Regional Multi-Modal Mobility Program (RM3P) Initiative

STAKEHOLDER ADVISORY GROUP (SAG)

INTRODUCTORY GUIDANCE PACKAGE

Regional Multi-Modal Mobility Program

April 2020

Welcome to RM3P

Cathy McGhee
Program Principal

- **What is RM3P?**
  - Virginia's *Regional Multi-Modal Mobility Program*.
  - A technology-centered schema harnessing data to optimize performance of the transportation network.
  - Emphasizes integrated, multi-modal approaches.
  - Engages public- and private-sector stakeholders.
  - Invites travelers, themselves, to be part of the solution.

- **The RM3P "Journey" begins in Northern Virginia…**
  - Deployed over a period of approximately 3 years.
  - Once successful, RM3P concepts will be migrated to other parts of the Commonwealth.

- **Thank you for taking the time to learn about RM3P!**

Program Background

Joel Ticatch
Consultant Program Manager

- RM3P builds on prior VDOT studies on *Integrated Corridor Management* (ICM).

- Key ICM precepts include the following:

  - Manage activities at a *corridor level*, across jurisdictions and agencies.

  - Operate *multi-modally*.

  - Focus on moving *people and goods*, rather than vehicles.

  - Emphasize *connectivity and integration.*

  - *Balance* the load.

# Program Background (Cont'd.)

- ICM planning studies conducted in Northern Virginia:

  - *North-South Corridor –*

    - Anchored by I-95/I-395

    - ICM operational strategies

    - Completed in 2013

  - *East-West ICM Corridor –*

    - Anchored by I-66

    - Foundational initiatives

    - Completed in 2017

- At the conclusion of these studies, the implementation concept shifted from *corridor* to *region*.

RM3P

RM3P Overview

Amy Mcelwain
Program Manager

- Collaborative program to **improve safety, reliability, and mobility** for Virginia travelers.

- Encompasses all modes of travel across Northern Virginia.

- Draws on the operational capabilities and support of public agencies and private-sector organizations.

- Harnesses new and emerging technologies to share real-time information, support collaborative actions and decision-making by regional partners, and incentivize travelers to modify transportation choices.

- Relies on the wisdom of travelers to engage in sensible transportation decision-making, when presented with sufficient information and a range of choices.

- RM3P is a **technology deployment initiative** with these goals:

  - *Optimization* – Optimize performance of the existing infrastructure.
  - *Reliability* – Enhance travel time reliability.
  - *Traveler Choice* – Support on-demand, multi-modal trip options for travelers.

Optimization   Reliability

RM3P Goals

Traveler Choice
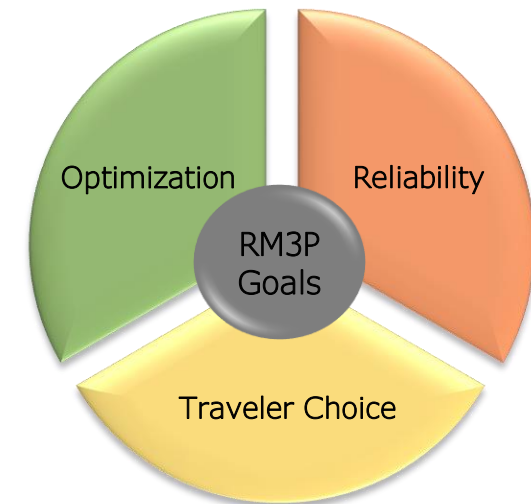
RM3P Overview (Cont'd.)

- RM3P is managed jointly by the:
  - Virginia Department of Transportation (VDOT),
  - Northern Virginia Transportation Authority (NVTA), and
  - Virginia Department of Rail and Public Transportation (DRPT).

- RM3P Base Period:
  - 36 months.
  - October 2019 – September 2022.

- Funding during Base Period:
  - Commonwealth of Virginia's Innovative Technology and Transportation Fund (ITTF).

- Key stakeholders include:
  - Departments of transportation, transit agencies, law enforcement and emergency responders, etc.
  - Transportation service planners, providers, and operators.
  - Regional transportation bodies, and third-party distributors of data.

RM3P Overview (Cont'd.)

- RM3P Region:

