The National Academies of
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TRANSPORTATION RESEARCH BOARD

How Performance and Data Informs Transportation Decision Making

July 21, 2020

@NASEMTRB
#TRBwebinar

PDH Certification Information:

- 1.5 Professional Development Hour (PDH) – see follow-up email for instructions
- You must attend the entire webinar to be eligible to receive PDH credits
- Questions? Contact Reggie Gillum at RGillum@nas.edu

The Transportation Research Board has met the standards and requirements of the Registered Continuing Education Providers Program. Credit earned on completion of this program will be reported to RCEP. A certificate of completion will be issued to participants that have registered and attended the entire session. As such, it does not include content that may be deemed or construed to be an approval or endorsement by RCEP.

RCEP

REGISTERED CONTINUING EDUCATION PROGRAM

#TRBwebinar

Learning Objectives

1. Identify considerations for project selections based on travel mode
2. Discuss data considerations and solutions
3. List communications strategies to leverage public involvement in decision making

#TRBwebinar

Performance and Data in Transportation Decision-Making

Today’s Roadmap

1. Introduction to e-Circular
2. Multimodal Planning
3. Performance and Data
4. Programming and Investment Prioritization
5. Communications and Stakeholder Engagement
6. Key Takeaways and Opportunities to Advance the Practice
7. Q & A session

Introduction to e-Circular

TRB Conference – Atlanta, September 15-18, 2019

TRB [former] Committees (7):

- Statewide Multimodal Planning
- Metropolitan Policy, Planning, and Processes
- Programming and Investment Decision-Making
- Data for Decisions and Performance Measures
- Performance Management
- Transportation Asset Management
- Transit Management and Performance

Co-sponsored by:

- Federal Highway Administration (critical sponsorship for e-circular)
- American Association of State Highway and Transportation Officials
- Association of Metropolitan Planning Organizations

Introduction to e-Circular

Planning Committee

- **Bob Hazlett, *Maricopa Association of Governments*, Co-Chair**
- David Wasserman, *North Carolina Department of Transportation*, Co-Chair
- Claudia Bilotto, *WSP*
- Jerri Bohard, *Oregon Department of Transportation*
- Matt Carpenter, *Sacramento Area Council of Governments*
- Matt Hardy, *American Association of State Highway and Transportation Officials*
- Trish Hendren, *I-95 Corridor Coalition*
- Jordan Holt, *Washington Metropolitan Area Transit Authority*
- Bill Keyrouze, *Association of Metropolitan Planning Organizations*
- Harlan Miller, *Federal Highway Administration*
- James Mitchell, *Louisiana Department of Transportation and Development*
- Jon Schermann, *Metropolitan Washington Council of Governments*
- Joe Schofer, *Northwestern University*
- Tracy Selin, *Cambridge Systematics*
- Hannah Twaddell, *ICF*
- Amy Van Doren, *Marin Transit*
- Dwayne Weeks, *Federal Transit Administration*
- Penelope Weinberger, *American Association of State Highway and Transportation Officials*
- Jennifer Weeks*, Transportation Research Board*

Introduction to e-Circular

4 Tracks

1. Multimodal Planning – Jerri Bohard, Oregon DOT
2. Performance and Data – Jordan Holt, WMATA
3. Programming and Investment Prioritization – David Wasserman, NCDOT
4. Communications and Stakeholder Engagement – Hannah Twaddell, ICF

Key links:

E-circular website - http://onlinepubs.trb.org/onlinepubs/circulars/ec263.pdf

Conference program and powerpoint slides - http://onlinepubs.trb.org/onlinepubs/Conferences/2019/PerformanceData/program.pdf

Performance and Data in Transportation Decision Making

Multimodal Planning

Jerri Bohard

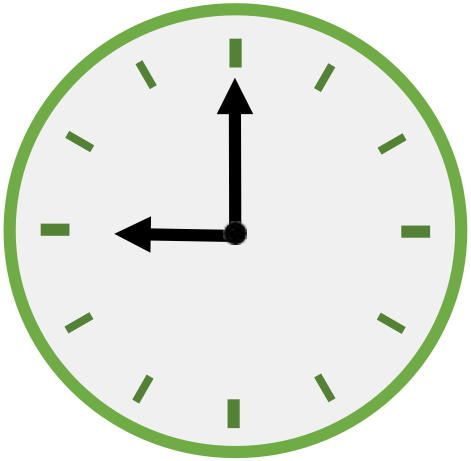
Oregon Department of Transportation

Multimodal Planning Take Aways

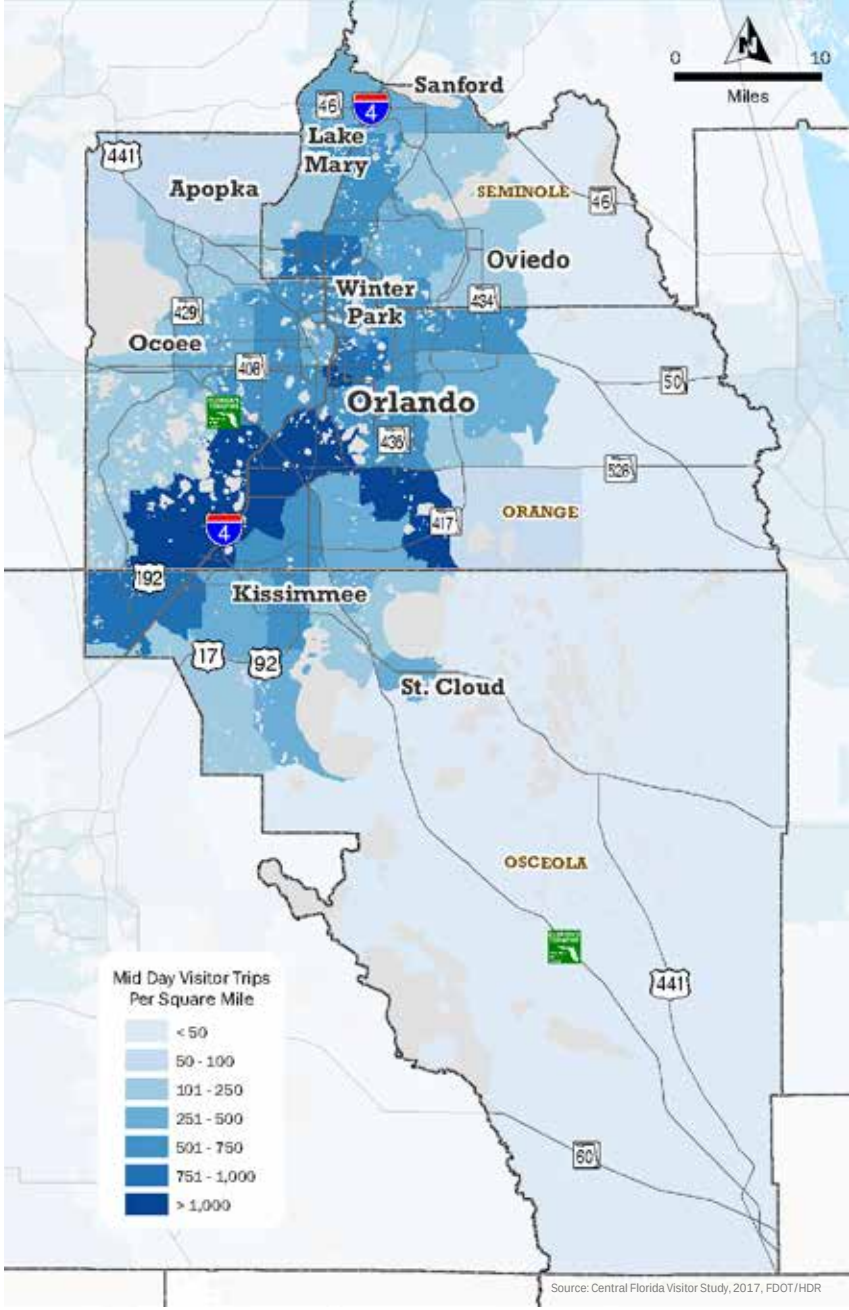
- Data, Data, Data
- From Data to Information
- From Information to Decision Making
- It Depends on Partnerships

