTMS data gaps</li> <li>✓ Modified Capital Bikeshare data ingestion due to feed changes</li> </ul>	<ul style="list-style-type: none"> <li>✓ Data governance</li> <li>✓ Data outage (and backfill) protocol</li> <li>✓ Wejo data (no API) support research</li> </ul>
Data Export	<ul style="list-style-type: none"> <li>✓ Updated exports to be delivered to both Dev and UAT environments</li> </ul>	<ul style="list-style-type: none"> <li>✓ Updated exports to also be delivered to production environment</li> </ul>	<ul style="list-style-type: none"> <li>✓ Changed extracts format</li> </ul>
API Enhancements	<ul style="list-style-type: none"> <li>✓ Continued API enhancements: more filtering capabilities, ability to exclude geometry data from GTFS-RT, improve performance of historical DMS request, historical detector search capability, more specific handling when the API key is missing or invalid</li> <li>✓ New dynamic API documentation</li> </ul>	<ul style="list-style-type: none"> <li>✓ Continued API enhancements: XML output format, mgmt. of weather data from multiple sources, historical RWIS searching capability.</li> </ul>	
Training			<ul style="list-style-type: none"> <li>✓ Open House and Technical Demo</li> </ul>
Performance		<ul style="list-style-type: none"> <li>✓ Added DEP API statistics gathering capability</li> </ul>	<ul style="list-style-type: none"> <li>✓ Evaluation metrics and dashboard</li> </ul>

# Project Accomplishments

Support VDOT beyond DEP ...

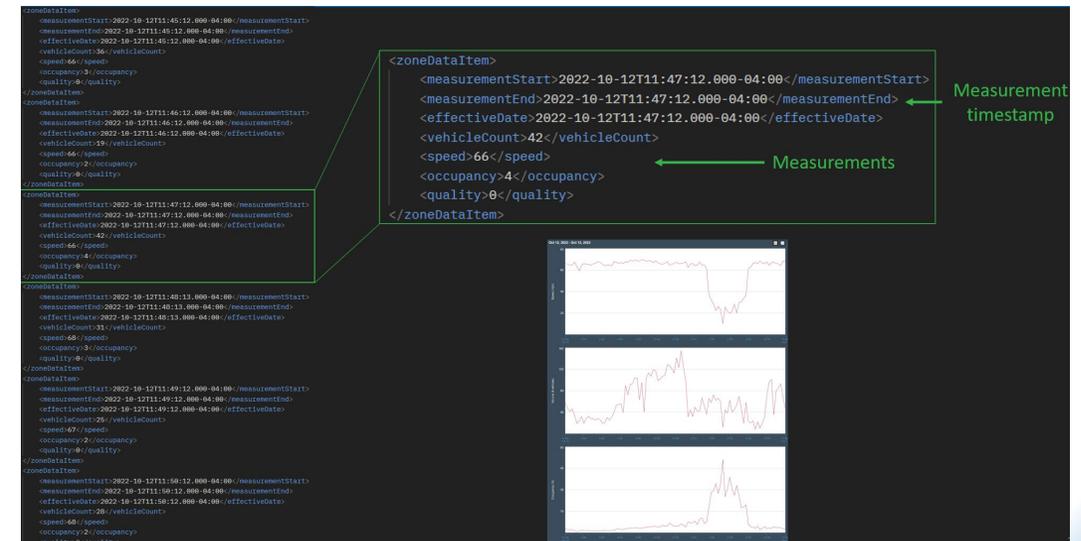
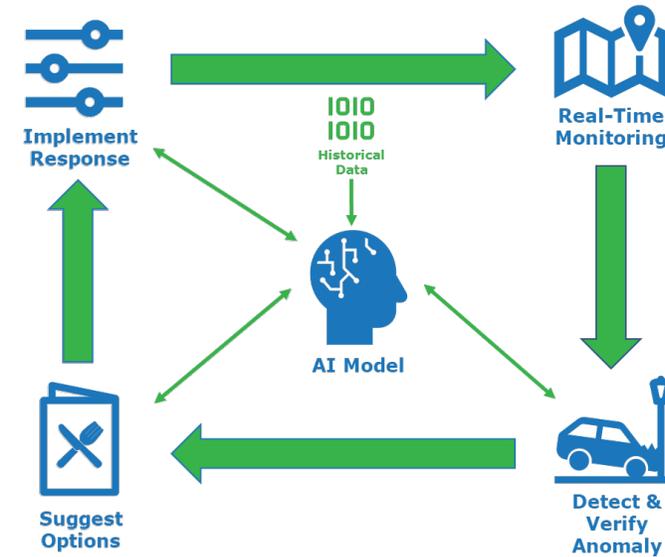
- Evaluation metrics and dashboards
- Wejo data to support VDOT research



Audit Start	Audit End	System Uptime	Data Streams Integrated	Data Quality Issues Identified	Number of Requests	Average Response Time (seconds)	95th Percentile Response Time (seconds)	75th Percentile Response Time (seconds)	50th Percentile Response Time (seconds)
11/1/2022	12/1/2022	0.39377	39	119	0	N/A	N/A	N/A	N/A

# Project Accomplishments

- DEP Open House
  - Drew a crowd of 150+ attendees
  - Recognition of partners and stakeholders
  - Technical demonstration and training