  - Geographic boundaries

  - Freeways, Express Lanes

  - Arterials

  - Metrorail

  - Commuter rail

  - Bus

  - Commuter parking lots

  - Bike infrastructure
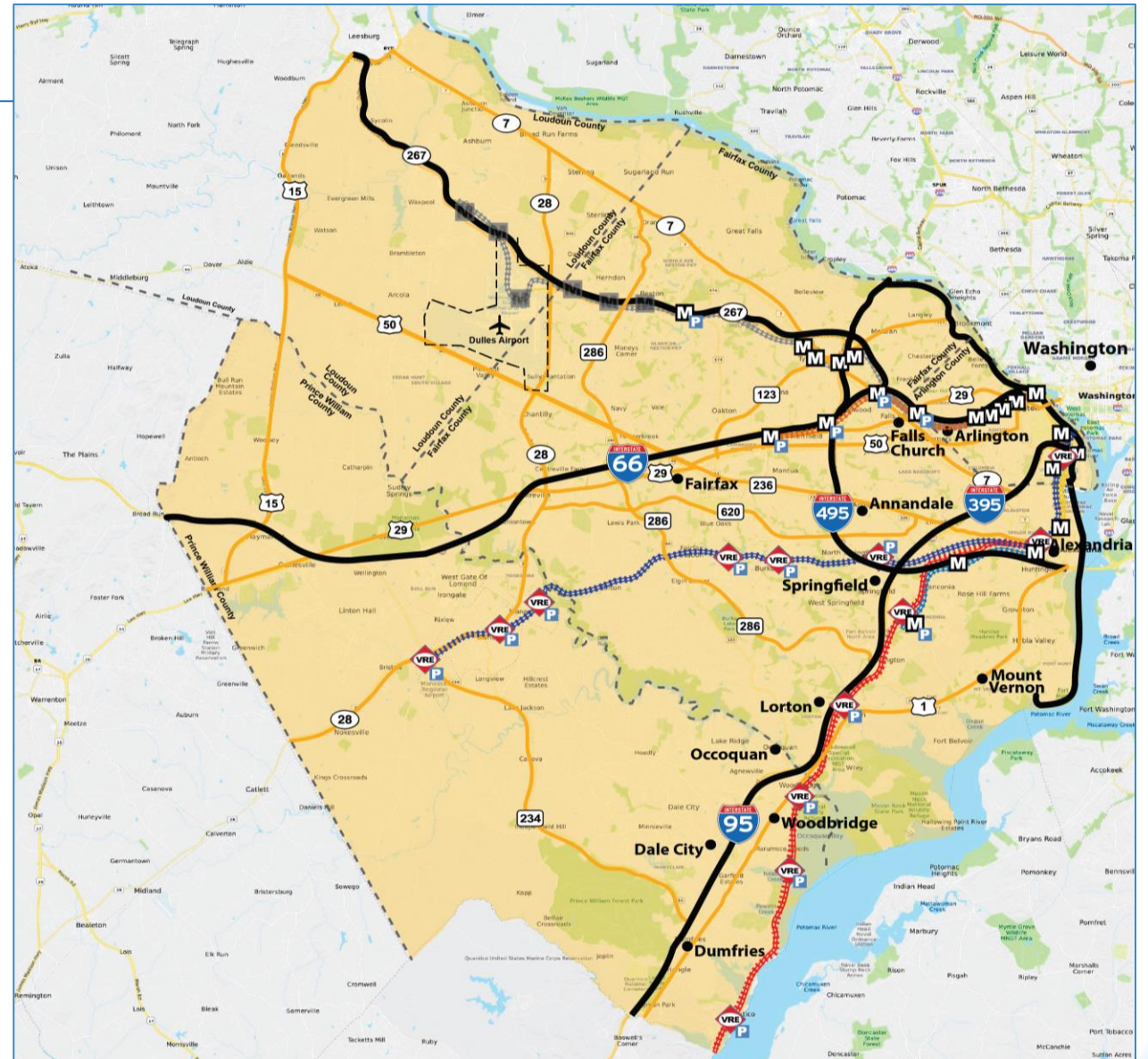
RM3P Program Elements

- **Data Lake/Data Store** – A centralized cloud-based system used by regional partners and third-party providers to capture, process, and exchange information on real-time, multi-modal travel conditions.

- **AI-Based Decision Support System –** Automated tool to predict emerging conditions and recommend plans for coordinated, multi-agency responses to congestion, incidents, and events.

- **Commuter Parking Information System –** Provides commuters with reliable expected parking space availability for lots serving rail, bus, and vanpool/carpool commuters.

- **Mobility Gap Dashboard –** Identifies gaps in the transportation service network and enables mobility providers to better meet demand by highlighting those areas that are overserved or underserved.

- **Dynamic Incentivization –** A data-driven system offering commuters incentives to modify travel choices and behaviors in response to real-time travel conditions.