*Source and location within the agenda

Visitor Travel Patterns



Mid-Day
9:00 AM – 3:00 PM

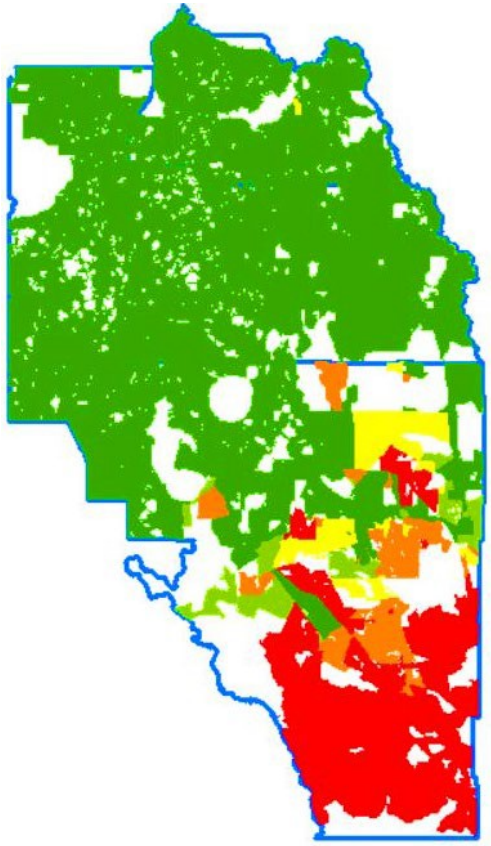


Source = Metroplan Orlando 5A

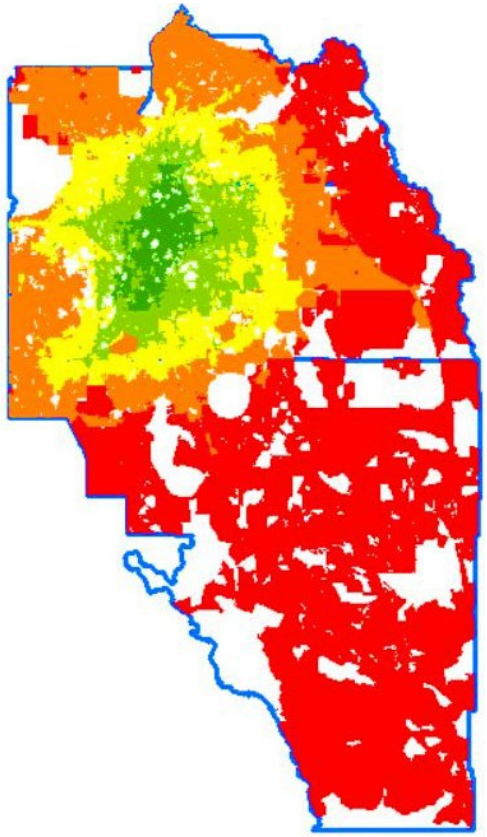
Measuring Accessibility

Analysis &Visualization Tools
ESRI ArcGIS | Citilabs Sugar Access

Sources of Data
Streetlight |Google Maps API |
Citilabs Default Decay Curves



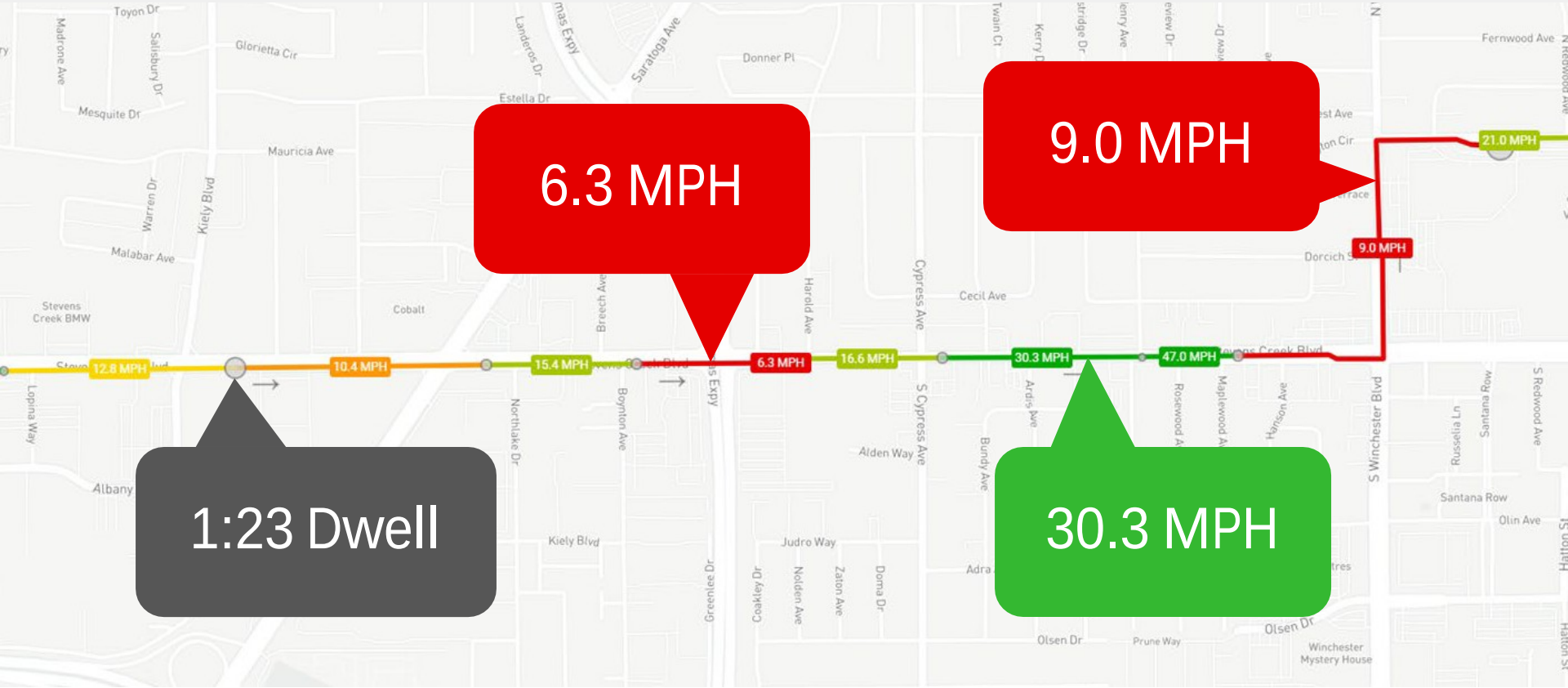
Without
Auto Travel Decay Curve



With
Auto Travel Decay Curve*

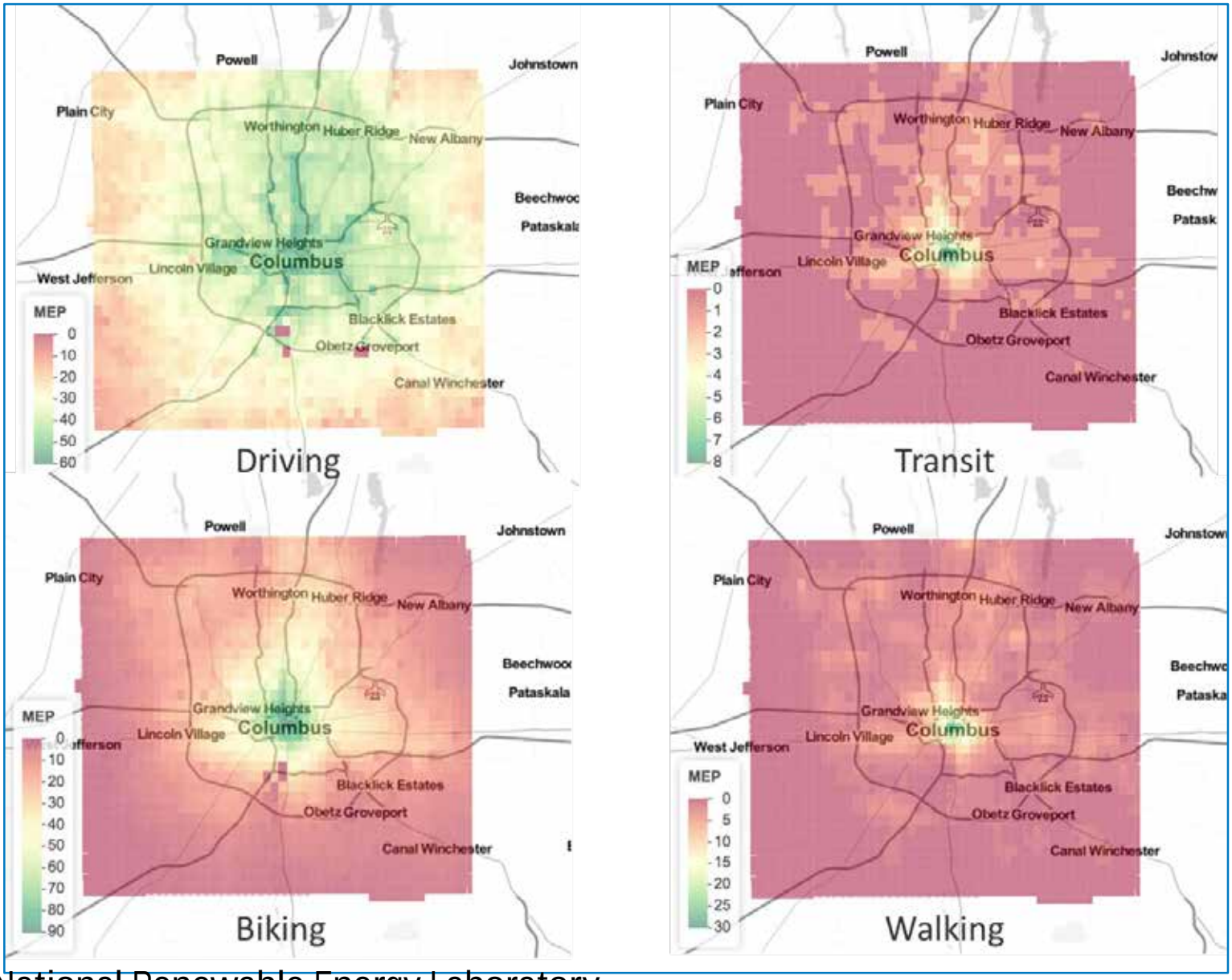
Source = Metroplan Orlando

WE CAN NOW QUANTIFY DELAY



Source = Valley Transportation Authority 7A

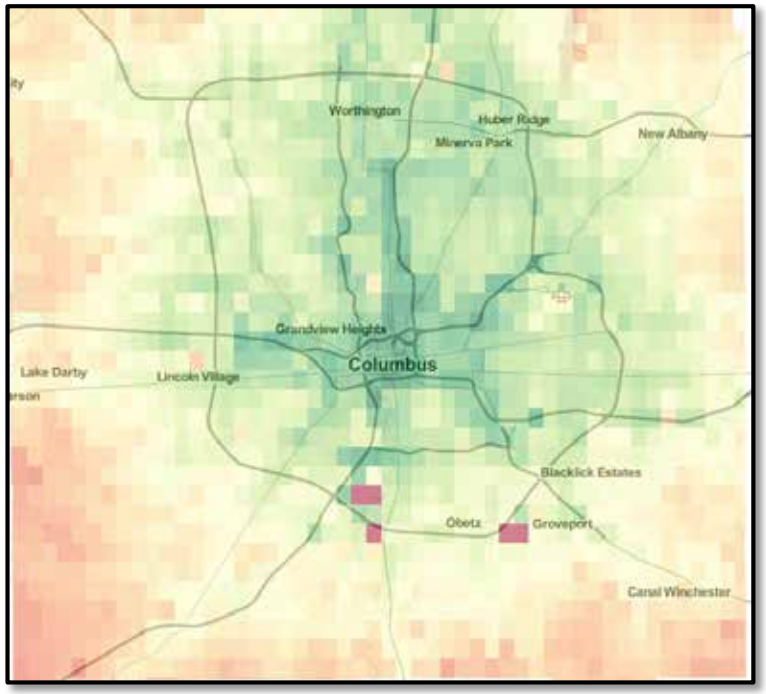
MEP Maps by Mode - Columbus



Source = National Renewable Energy Laboratory

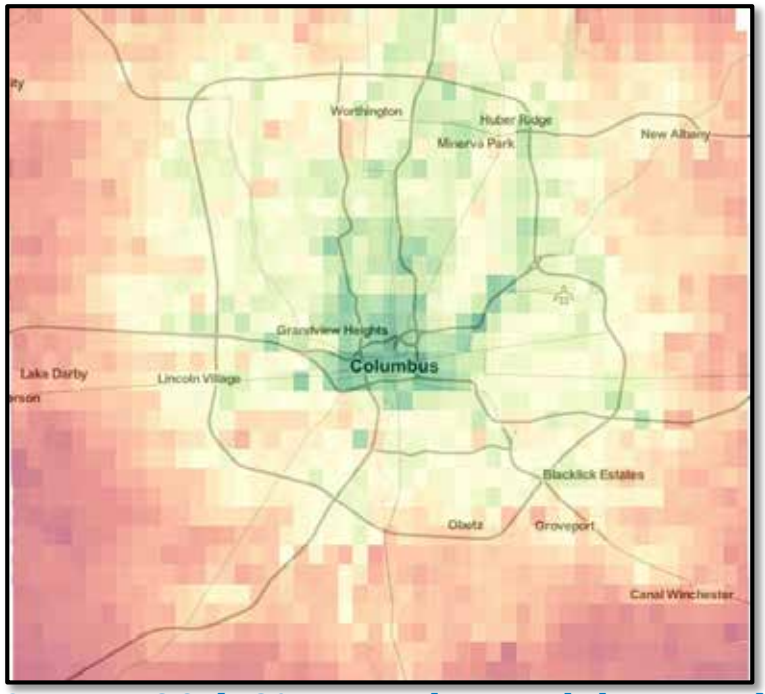
TNC Isochrones

Driving



Driving MEP: 126

TNC



TNC MEP: 36 (73% Less than Driving MEP)

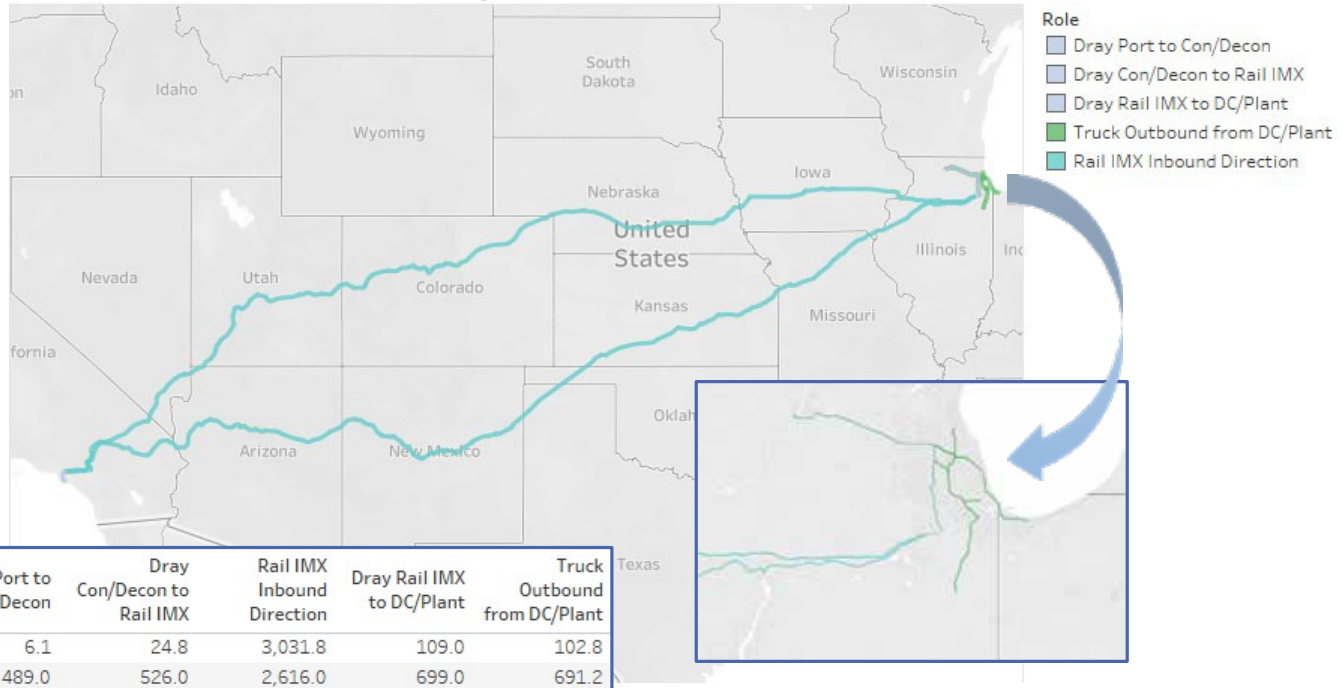
Caveat: The TNC MEP computation does not account for any secondary effects of TNCs such as increased energy (due to deadheading), cost, or congestion effects.

Source = National Renewable Energy Laboratory 4A

Example Output: Supply Chain Performance by Stage

Sector: Home Improvement

- Multimodal
- 5 stages from port to retail outlet
- Alternate rail routes
- Substantial drayage expense

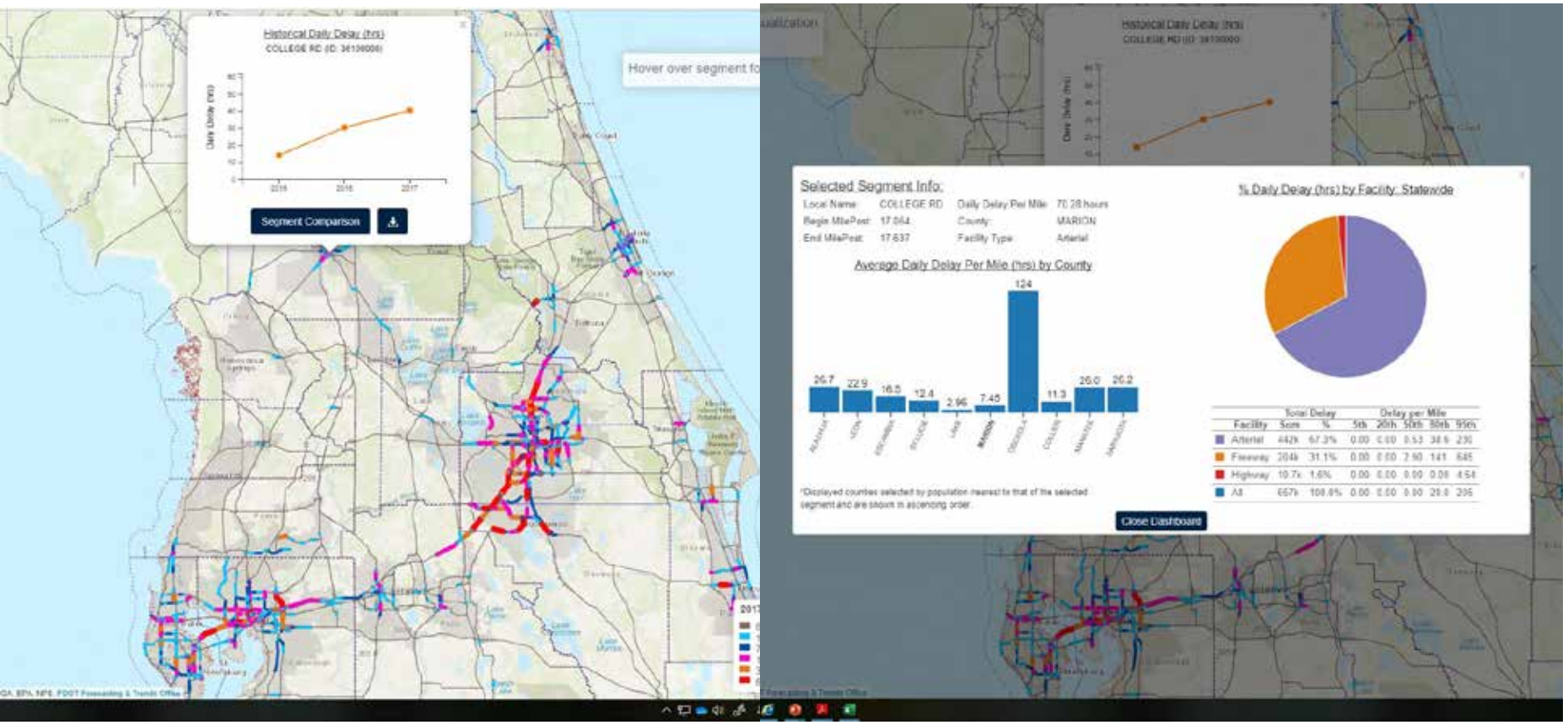


	Dray Port to Con/Decon	Dray Con/Decon to Rail IMX	Rail IMX Inbound Direction	Dray Rail IMX to DC/Plant	Truck Outbound from DC/Plant
Avg. Adjusted Path Miles	6.1	24.8	3,031.8	109.0	102.8
Avg. 2017.4 Total Cost per Unit	489.0	526.0	2,616.0	699.0	691.2
Avg. 2017.4 Linehaul Cost per Unit	487.0	518.0	2,298.0	659.0	652.9
Avg. 2017.4 Fuel Cost per Unit	2.0	8.0	319.0	40.0	38.3
Avg. 2017.4 Mean or 50% Travel Time (hrs)	0.3	0.7	0.0	1.9	1.8
Avg. 2017.4 Cross Modal Reliability Ratio	1.5	1.6		1.1	1.3