**Overcome Challenges**



# Project Challenges

## Overcome the Challenges ...

Challenge Category	Challenge	Mitigation
Data Discovery	<ul style="list-style-type: none"> <li>a) Identifying key personnel and determining true status of available data and feeds</li> <li>b) Some data changed or turned out to be unavailable while some data anticipated unavailable became available.</li> </ul>	<ul style="list-style-type: none"> <li>a) Cooperative approach with VDOT to engage and maintain conversations with stakeholders</li> <li>b) Agile and active management approach for continuous data discovery and prioritization for ingestion.</li> </ul>
Data Quality	<ul style="list-style-type: none"> <li>a) Consuming data from sources is exposing interface and data issues at source level</li> </ul>	<ul style="list-style-type: none"> <li>a) Provide feedback to the data owners for fix</li> <li>b) Address at the receiving (DEP) end</li> </ul>
Development Challenge	<ul style="list-style-type: none"> <li>a) Testing vs Production environments</li> <li>b) Data duplication</li> <li>c) RWIS and WxDE data sources caused ID collisions</li> <li>d) Toll rate data inconsistencies</li> <li>e) VDOT TMS archived data format and non-incremental update transmission method</li> </ul>	<ul style="list-style-type: none"> <li>a) Resolved in working with data owner engineers</li> <li>b) Identified logic for filtering out duplications</li> <li>c) Modified DEP data model and all archived data (billions of data records)</li> <li>d) Worked with Transurban for updating data elements</li> <li>e) VDOT ITD changed adopted traditional incremental update on TMS archived data transmission</li> </ul>
Implementation	<ul style="list-style-type: none"> <li>a) Existing APIs contain many capabilities not necessary for RM3P</li> <li>b) Discovering feed and data issues and discrepancies during implementation</li> </ul>	<ul style="list-style-type: none"> <li>a) Leverage the existing codebase to spin off a dedicated RM3P API that reduces complexity for users</li> <li>b) Work with feed providers to correct issues or identify workarounds</li> </ul>

# Project Challenges

## Overcome the Challenges ...

Challenge Category	Challenge	Mitigation
Unavailable Data Sets	<ul style="list-style-type: none"> <li>a) VDOT KITS – No actual interface to provide data to DEP</li> <li>b) WMATA Parking Occupancy – agency internal security approval not approved in time</li> <li>c) VDOT Haymarket Parking Occupancy – No actual interface to provide data to DEP</li> <li>d) RM3P procurement delays</li> </ul>	<ul style="list-style-type: none"> <li>a) Continued engaging with data owners</li> <li>b) Identified and prioritize other data sets with high value to RM3P</li> </ul>
Unlinked Sources of Data	<ul style="list-style-type: none"> <li>a) VDOT KITS and HMMS – no linkage</li> </ul>	<ul style="list-style-type: none"> <li>a) VDOT KITS – may have linkage to the new inventory</li> </ul>
Systems Transition	<ul style="list-style-type: none"> <li>a) VDOT KITS and OpenTMS transition to Cloud</li> <li>b) VDOT Inventory system change</li> <li>c) City of Alexandria Signal to KITS</li> <li>d) Arlington Signal – new procurement</li> </ul>	<ul style="list-style-type: none"> <li>a) Deferred and continued engaging with data owners</li> </ul>
Interface Reliability	<ul style="list-style-type: none"> <li>a) Data feed and data outage from OpenTMS</li> </ul>	<ul style="list-style-type: none"> <li>a) Worked with VDOT and OpenTMS on data backfill</li> <li>b) Developed data outage protocol</li> </ul>

# Lessons Learned

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## Collaboration, Agile, and Flexibility

Engage partners early, manage expectations, and be prepared to pivot to alternatives if feeds/data/elements turn out different from expectations.

## Leverage Previous Investments and Successes

Take advantage of previous investments by adjusting approaches to leverage existing data, feeds, and systems.

## Be Transparent About Goals and Expectations

Demonstrate benefit and obtain buy-in from stakeholders to help overcome technical barriers and set up a cooperative roadmap.

## Be Sensitive and Aware of Others' Challenges

Be prepared to accommodate when possible, especially when it comes to cybersecurity and policy requirements.

# Looking Ahead



# What's Next?

## ***More data in the future? Absolutely!***

*But ... it depends on funding and priority of business cases that data enables.*

*Top priority is to support other RM3P elements and ingest data from RM3P*

## ***User Support***

*Ensure users receive exceptional service to enable their use cases.*

*Goal: achieve efficient data democratization*

## ***Continuous Improvements***

*Performance metrics, user feedback, and technology evolution: improvements*

*Combine data where appropriate to create value and save users' time.*

**We want to hear from  
YOU!**

Contact [RM3P@vdot.Virginia.gov](mailto:RM3P@vdot.Virginia.gov)

**for**

**suggesting data that can be  
shared via DEP, and  
sharing use cases so that we may  
build a library of use cases that  
can be shared with other users.**

# Proposed 2023 Enhancements

The integration of these systems will be prioritized by VDOT depending on funding availability and readiness of data sources:

- VDOT KITS
- VDOT Haymarket Parking
- WMATA Parking Occupancy
- RM3P DSS Response Plans
- RM3P Incentivization Program
- RM3P Parking Information Management System
- Cintra I-66 Express Lanes
- VRE Incidents and Ridership
- RITIS CCTV for Real-Time Analytical Use
- City of Alexandria KITS
- Arlington County Signals
- Arlington County Bluetooth Travel Times
- VDOT TMS Real-Time In-Pavement Detectors



**Upon VDOT PM's approval, CATT Lab will submit the Statement of Work, Budget, and Schedule in a Task Order format. Work will be authorized to proceed after approval by the Change Management Board.**



# Thank You!

[rm3pvirginia.org](http://rm3pvirginia.org)

[rm3p.ritis.org](http://rm3p.ritis.org)

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Regional Multi-Modal Mobility  
Program