Regional Multi-Modal Mobility Program

RM3P

RM3P Process

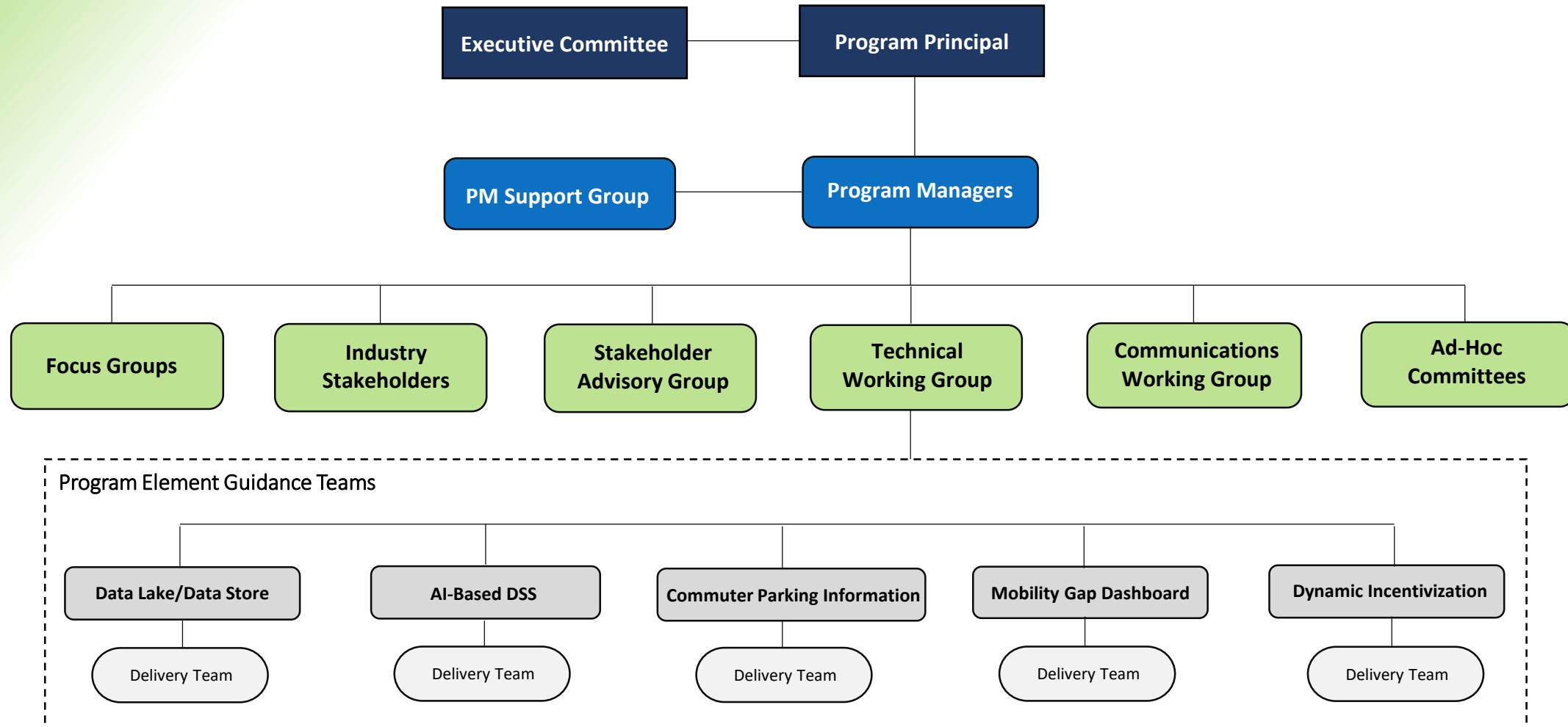Joel Ticatch
Consultant Program Manager

- Program element *solutioning*:

  - Process used to advance RM3P from initial concepts to the point of procurement.

- Solutions planning carried out in 3 steps:

  - *Scoping* – <u>What</u> is to be accomplished under each program element.

  - *Framing* – Explains <u>how</u> the work will be accomplished; includes needs and requirements.

  - *Documenting* – <u>Presents</u> scopes and framing in the form of a *scope-of-work*.

- These steps are applied to each of the 5 program elements.

Program Organization Chart
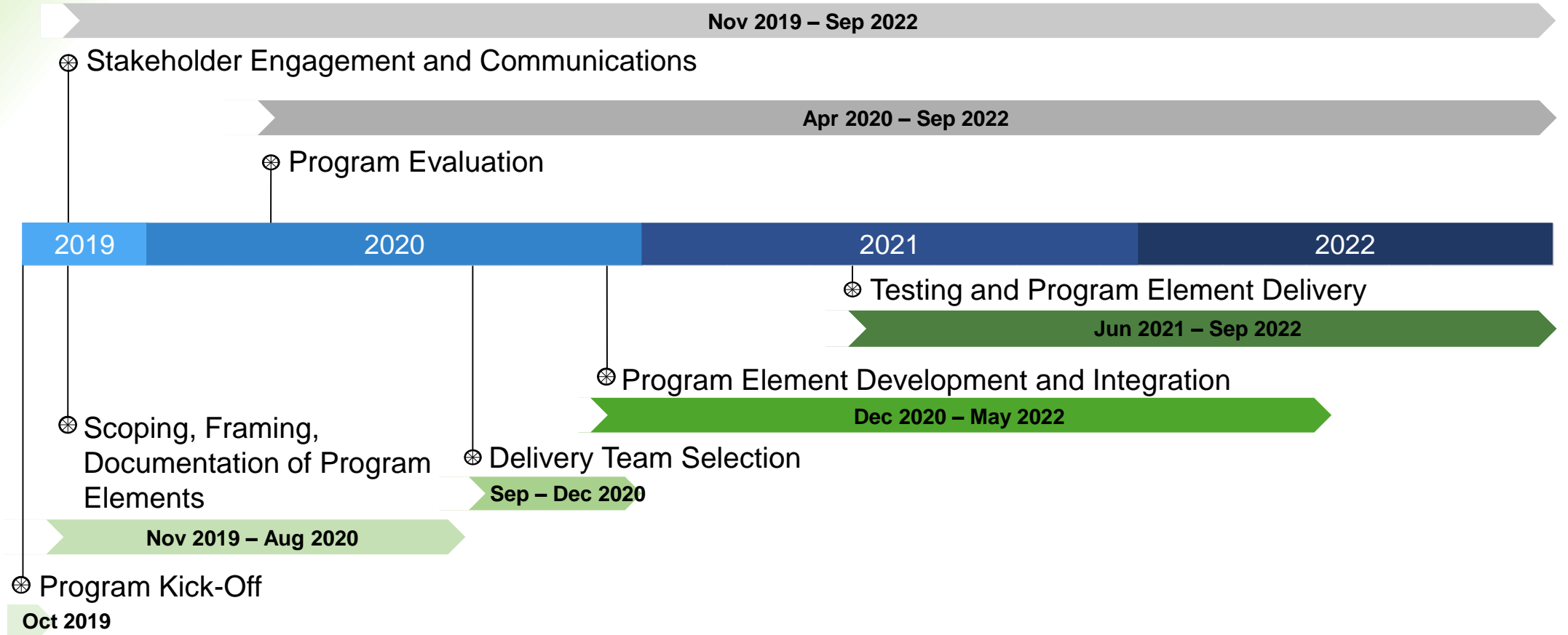
Aafiya Shah
Program Coordinator