www.i95coalition.org

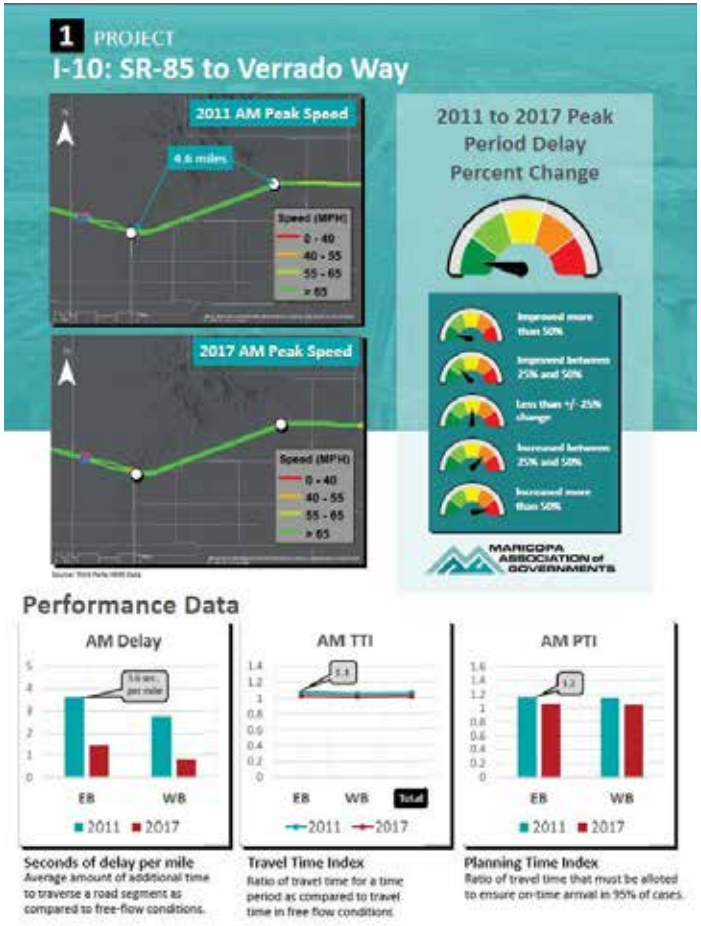
Source = I-95 Corridor Coalition 4A

Digital Source Book



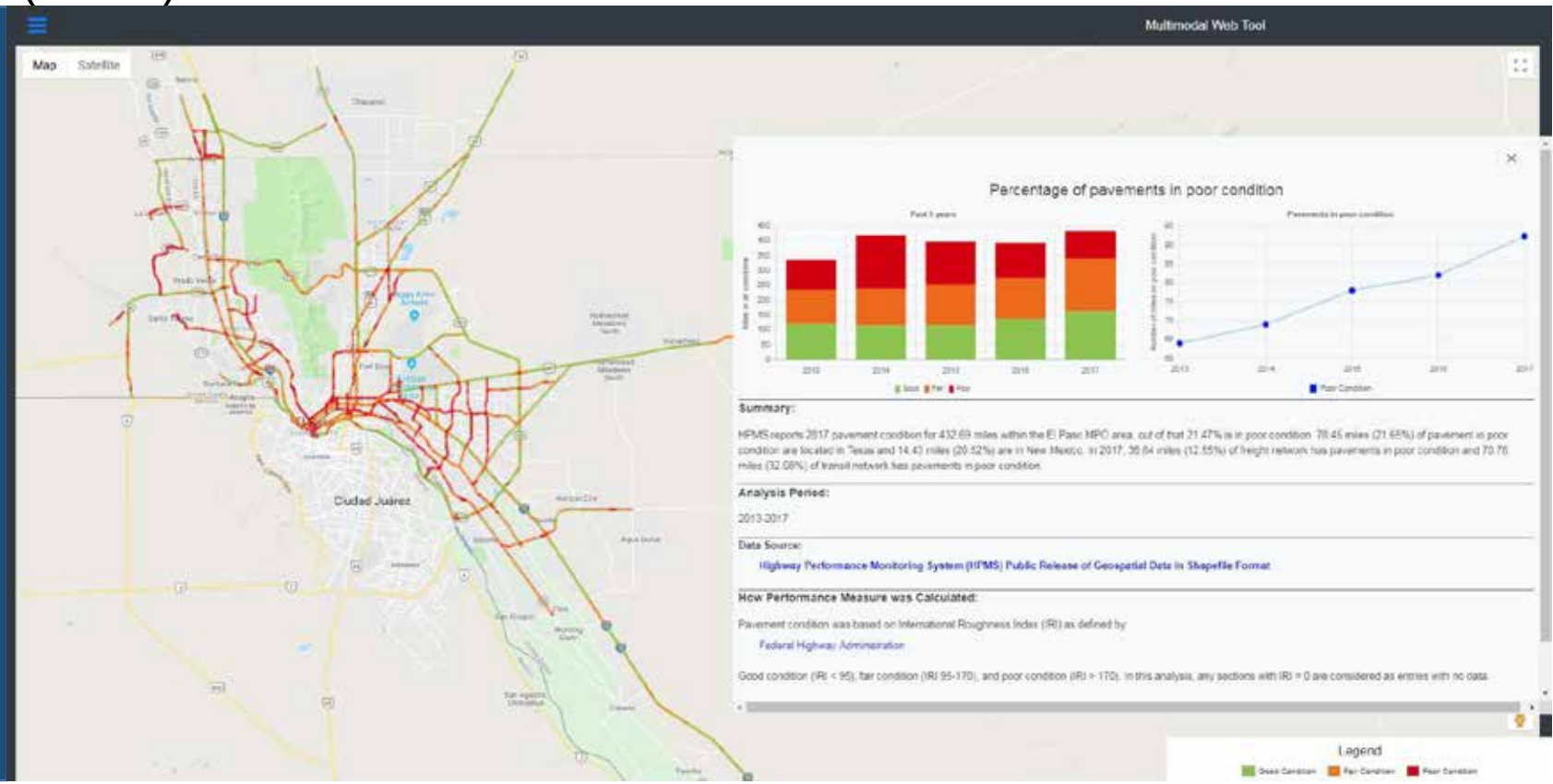
Source = Florida DOT 4A

Reporting



Source = Maricopa Association of Governments 1A

5. Web Tool
(cont'd)



www.ctis.utep.edu

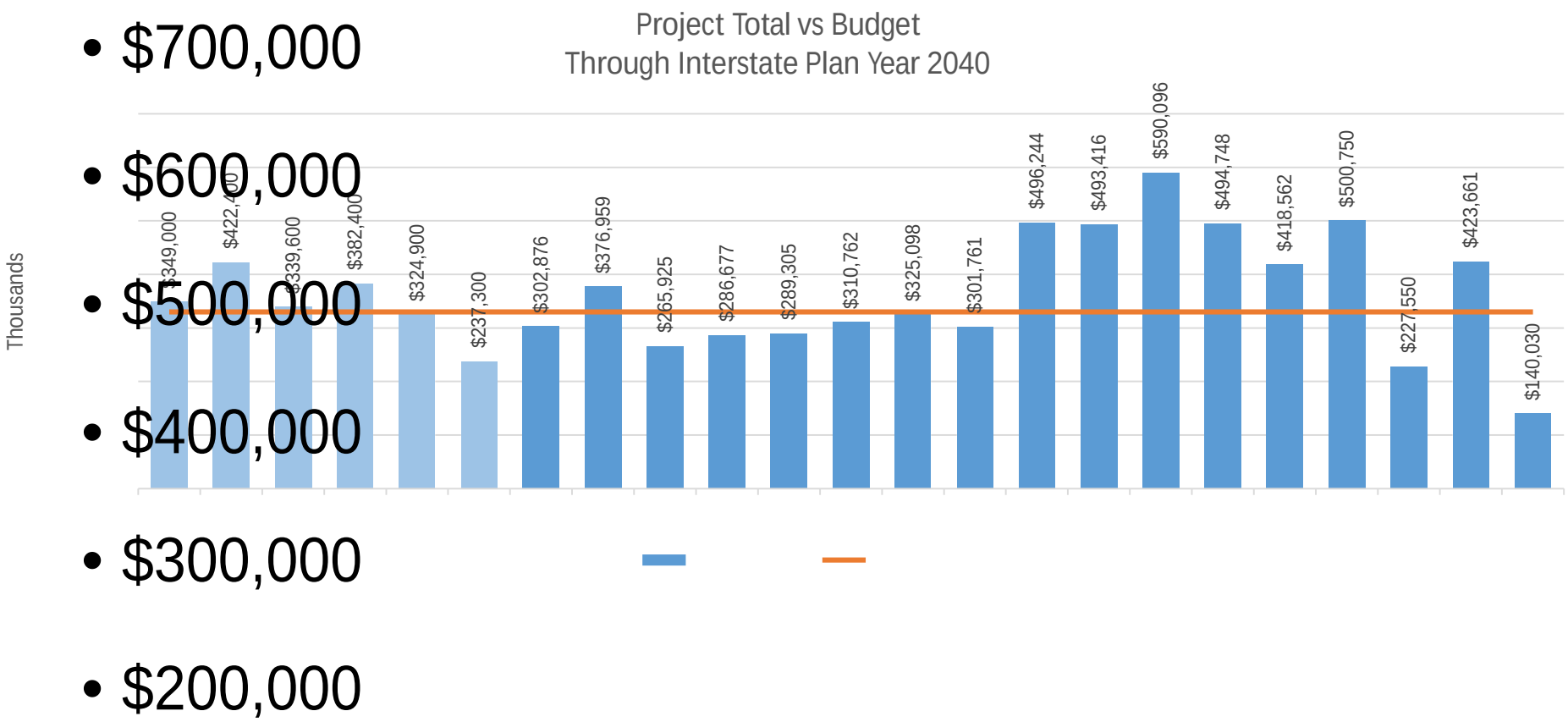
Source = El Paso MPO & Univ of Texas @ El Paso 4A

STATEWIDE TARGETS

Priority	Target
Safety	**0** fatalities and serious injuries
Infrastructure	**60%** of interstate pavement in good condition **40%** of non-interstate NHS pavement in good condition **50%** of NHS bridges in good condition
Mobility	**75%** travel time reliability on Interstates **50%** travel time reliability on other NHS roadways

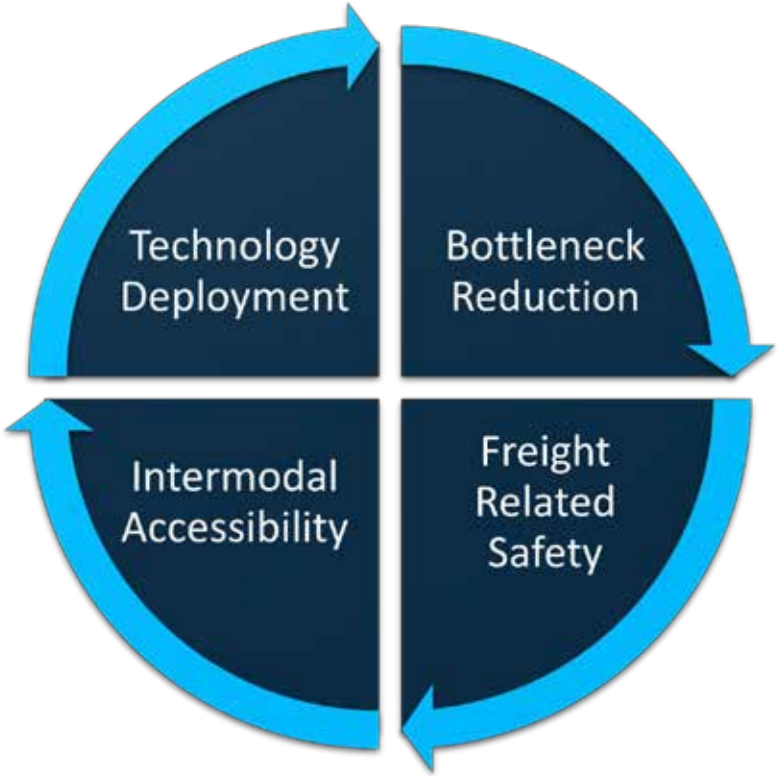
Source = Florida DOT

Current Status



Source = Iowa DOT 1A

Freight Program Goals



Source = Illinois DOT-1A

Trade Offs

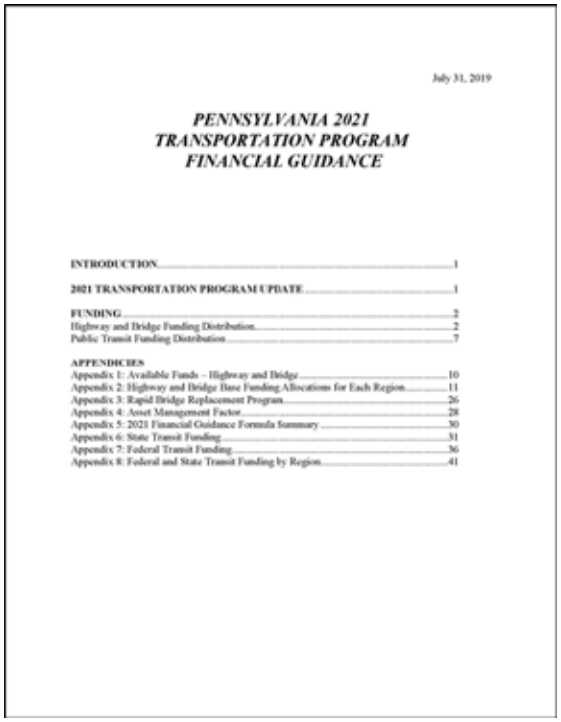
A $19.5 Million Interstate 57 reconstruction project was passed over for:

- 2 interchange phase I studies
- Truck parking expansions at two IDOT rest areas (24 spaces)
- Reconstruct Cargill Elevator Road in Cahokia
- Install .6 miles of new RR track avoids 4 at-grade crossings of State Route
- Reconstruct Front Street in Pekin – access to Marine Port
- New access road and dock at America's Central Port
- $1m for truck parking information system (Statewide)

$24m vs $19.5m (+23%) plus over $3m from locals.