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│ Executive Committee  │──────────│  Program Principal   │
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┌──────────────────────┐          ┌──────────────────────┐
│  PM Support Group    │──────────│  Program Managers    │
└──────────────────────┘          └──────────────────────┘
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Focus Groups	Industry Stakeholders	Stakeholder Advisory Group	Technical Working Group	Communications Working Group	Ad-Hoc Committees

Program Element Guidance Teams

Data Lake/Data Store	AI-Based DSS	Commuter Parking Information	Mobility Gap Dashboard	Dynamic Incentivization
Delivery Team	Delivery Team	Delivery Team	Delivery Team	Delivery Team

RM3P Base-Period Timeline

Candice Gibson
Deputy Program Manager

36 Months (October 2019 – September 2022)

Nov 2019 – Sep 2022

⊛ Stakeholder Engagement and Communications

Apr 2020 – Sep 2022

⊛ Program Evaluation

| 2019 | 2020 | 2021 | 2022 |

⊛ Testing and Program Element Delivery

Jun 2021 – Sep 2022

⊛ Program Element Development and Integration

Dec 2020 – May 2022

⊛ Scoping, Framing, Documentation of Program Elements

⊛ Delivery Team Selection

Sep – Dec 2020

Nov 2019 – Aug 2020

⊛ Program Kick-Off

Oct 2019

Regional Multi-Modal Mobility Program

RM3P

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Joel Ticatch
Consultant Program Manager

Summaries of RM3P Program Elements

- Data Lake/Data Store

- AI-Based Decision Support System

- Commuter Parking Information System

- Mobility Gap Dashboard

- Dynamic Incentivization

Data Lake/Data Store

Mike Barba
Data Lake Lead

- **Description:**
  - Captures, processes, aggregates, and exchanges information among regional partner systems and third-party provider systems on real-time and historic travel conditions.

- **Expected Outcomes:**
  - Highly scalable cloud-based data-storage and data processing data warehouse.
  - Obtaining real-time and historic data from various input source systems, including other RM3P program elements.
  - Provision of data to various output data consumer systems including other RM3P program elements.

- **Implement key supporting technologies and processes:**
  - Enterprise service bus for real-time communications.
  - Support for real-time data feeds, current-state data, and the storage of historical data.
  - Defining authoritative master data sets that provide a single source of "truth" when data elements overlap.
  - Fusing data from multiple sources into a single data set to be used for analysis.
  - Execution of data-quality checks to ensure the accuracy and completeness of the data received.

Data Lake/Data Store (Cont'd.)

- Baseline Scope:

  - Specific data sources included in the Data Lake/Data Store will be based on use cases defined by the other program elements.

  - Develop a hybrid data architecture that leverages the "hub-and-spoke" model for most use cases and a "point-to-point" model for exceptional use cases.

  - Focus on Target Audiences:

    - Agencies responding to incidents in the region.

    - Existing public agency and private-sector systems (VDOT, local jurisdictions, VRE, WMATA, etc.).

    - Other RM3P program element system providers, including incentivization-related mobile app(s).

    - Mobility/navigation apps and systems.

    - Public agency parking systems (e.g., VDOT, VRE, WMATA, etc.) and those from local jurisdictions.

    - Traveler information service providers.

AI-Based Decision Support System

Kevin Miller
DSS Lead

- Description:
  - Uses the content of the Data Store, including real-time conditions and historic data, for operational decision-making.
  - Facilitates multi-agency, multi-modal coordinated responses and the ability to begin predicting congestion/incidents and their associated impacts.

- Expected Outcomes:
  - Furnish guidance to agencies on response options to address adverse conditions.
  - Improve regional coordination among agencies, resulting in a more streamlined and efficient responses to conditions.
  - Support the full range of traffic and transit management agencies and services across the region.

- Target Audience:
  - Regional operators for interstates, arterials, toll roads, express lanes, and parkways; transit operators; MATOC (regional operation facilitator); incident management teams (police, fire and rescue, hazmat cleanup, etc.); and emergency patrols.

RM3P

AI-Based Decision Support System (Cont'd.)

- Baseline Scope:

  - Deploy a predictive analytics engine to predict when incidents and congestion are likely to occur.

  - Develop simulation model to develop and analyze response plans, and perform after-action analysis.

  - Create business rules and develop multi-agency/multi-modal response plans using existing standard operating procedures and response plans from regional agencies.

  - Develop rules engine to assist operators with the selection and distribution of response plans for incidents/congestion conditions across the region.

  - Develop GUI for agencies to coordinate response actions.

Predictive Analytics	Domain Knowledge	Pattern Recognition	Modeling
1. Develop scope and area of region for prediction using available data 2. Evaluate prediction services vs. development of prediction engine. 3. Contract/develop prediction engine 4. Deploy & integrate with operations.	1. Collect response plans 2. Create multi-agency/multi-modal plans 3. Use model to evaluate and update plans 4. Develop logic for selecting plans	1. Procure rules engine software 2. Setup rules logic 3. Setup agency approval process 4. Integrate data from data warehouse.	1. Use existing models within region 2. Develop an offline multi-modal model 3. Model and update response plans 4. Evaluate response plan use and impact

Commuter Parking Information System

Stephen Crim
Parking Liaison

- **Description**
  - Furnishes reliable parking availability information for high-priority commuter lots serving bus, rail, and carpool commuters.

- **Expected Outcomes:**
  - "Power" public- and private-sector parking information and navigation applications used by travelers.
  - Communicate parking availability data to operators and commuters.
  - Support other RM3P program elements – Incentivization, Mobility Gap Dashboard, and DSS.

- **Target Audiences:**
  - Parking data consolidators.
  - Mobility/navigation apps and companies, and parking info providers.
  - Public parking planners/operators (e.g., VDOT, VRE, WMATA, etc.) and local jurisdictions.
  - Existing commuter lot users.
  - Traveler information service providers.

Commuter Parking Information System (Cont'd.)

■ Baseline Scope:

- Provide standardized static parking lot information (e.g., location, services available) to navigation app companies.

- Use historic parking occupancy data and manual counts to provide typical usage information to customers.

- Integrate real-time parking information from existing sources in the region, including WMATA, VRE, VDOT, and third-parties with the Data Store.

- Deploy cost-effective technology to detect occupancy status in subsections of the lot. Prioritize locations to reduce the number of lots to be deployed.

- Develop Parking Data-Processing System and integrate outputs with the Data Store.

- Develop Parking API.

- Integrate with other RM3P elements.

Regional Multi-Modal Mobility Program
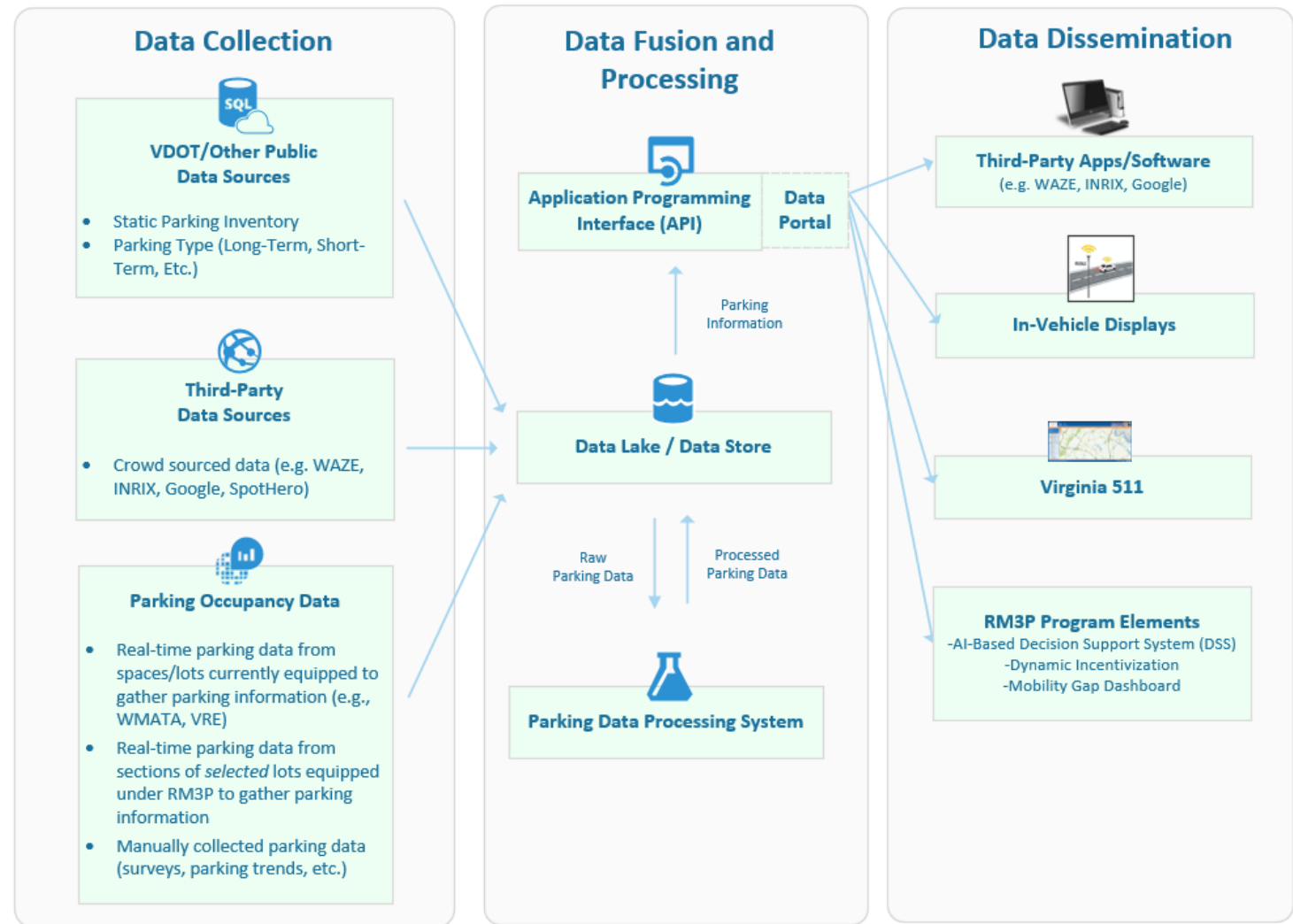
Mobility Gap Dashboard