6 happy partners

Source = Illinois DOT

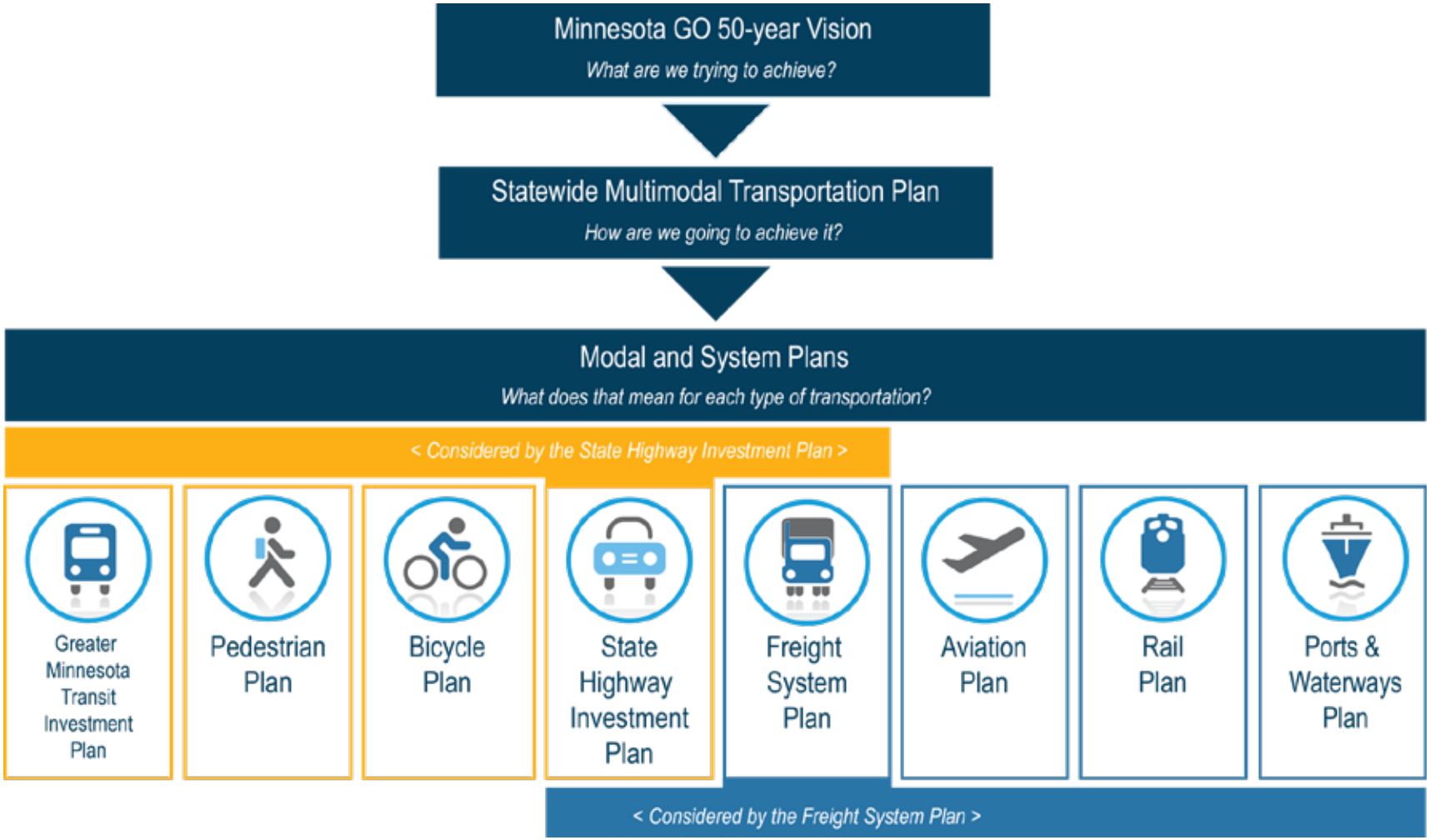


July 31, 2019

PENNSYLVANIA 2021
TRANSPORTATION PROGRAM
FINANCIAL GUIDANCE

- Formulas unchanged for first and second year (FFY 2021 & 2022)
- New Formulas for remaining 10 years

Source = Pennsylvania DOT 3A



MnDOT's Family of Plans

Source = Minnesota DOT

Project Selection Committee Decision Making

Projects	Criteria 1	Criteria 2	Criteria 3
• Pretty bad project	Unacceptable	N/A	Acceptable
ü Pretty good project	Excellent	Good	Acceptable
• Average project	N/A	Acceptable	Good
ü Great project	Excellent	Excellent	N/A
• Awful project	Unacceptable	Acceptable	Unacceptable
• Average project	Acceptable	Good	N/A
• Average project	N/A	Acceptable	Acceptable

Source = Wichita Area MPO 5A

Lessons

- The process may be **fair**
- The process may be **accurate**
- The process may be **true to the data**

- It doesn't matter if the process doesn't produce the outcomes stakeholders expect

Source = Wichita Area MPO

3 easy steps

1. Ask who is willing to go on the journey with us

2. Establish the ground rules for traveling together

3. Go on the journey

Source = Washington State DOT 3A

Performance and Data in Transportation Decision Making

Performance and Data

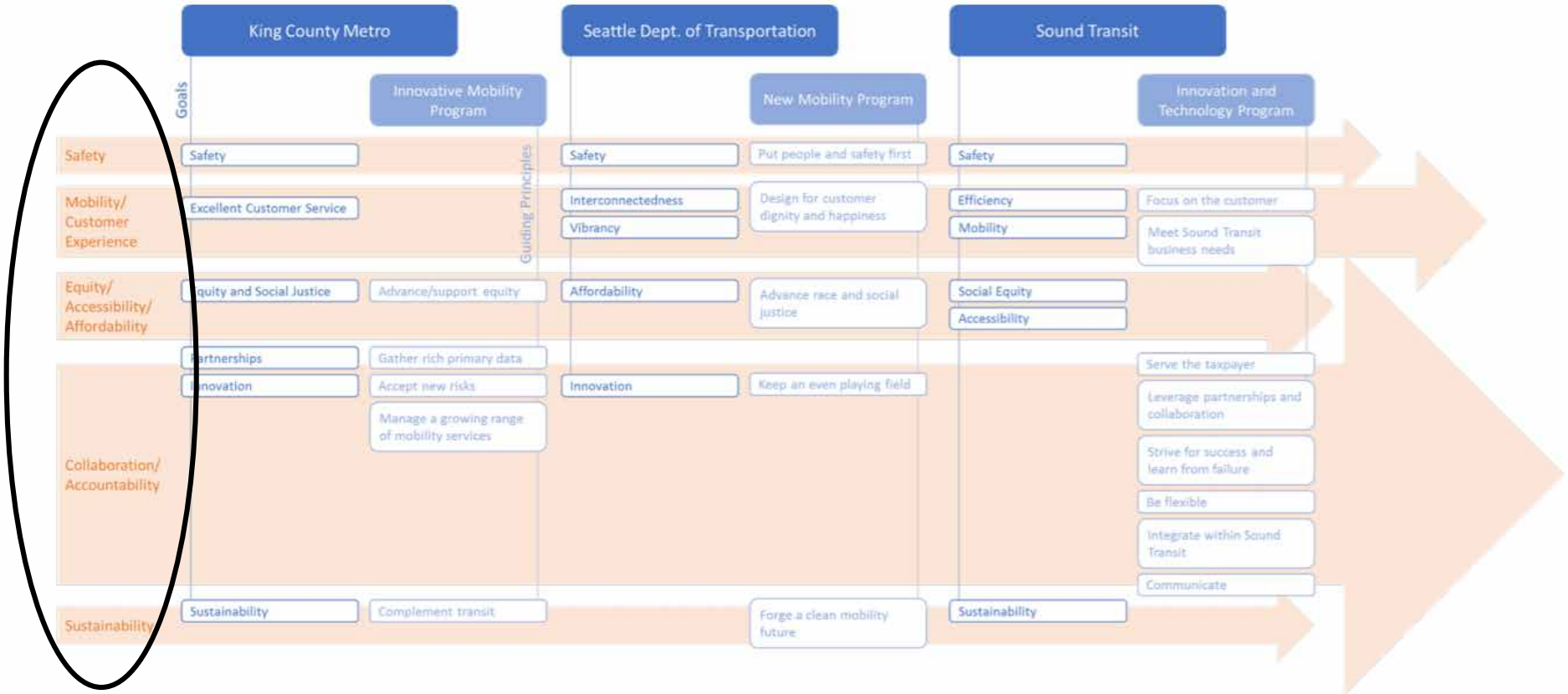
Jordan Holt

Washington Metropolitan Area Transit Authority

Track B

- Shared performance measures to drive common outcomes: 2 examples
- Business Intelligence to inform decision-making: 3 approaches
- Data governance: Chief Data Officers share different models
- Transportation (data) as a Service?

Goals and Guiding Principles continued..



Goals and G

Pilot Evaluation Scorecard

Updated May 2019

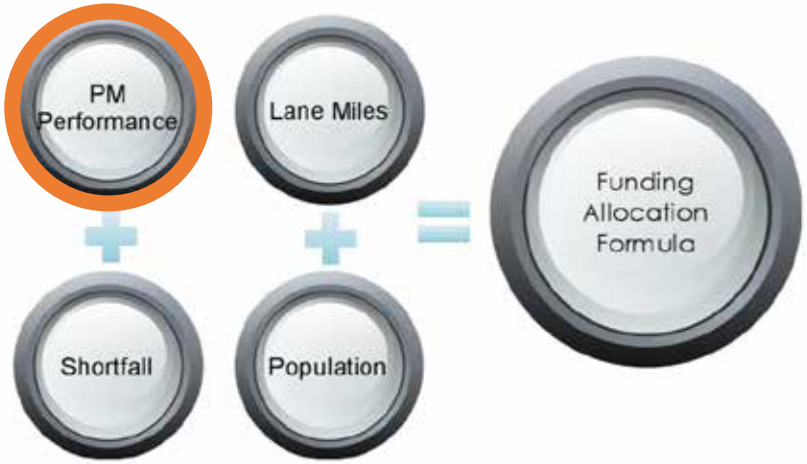
Date of review: _____ Name of reviewer: _____

What are you working towards?	What are you measuring?	What does success look like?		
Goal area	**Performance metric**	**Intended directionality**	**Target for this pilot**	**B fo**
Safety	**Number of serious incidents (deaths or serious injuries)** Total and per 1000 service miles	Zero		
	Number of minor incidents Total and per 1000 service miles	Low		
	Conflicts between vehicles and other road users Observed rate per 100 loads/unloads	Low		
	Perceived safety/security Average user rating out of 5	High		
Mobility	**Total users** Number of unique users served by the pilot	High		
	Total trips Number of trips completed in the pilot	High		
	Reliability of service Percentage of trips completed within 5 minutes of time estimate	High		
	Trip request fulfillment time [Minutes]	Low		
	Average travel time [Minutes]	Low		
	First/last-mile connectivity Percentage of trips provided to/from transit stations	High		
	Average distance to pick-up/drop-off point [Feet]	Moderately low		
Customer Experience	**Customer satisfaction** Average user rating out of 5	High		
	Ride completion rate % of trips completed	High		
	Marketing Total number of service sign-ups or app downloads	High		
	Active users Percent of all users who have used the service at least once in the last three months	High		
Accessibility	**Physical accessibility** Percentage of vehicles/infrastructure that are wheelchair-accessible	High		
	Average request fulfilment time For users requiring wheelchair-accessible vehicle	Low		
	Digital accessibility Service availability for users without smartphones and/or data plans	High/Yes		
	Financial accessibility Service availability for users without credit/debit cards	High/Yes		
	Language accessibility Service and information offered in languages spoken by user population	High/Yes		

User-Level Goals

...inued..

PERFORMANCE-BASED FUNDING ALLOCATION



KPI: PAVEMENT PRESERVATION INDEX

What is the effort toward pavement preservation?

PPI = Actual PM % / Recommended PM %

nty	Jurisdiction	Network PCI	$PM/ Lane Mile	Actual PM%	Recom'd PM%	Pavement Preservatic Index
	Regional Benchmark	**68**	**$1,336**	**17%**	**16%**	**1.06**
neda	ALAMEDA	66	$1,271	13%	15%	0.88
	ALAMEDA COUNTY	71	$ 671	18%	28%	0.67
	ALBANY	58	$1,247	10%	13%	0.78
	BERKELEY	58	$ 263	2%	11%	0.20
	DUBLIN	87	$3,124	50%	79%	0.62
	EMERYVILLE	75	$ 48	100%	35%	2.87
	FREMONT	63	$5,140	43%	16%	2.76

KPI: ASSET SUSTAINABILITY INDEX

Is the pavement asset sustainable?

ASI = Actual M&R / Annualized 10-Year Needs

County	Jurisdiction	Network PCI	Actual M&R /Lane Mile	Needs /Lane Mile	Asset Sustainability Index
	Regional Benchmark	**68**	**$10,400**	**$27,000**	**39%**
Alameda	ALAMEDA	66	$9,800	$26,900	36%
	ALAMEDA COUNTY	71	$3,600	$16,200	22%
	ALBANY	58	$12,700	$29,800	43%
	BERKELEY	58	$11,600	$32,400	36%
	DUBLIN	87	$6,300	$5,600	113%
	EMERYVILLE	75	$0	$16,100	0%
	FREMONT	63	$11,900	$29,100	41%

KPI: BACKLOG OVER ASSET VALUE

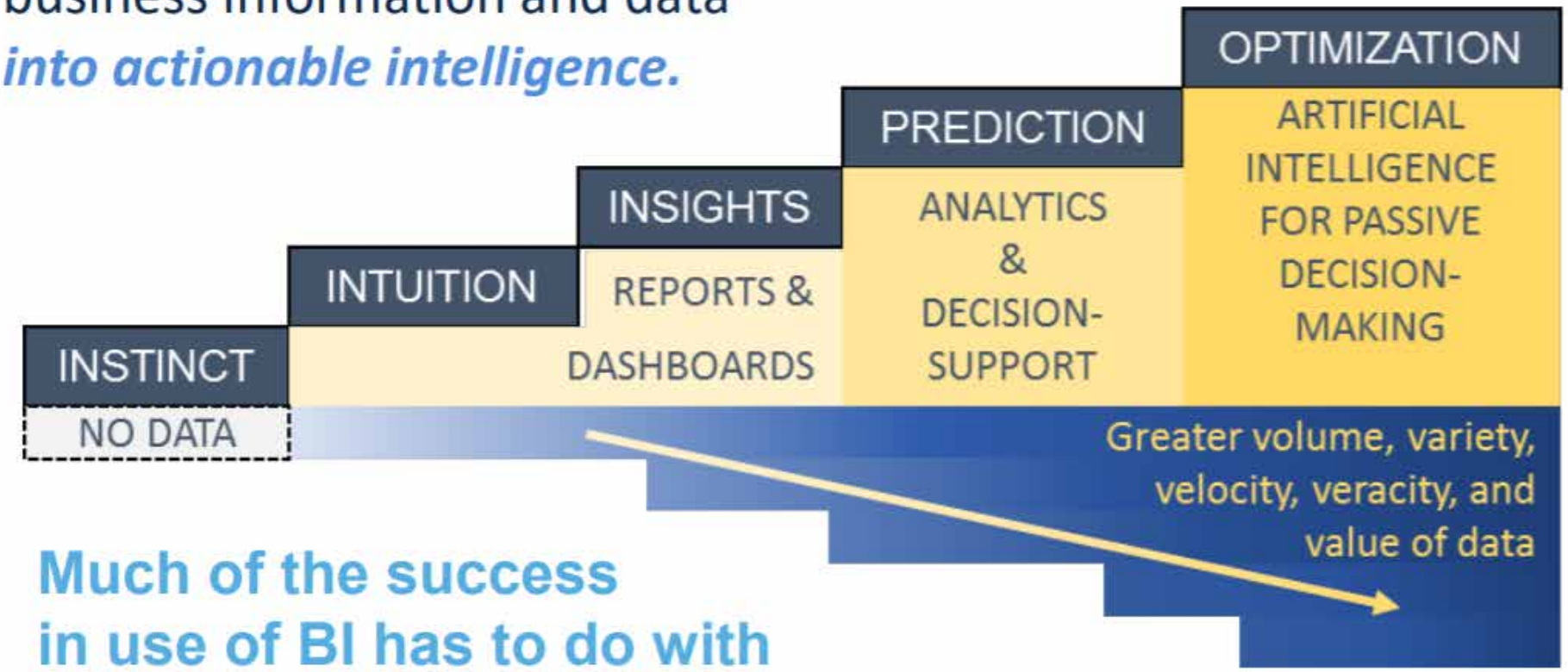
How much effort is needed to reach the state of good repair?