Tiffany Dubinsky
Mobility Liaison

- Description:
  - Planning tool to help make decisions about resource investments and plan for major regional events
  - Combines capacity and demand data across all modes in one interface and shows users where demand exceeds capacity ("gaps")
  - Interactive tool allowing users to quickly experiment with scenarios for estimated growth, service changes or new development

- Expected Outcomes:
  - Improve optimization of investments and services
  - Improved first-mile/last-mile service options
  - Common data-driven planning tools facilitate cross-agency coordinated planning

- Target Audiences:
  - State, regional and local transit and transportation planners
  - Transportation investment decision makers (e.g., NVTC, NVTA)
  - Private mobility providers

Mobility Gap Dashboard (Cont'd.)

John Horner
Mobility Lead

- Baseline Scope:
  - Analytics
    - Develop data management tools representing baseline demand and capacity across all modes throughout the region.
    - Multi-modal macroscopic model to calculate the combined effects of multiple simultaneous regional events including ability to correctly predict mode shifts.
  - User Interface
    - Develop a map-based user interface to show the ratio of demand-to-capacity on the map for all modes.
    - Add adjustments from a library or create a manual adjustment and save for later.

Regional Multi-Modal Mobility Program
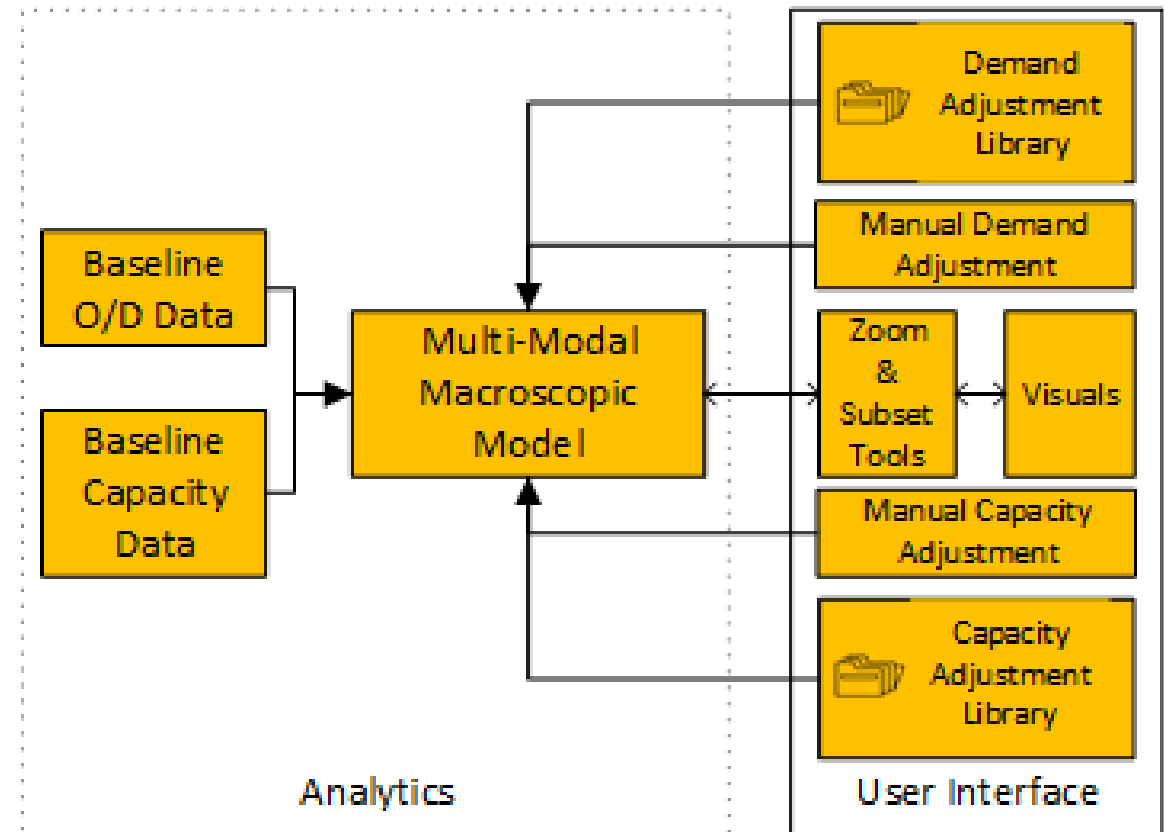
Dynamic Incentivization