Backlog over Asset Value = Current Backlog / Network Asset Value

County	Jurisdiction	Network PCI	Current Backlog (millions)	Network Asset Value (millions)	Backlog/ Asset Value
	Regional Benchmark	**68**	**$5,645**	**$38,814**	**15%**
Alameda	ALAMEDA	66	$32	$229	14%
	ALAMEDA COUNTY	71	$55	$647	8%
	ALBANY	58	$9	$41	22%
	BERKELEY	58	$77	$298	26%
	DUBLIN	87	$4	$180	2%
	EMERYVILLE	75	$3	$37	7%
	FREMONT	63	$131	$805	16%

DEFINING BUSINESS INTELLIGENCE?

Technologies, applications, and practices for the collection, integration, analysis, and presentation of business information and data ***into actionable intelligence.***



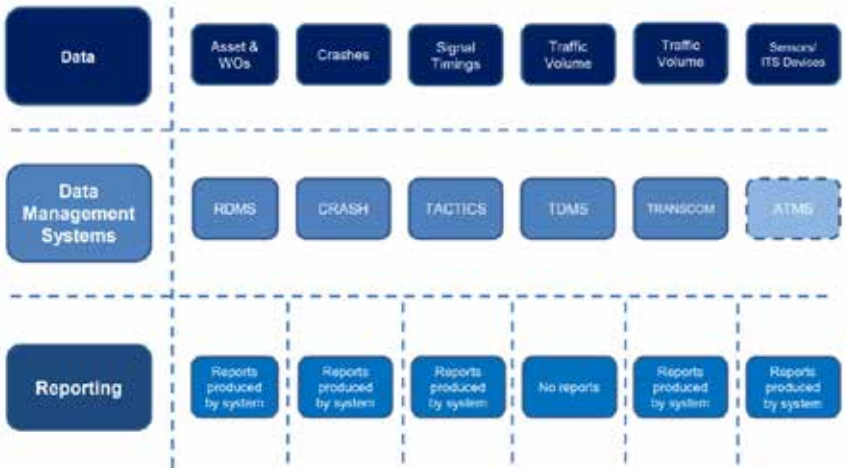
Much of the success in use of BI has to do with people, processes and culture.

Source: Adapted from Optimal BI

Gen 1

PA Traffic Reporting - Current

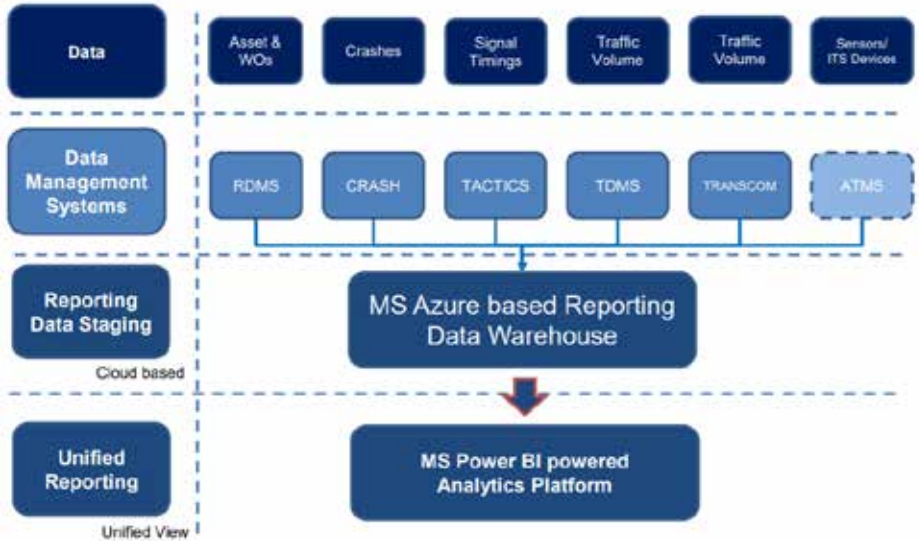
Currently, each functional system/data source produces its report in silo.



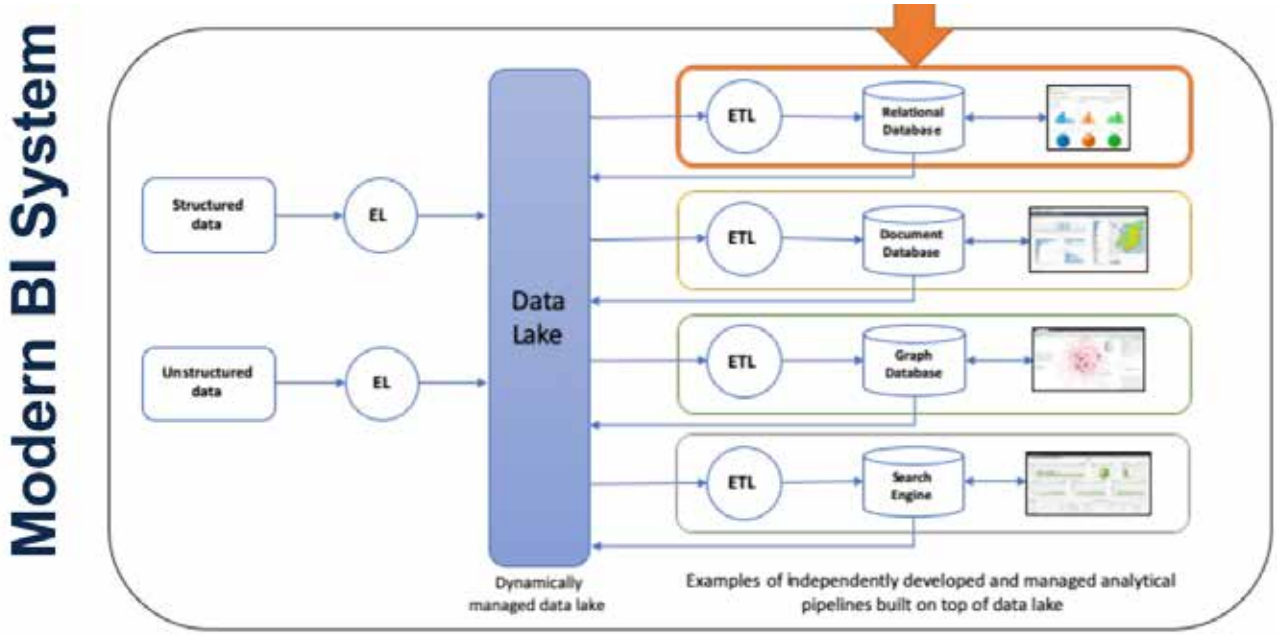
Gen 2

PA Traffic - Future

Our goal is to move to a centralized data warehouse and visualization window into the data.



Gen 3



BI Practices "In a Nutshell"

Good Practices

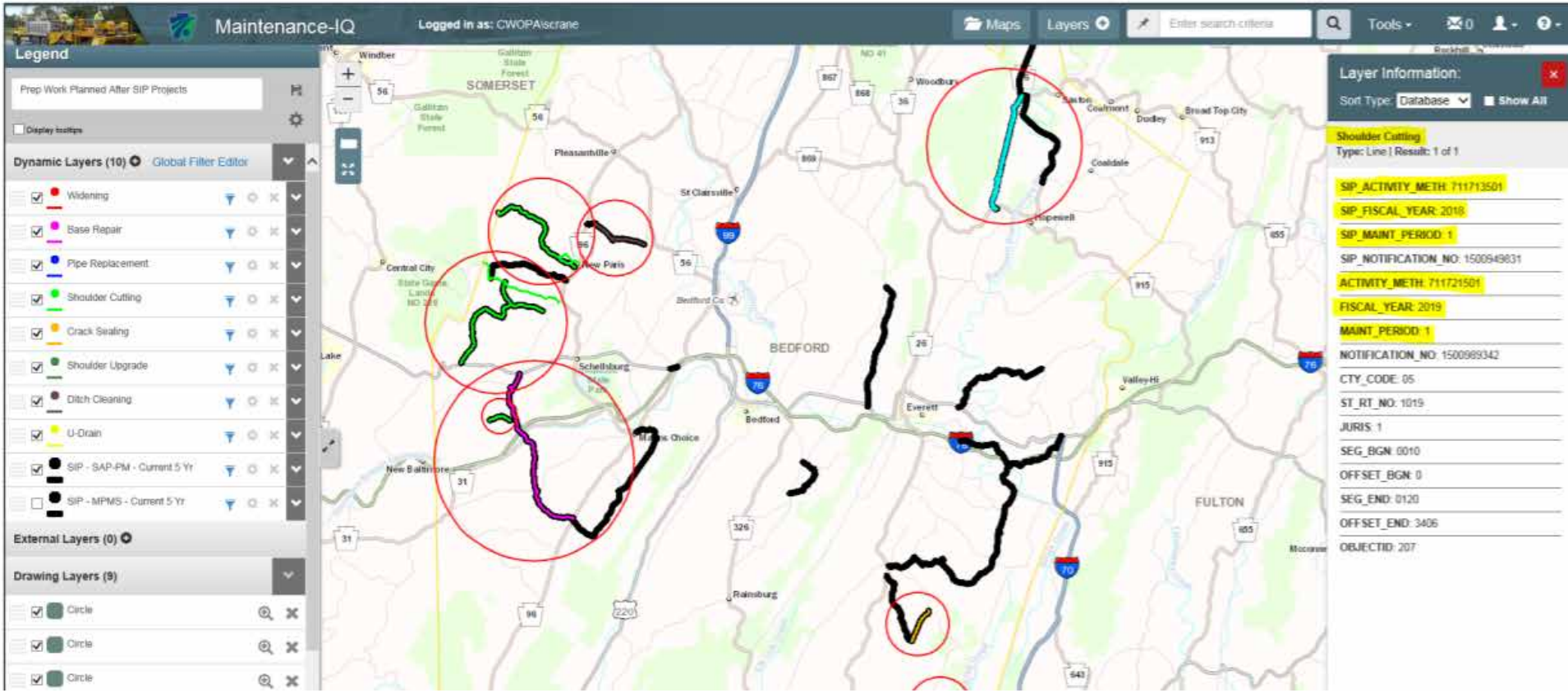
- ✓ Identify the business need
- ✓ Obtain executive support
- ✓ Identify data sources
- ✓ Utilize proper training
- ✓ Make use of data visualizations
- ✓ Encourage experimentation
- ✓ Invest in research
- ✓ Measure success through multiple perspectives

Practices to Avoid

- × Choose BI tools before knowing needs
- × Promise everything on day 1
- × Immediately provide overbroad access to all BI tools
- × Make it perfect and done
- × Measure too many metrics
- × Put security considerations on the back burner

Out of Sequence Work

The below GIS system map allows managers to visualize the prep work activities planned after surface improvement projects (paving). It is a proactive map that helps to eliminate out-of-sequence rework (i.e., prep-type activities performed soon after a surface improvement).



NDOT Cable Median Barrier (CMB) Sensitivity Analysis

This app provides interactive sensitivity analysis of the benefit/cost ratio of installing cable median barrier on the Nebraska sections of I-80 with open medians. Two models are available to predict the frequency of future crossover median crashes (CMC): the 'NDOT Zero Inflated Negative Binomial model' which is fit from NDOT's observed CMC history on I-80 based on VMT and median width, and the 'Sicking' model from Dean Sicking's 2009 pooled fund research.

Crash Model

CMC Prediction Model:

- ○ NDOT Negative Binomial
- ◉ Sicking

Crash Costs

Cost per CMC ($m):

$1m | $7.5m | $10m

1 2 3 4 5 6 7 8 9 10

Cost per Barrier Strike ($):

5,000 | 34,000 | 50,000

5,000 15,000 25,000 35,000 45,000

Barrier Costs

Installation Cost per Mile ($):

200000

Discount Rate:

0.04

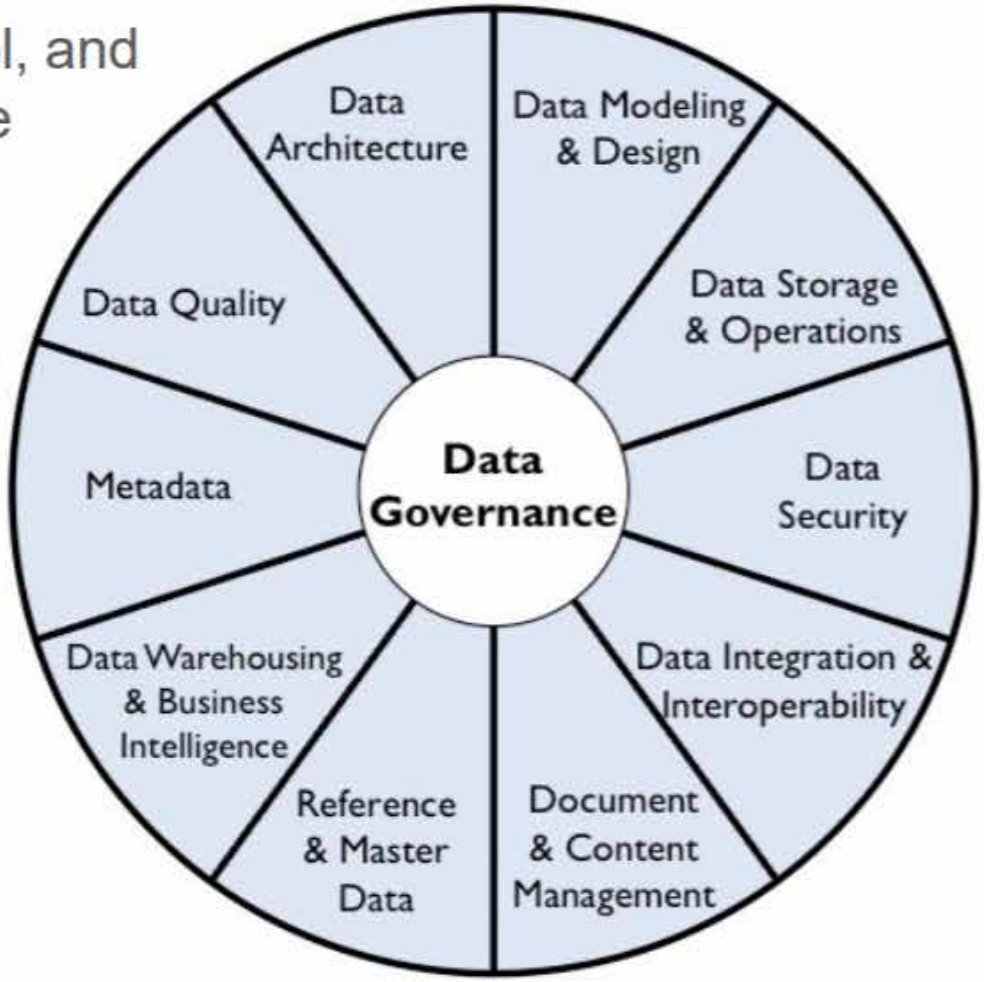
I-80 Benefit / Cost Ratio of CMB Installation

Benefit / Cost Ratio by Traffic Volume, Median Width

Per One-mile Section of I-80

What is Data Governance

- The exercise of authority, control, and shared decision making over the management of data assets.
- Ensures data meets standards, business rules, regulations, and organizational needs.
- It is a process, not a project, rooted in people, processes, and technology.