Keith Jasper
Incentivization Liaison

- Description:
  - Offers incentives to the public in real-time which encourage travelers to change mode/route/departure in response to congestion or incidents
  - Loyalty program for shared and active modes which encourages long term behavior changes
  - Incentives may include merchandise and/or services, "points" which can be accrued through gamification techniques, free or discounted transportation services, etc.
  - Uses an app-agnostic approach meaning incentives may be offered through multiple apps giving consumers choice of how they access incentives
  - Ongoing program management will sustain the program by recruiting vendor contributions for incentives and engaging with the public to market and regularly revise the program

- Expected Outcomes:
  - Reduce impact of extreme congestion and incidents
  - Change traveler behavior to reduce single occupancy vehicle (SOV) usage in the long term

- Target Audiences (Users):
  - SOV drivers – for changes in behavior in response to congestion and incidents
  - Occasional transit users – for reinforcing shared mode use

Dynamic Incentivization (Cont'd.)

John Horner
Incentivization Lead

■ **Baseline Scope**

- Back end services available to multiple approved partner apps
  - Create and publish real-time incentive offers so that multiple public-facing apps can provide the incentives
  - Verify compliance for dynamic incentive awards and progress toward loyalty program goals
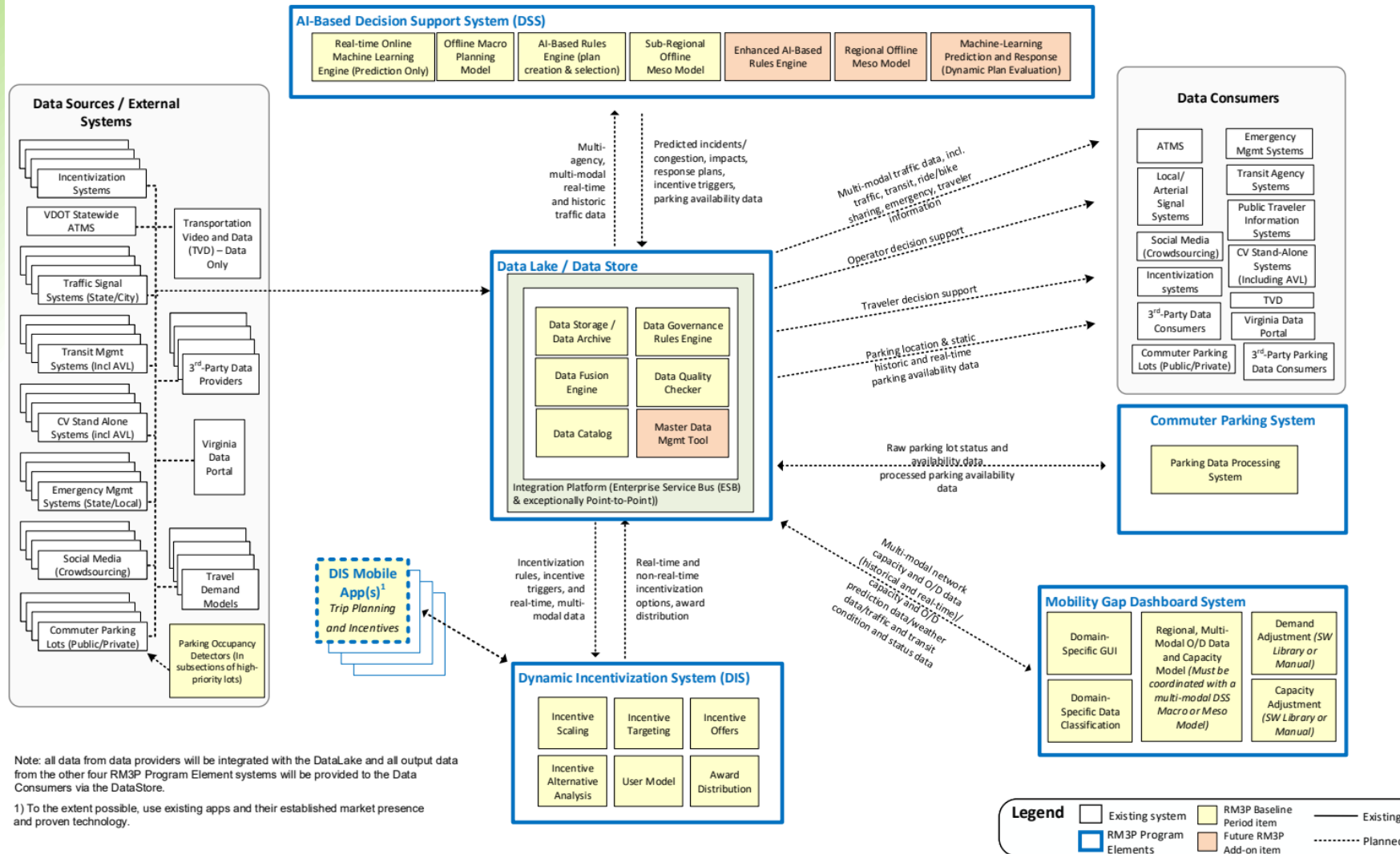 - To the extent possible, use existing apps and their established market presence and proven technology

- Integrations
  - Customize or extend existing incentive app to support dynamic incentives
  - Integrate with DSS – trigger dynamic incentive creation as part of incident response
  - Integrate with parking system – free or discounted parking at multi-modal hubs offered as reward
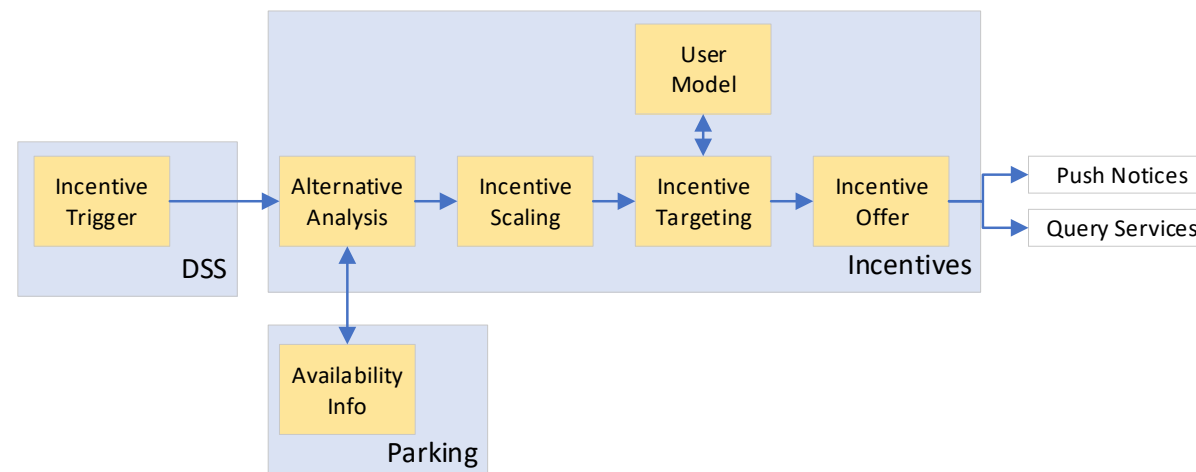
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Architecture Overview (Cont'd.)

- All 5 RM3P Program Elements are inter-dependent, creating a first of its kind integrated mobility program in the region.

- The Data Lake/Data Store forms the core of the system, serving as a multi-modal data repository for the other 4 program elements.

- Key data sources and data consumers for RM3P include VDOT Statewide ATMS, transit management systems, emergency management systems, and private-sector providers.

- The DSS will ingest data from the Data Store to provide response actions. In some cases, the responses may trigger a need for Dynamic Incentivization.

- The parking system will provide information to customers and support the DSS response actions, Gap Dashboard, and Incentivization elements.

Next Steps & Getting Involved in RM3P

Candice Gibson
Deputy Program Manager

- **Public agency stakeholders:**
  - Program element guidance teams
  - Near-term upcoming activities:
    - Stakeholder survey
    - Stakeholder focus group – to validate plans and approach
  - Ongoing/to launch in the near-future:
    - Website
    - Newsletter

- **Industry stakeholders:**
  - Developers, service providers, information distributors
  - Industry day

- **Opportunities for everyone; please let us know your interests!**

In Conclusion…

Cathy McGhee
Program Principal

- ■ Why RM3P?
  - ▪ Faster responses to travel disruptions.
  - ▪ Improved safety.
  - ▪ More current and reliable travel information.
  - ▪ Enhanced connectivity.
  - ▪ Incentives for travelers.

- ■ Thank you for learning about RM3P.
  - ▪ Please become an *RM3P Stakeholder Champion*.
  - ▪ Join in the *RM3P Journey*!

- ■ Please reach out:
  - ▪ Amy McElwain: amytang.mcelwain@vdot.virginia.gov
  - ▪ Candice Gibson: candice.gibson@vdot.virginia.gov