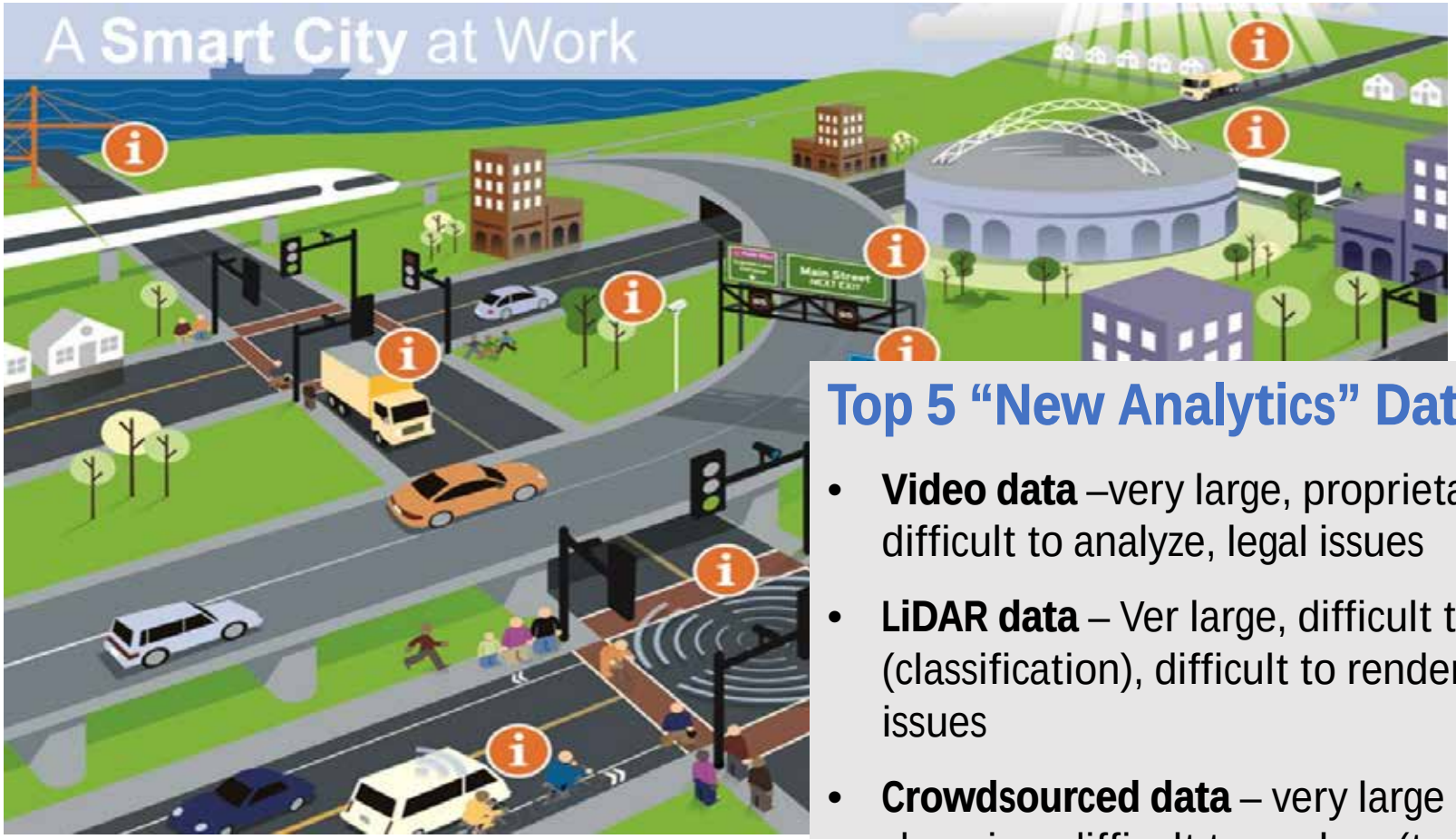


Takeaways

- Look for incremental, high value, and quick wins
- Don’t boil the ocean (prioritize effort)
- Use existing requirements to set urgency
- Provide constant support

Takeaways

- Executive support
- Constant communication
- Dedicated resources
- Keep it simple
- Don’t let perfection get in the way of the good



Top 5 "New Analytics" Data

- **Video data** –very large, proprietary formats, difficult to analyze, legal issues
- **LiDAR data** – Ver large, difficult to analyze (classification), difficult to render, legal issues
- **Crowdsourced data** – very large and fast changing, difficult to analyze (text, image, video), legal issues, quality and veracity
- **Internet of Things data** – Very large and fast changing, quality and veracity, legal issues
- **CAV data** – very large and fast changing, proprietary, lack of control and transparency, legal issues

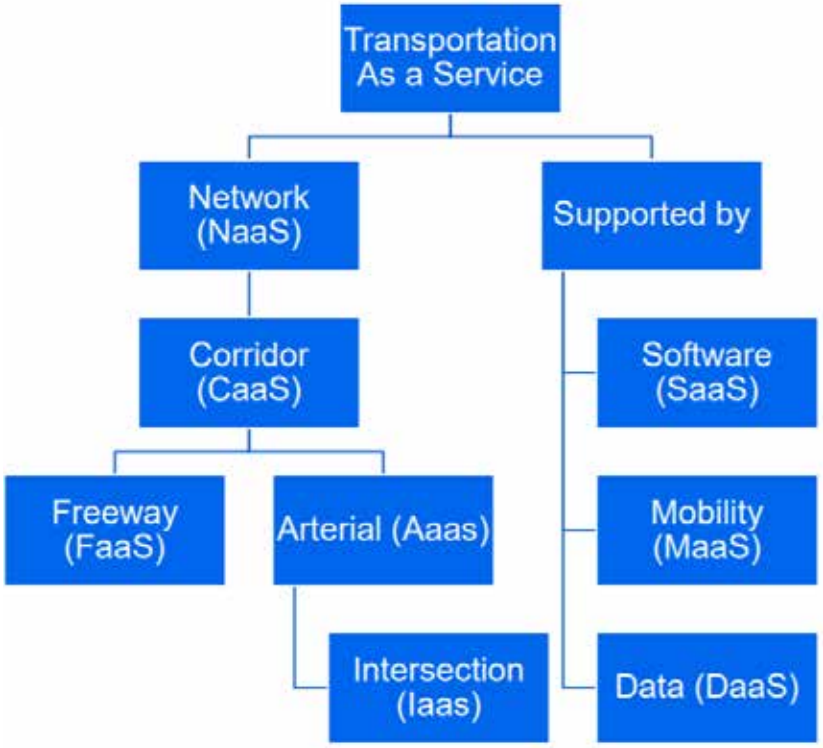
XaaS for Transportation

Challenges

- Business models
- Contracting
- Funding

Benefits

- Serve customers
- Be flexible
- Save resources
- Be ready for the future of technology



Performance and Data in Transportation Decision Making

Programming and Investment Prioritization

David Wasserman

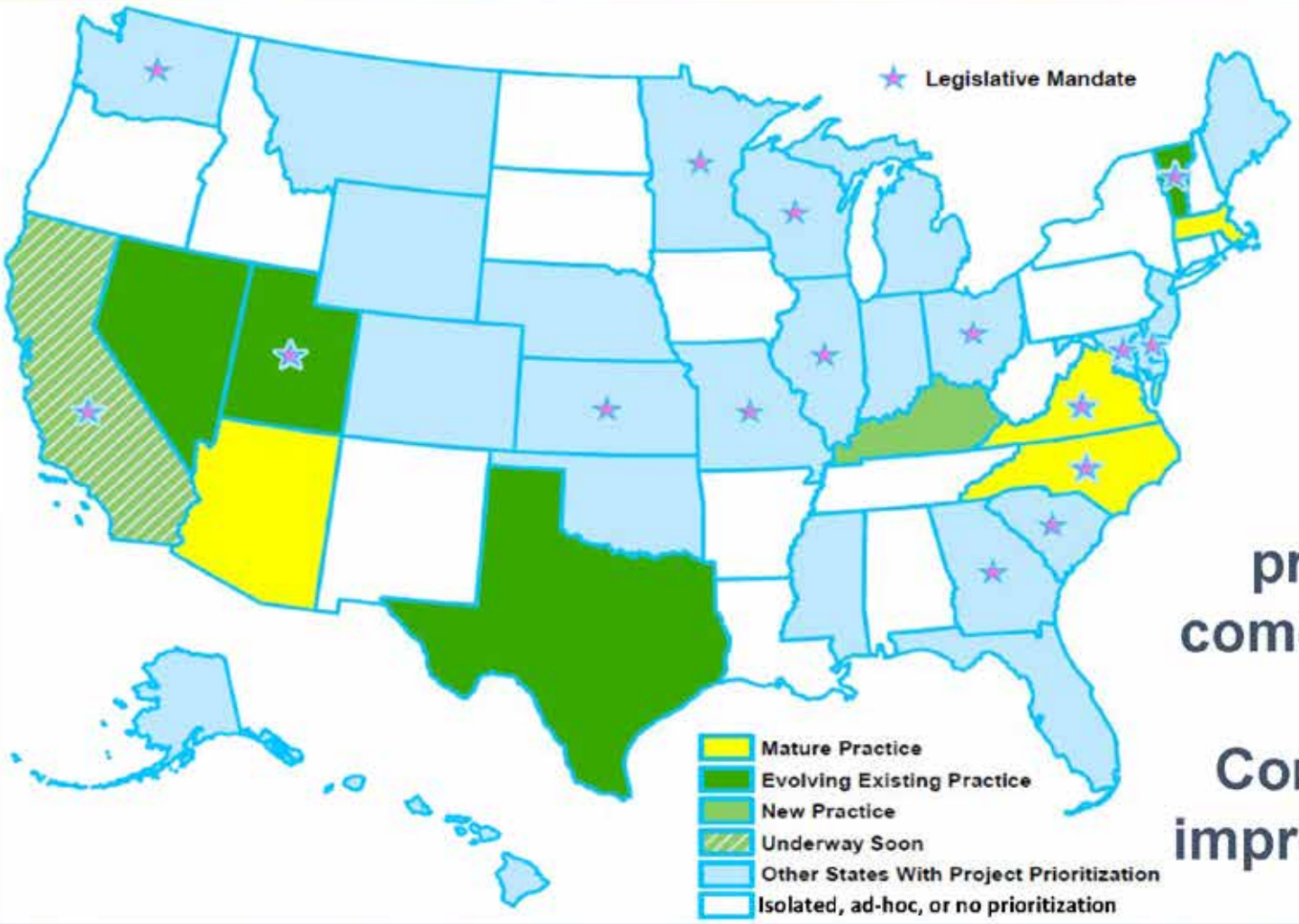
North Carolina Department of Transportation

Track C

- Peer Exchange
- Many different agencies speakers
- Organizations have a variety of experience

State of the Nation / Balancing Data-Driven Decision-Making with Political Reality

State of the Nation



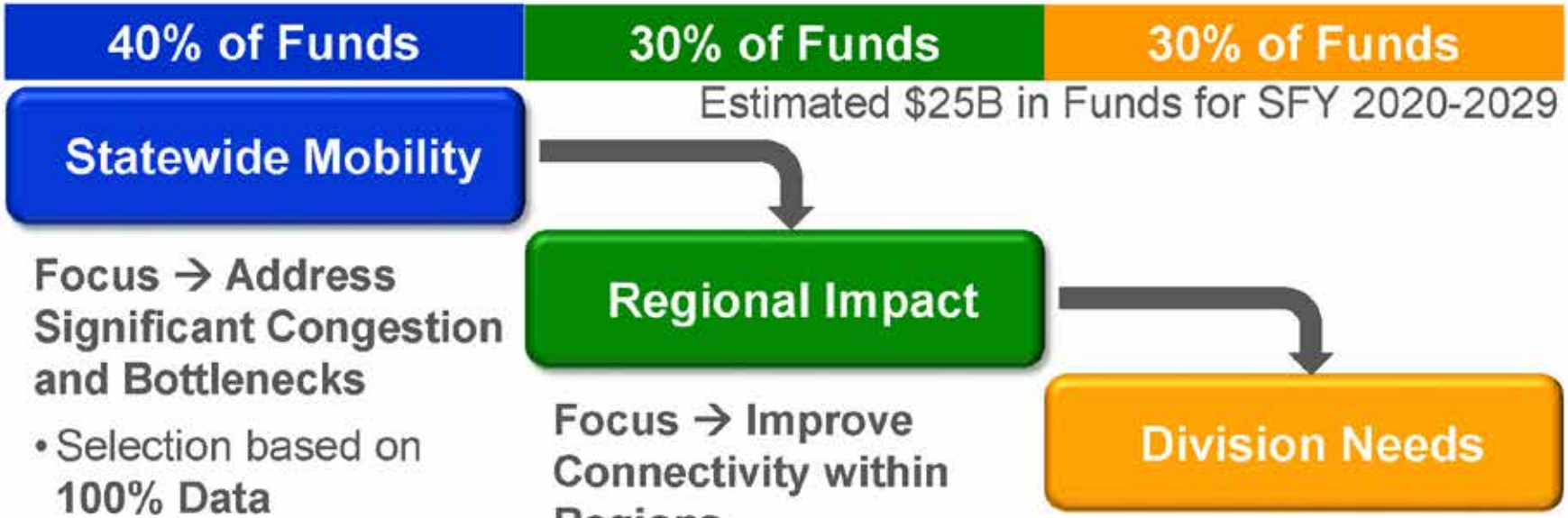
State of flux

Political shifts

Some processes come and go

Continuous improvement

How STI Works



Focus → Address Significant Congestion and Bottlenecks

- Selection based on **100% Data**
- Projects Programmed prior to Local Input Ranking

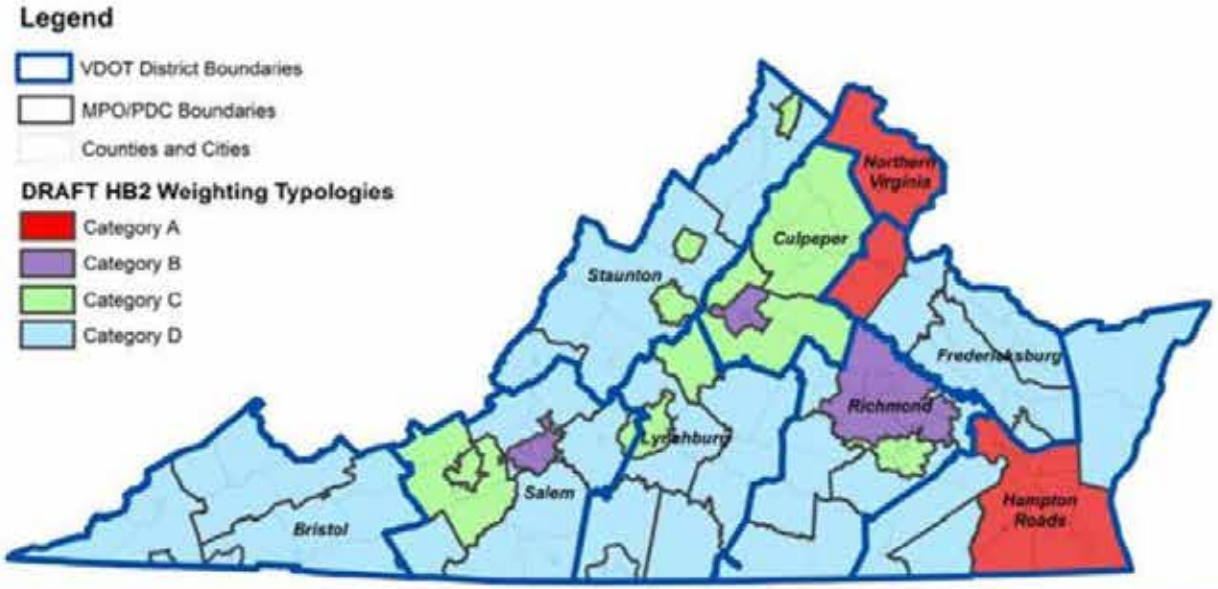
Focus → Improve Connectivity within Regions

- Selection based on **70% Data & 30% Local Input**
- Funding based on population within Region (7)

Focus → Address Local Needs

- Selection based on **50% Data & 50% Local Input**
- Funding based on equal share for each Division (14)

Area Type Weighting



Factor	Congestion Mitigation	Economic Development	Accessibility	Safety	Environmental Quality	Land Use
Category A	45%	5%	15%	5%	10%	20%
Category B	15%	20%	25%	20%	10%	10%
Category C	15%	25%	25%	25%	10%	
Category D	10%	35%	15%	30%	10%	

P2P Overview

Pavement Preservation

Funding:
$260M / year

Scoring:
Technical = 35%

District = 30%

Safety = 25%

Policy = 10%

Bridge Preservation

Funding:
$60M / year

Scoring:
Technical & Safety = 60%

District = 30%

Policy = 10%

Modernization

Funding:
$91M / year

Scoring:
Technical = 35%

District = 30%

Safety = 25%

Policy = 10%

Expansion

Funding:
$0M / year

Scoring:
Technical = 50%

District = 25%

Safety = 15%

Policy = 10%

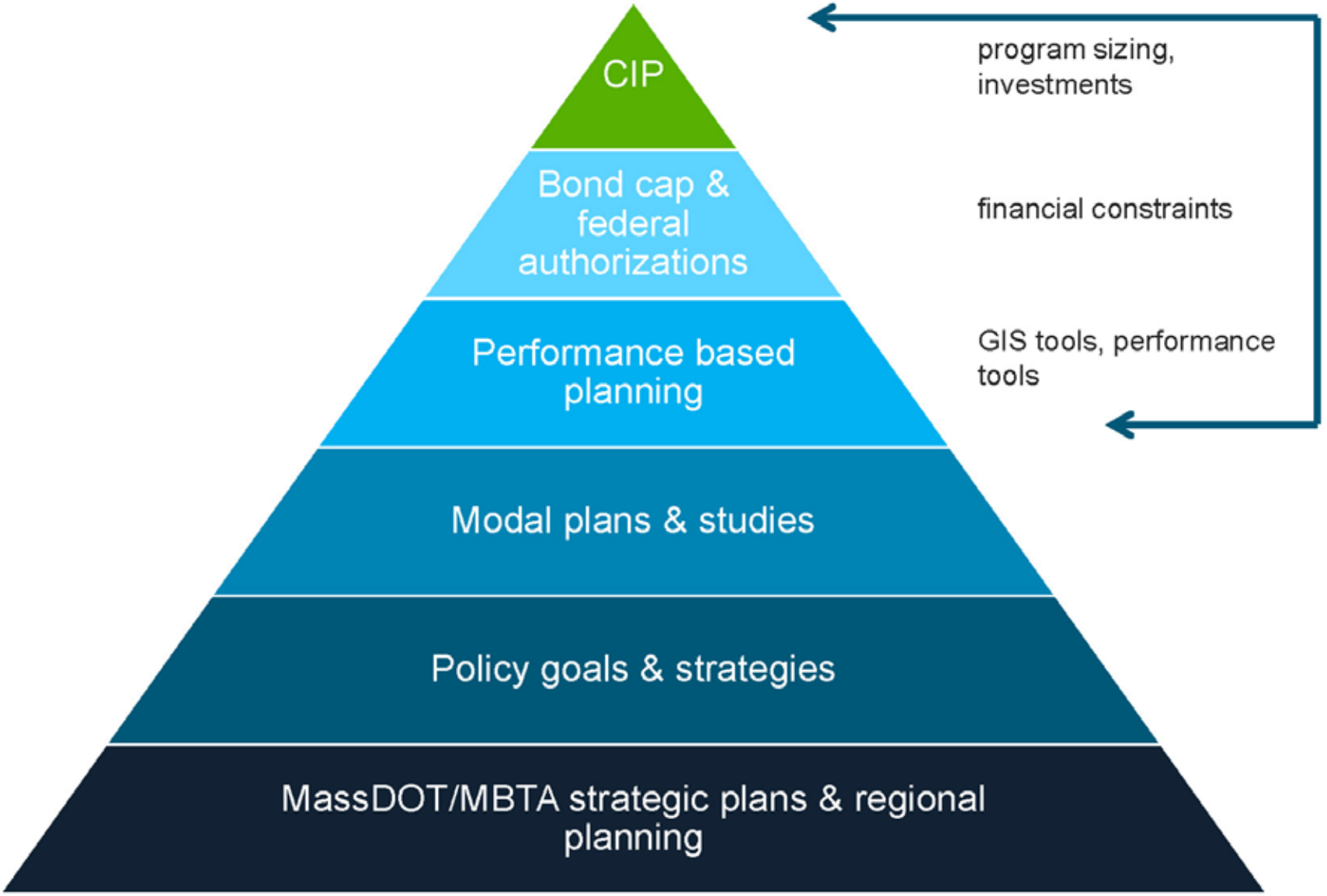
**Subject to Change*

Data-driven Project Selection Across the States

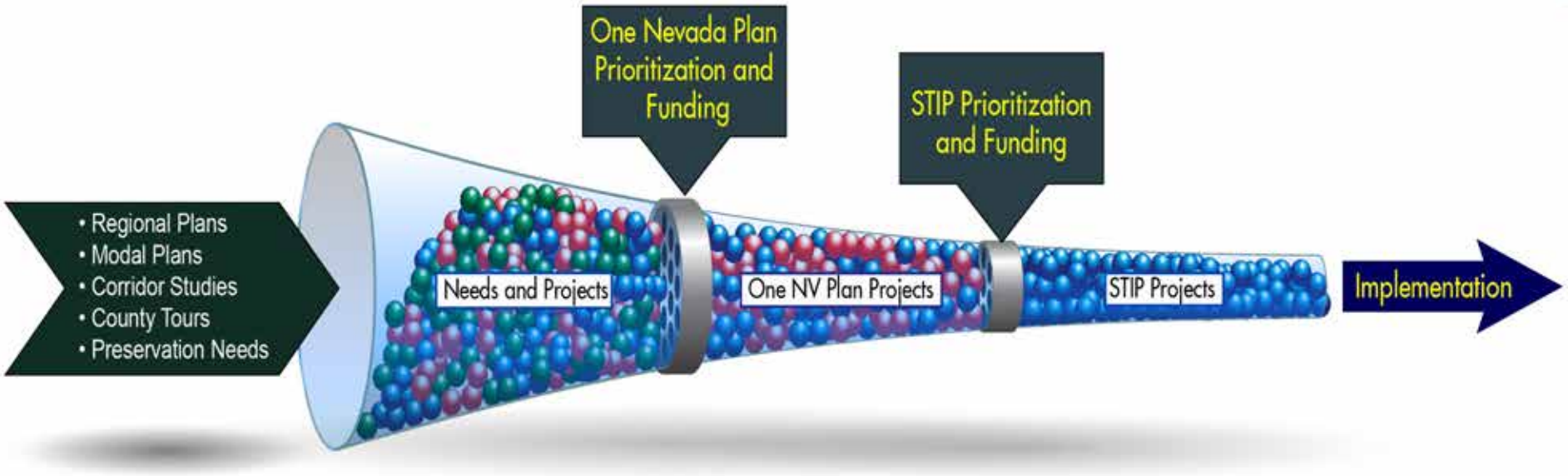
SHIFT 2020 Benefits

- Data-Driven
- Objective
- Transparent
- Collaborative
- Dependable

The *massDOT* planning pyramid



The OneNV Plan Process



From prioritization by allocation to allocation by performance based prioritization

Process Automation for Corridor Prioritization

TxDOT Data

Raw Input

Criteria	Performance Measure	Raw Value
	Pavement	
1	Pavement Condition Score	89.8
2	% Pavement with Pavement Condition Score < 60	5.7%
	Bridge	
3	Bridge Sufficiency Score	92.8
4	% Deck Area on Bridges with Suff Rating < 60	0.0%
	Safety	
5	K&A crash rate for entire corridor	3.5
6	Total crash rate for entire corridor	55.3
	Congestion	
7	% Count Stations with Existing V/C > 0.80	0.0%
8	% Count Stations with Future V/C > 0.80	18.5%
9	Texas Transp Institute hot spot list for all	0.0%
10	Texas Transp Institute hot spot list for trucks	0.0%
	Economic Development	
11	Daily Freight Volumes	9,300
12	Commodity Flow	142M
13	Existing employment	157
14	Existing population	349
15	Projected annual traffic growth rate	3.8%
16	% of Privately held land	99.2%
	Connectivity	
17	Provides access to existing multi-modal facilities or major traffic generators	0.44
18	Part of hurricane evacuation route	100%
19	Part of National Freight Network or TxDOT Primary Freight Network	100%

Data Extraction Tool

Score

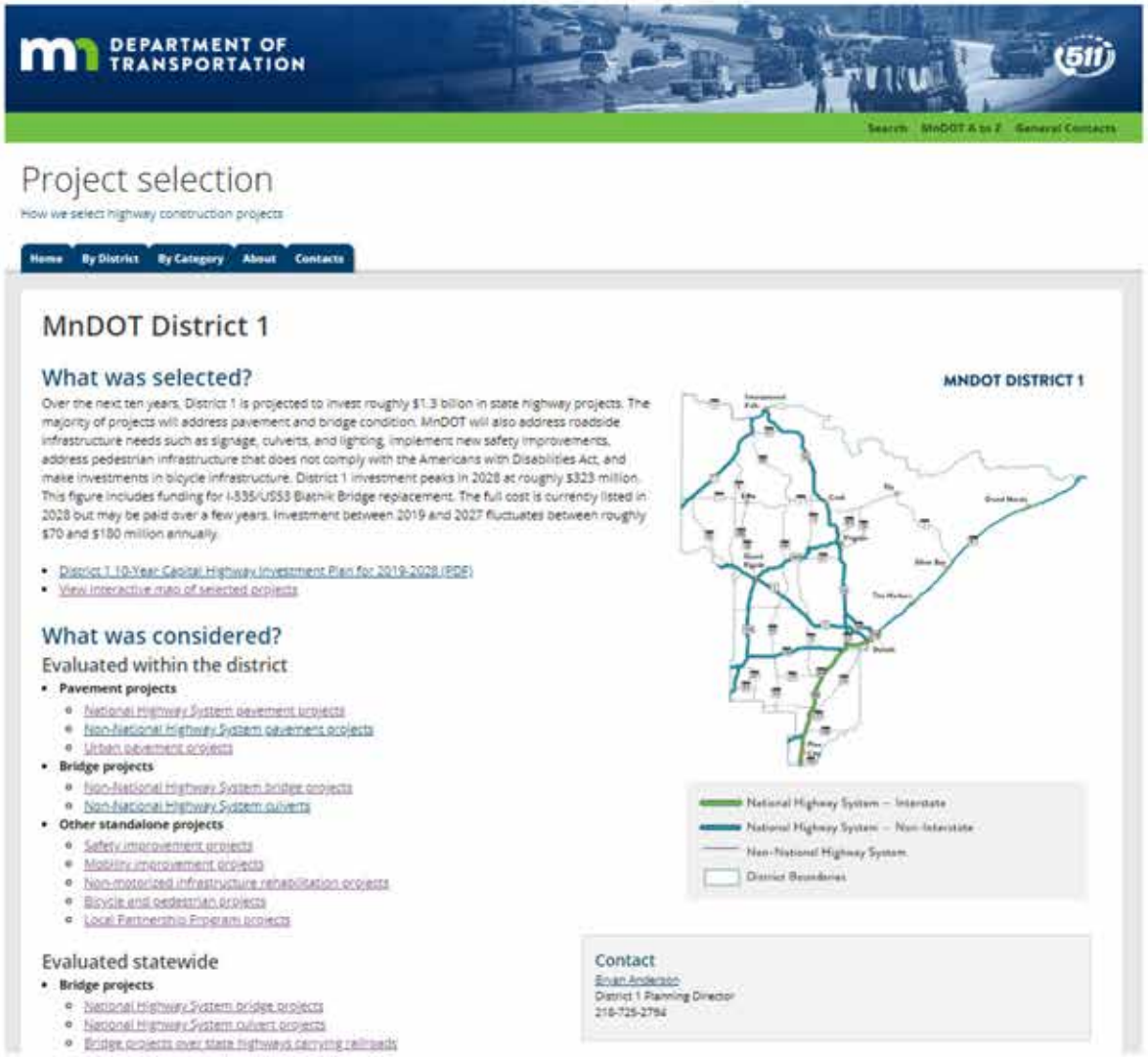
Criteria	Performance Measure	Score
	Pavement	
1	Pavement Condition Score	5.1
2	% Pavement with Pavement Condition Score < 60	5.7
	Bridge	
3	Bridge Sufficiency Score	1.0
4	% Deck Area on Bridges with Suff Rating < 60	0.0
	Safety	
5	K&A crash rate for entire corridor	3.9
6	Total crash rate for entire corridor	1.3
	Congestion	
7	% Count Stations with Existing V/C > 0.80	0.0
8	% Count Stations with Future V/C > 0.80	2.3
9	Texas Transp Institute hot spot list for all	0.0
10	Texas Transp Institute hot spot list for trucks	0.0
	Economic Development	
11	Daily Freight Volumes	4.8
12	Commodity Flow	4.3
13	Existing employment	5.2
14	Existing population	5.6
15	Projected annual traffic growth rate	6.3
16	% of Privately held land	9.2
	Connectivity	
17	Provides access to existing multi-modal facilities or major traffic generators	2.5
18	Part of hurricane evacuation route	10.0
19	Part of National Freight Network or TxDOT Primary Freight Network	10.0
20	Part of Energy Sector Route	9.6

Corridor Prioritization Tool (CPT)

Website

Multiple ways to navigate to a project list

- By type of project
- By district



Mode-Neutral Project Evaluation

Project Evaluation Across Modes

Benefits	Challenges	Requires
• Provides decision-makers the information to better optimize project selection and funding.	• Different modes have different purposes and benefits – apples to oranges comparison • Stakeholder engagement to understand the process can be time consuming and costly	• Engaged leadership • Common goals • Diversity of thought at the table • Communication across all levels within agency • Improved communication tools • Common and meaningful language
• Allows decision-makers to evaluate the transportation network as a system, instead of by individual modes.	• Political realities and funding availability and requirements may not align with results	• Keep performance evaluation funding agnostic • Manage expectations around needed projects • Focus on outcomes • Agile funding strategies
• Provides a data-driven mechanism to determine the greatest needs, irrespective of mode	• Limited mode-neutral measures • Limited common data exists between and across modes • Lack of robust data management/governance processes	• Creative evaluation processes • Elevating data management as a part of the process • Better predictive tools

"Community to Region" Performance Framework

INVESTMENT NEEDS THAT SUPPORT

- Local, multimodal connections and access to community resources
- Advance livability and quality of life principles

INVESTMENT NEEDS THAT SUPPORT

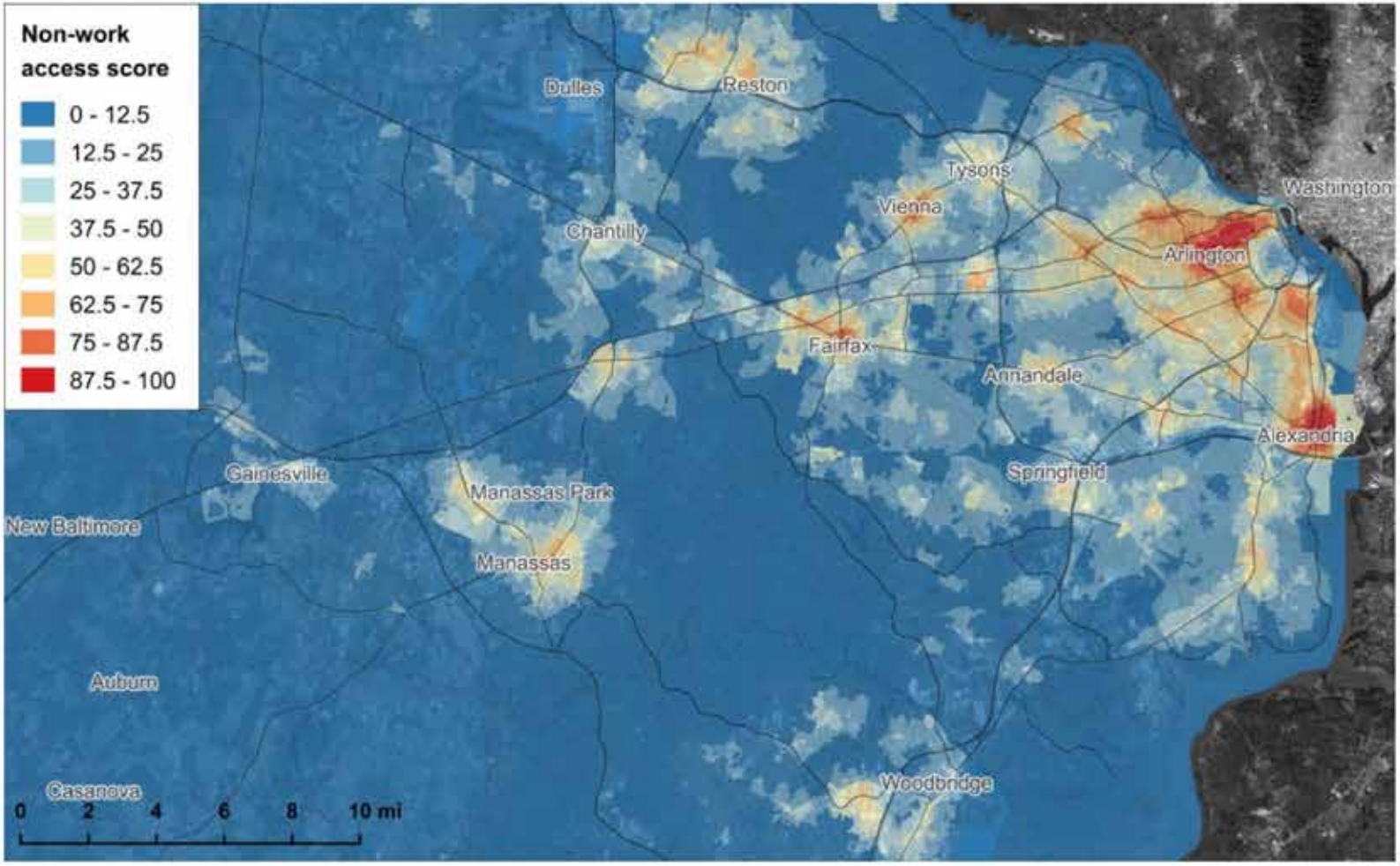
- Strategic, multimodal connections between communities and regional activity/ economic centers to support economic development

INVESTMENT NEEDS THAT SUPPORT

- Mobility and intermodal improvements to ensure region is well connected within the state and the nation
- Support economic competitiveness and advance overall economic development potential

Selin, T., and Taylor, M.D. Chattanooga 2040 RTP Performance-Framework: Balancing Regional and Community Needs, TRB, June 2014

Land Use – Non-Work Accessibility
Northern Virginia

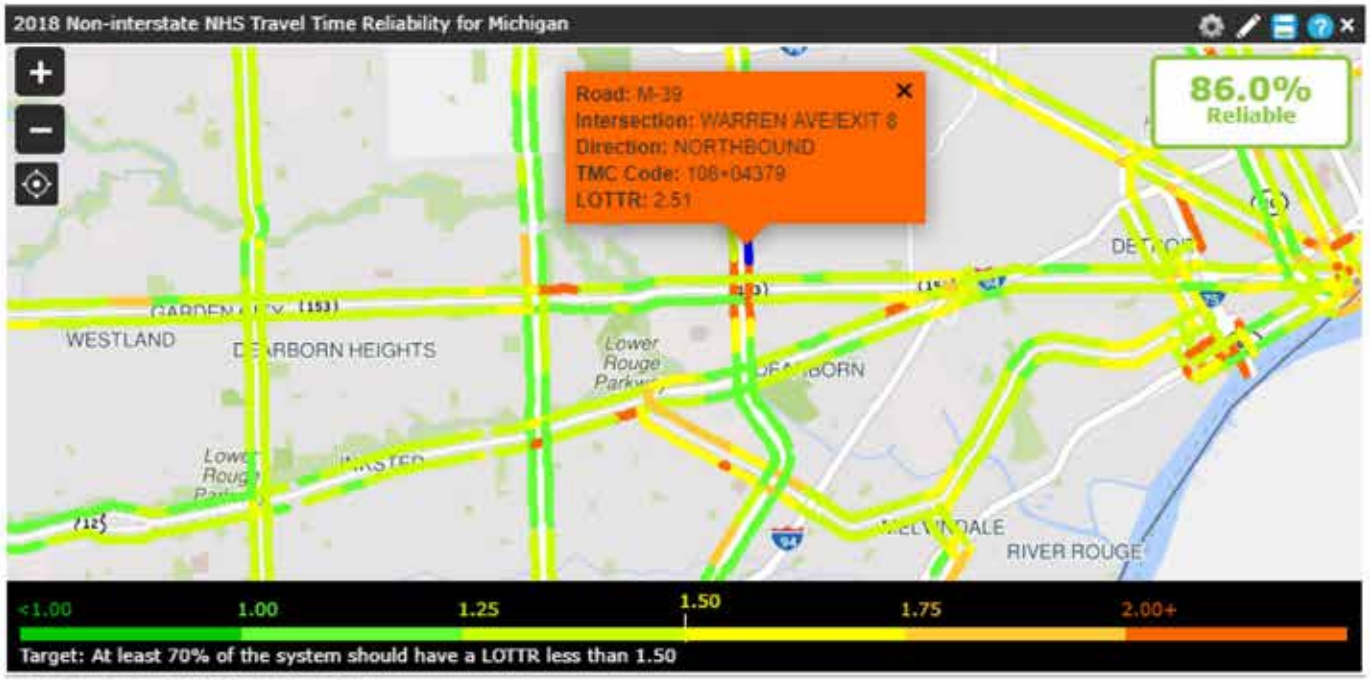


Mode Neutrality

- 5 Modes: Highways, Walkways/Paths/Trails (WPT), Rail, Aviation, & Transit
- 8 Evaluation Criteria:

Safety
Mobility / Connectivity
Asset Condition
Resiliency
Community
Environment
Economic Access
Health Access

LOTTR (Level of Travel Time Reliability)



Calculated using 100.00% of miles in Michigan

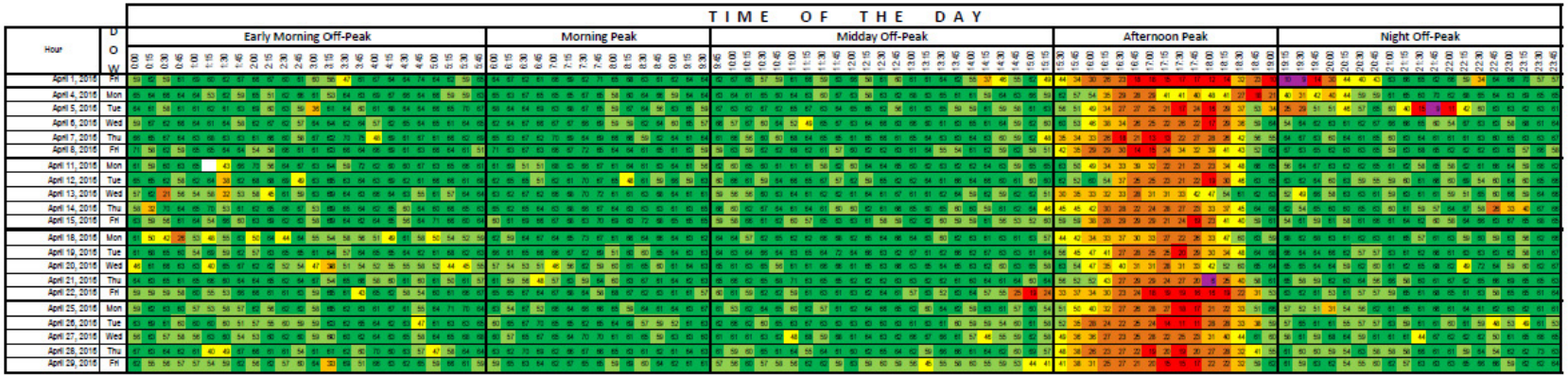
Data source: NPMRDS INRIX

EXAMPLE OF RECURRING CONGESTION

IH 635 (E), Royal/Miller Rd) to SH 78

Direction: EB

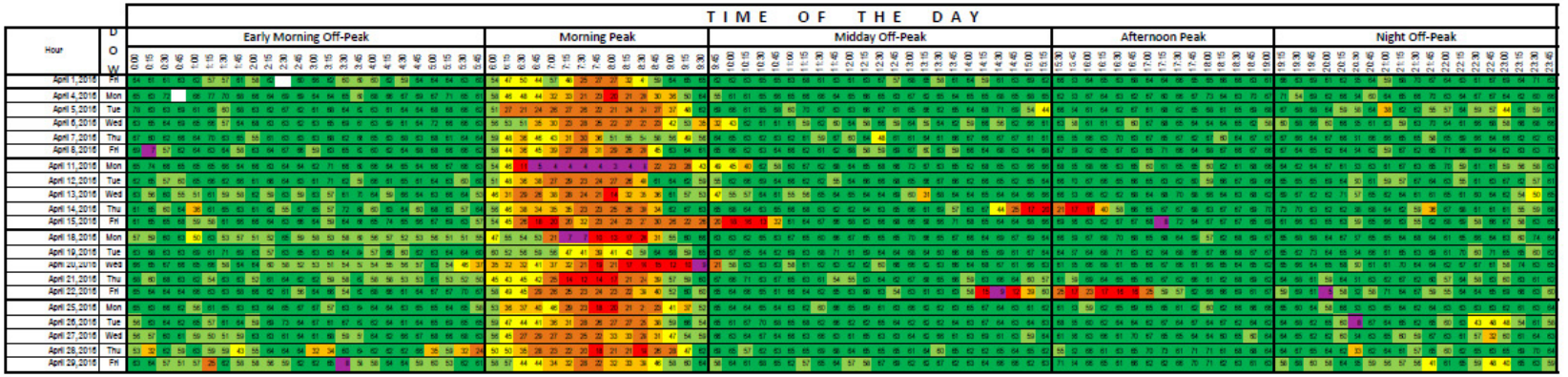
Speeds, mph, by time of day (15-minute interval) and day of April 2016



IH 635 (E), Royal/Miller Rd to SH 78

Direction: WB

Speeds, mph, by time of day (15 minute interval) and day of April 2016



Legend for Freeways speed, mph

No Data
1 10
11 20
21 30
31 40
41 50
51 60
61 70

Example Metrics

Roadway Expansion Mobility & Congestion Criterion

Measure	Metric	Nature of Metric	Sponsor Provided	Percent of Criterion Score
1) Change in Congestion Intensity	Absolute change in the link-level travel time index (TTI) in the build vs no build scenario for the worst traffic time period	Numerical; derived from ARC's modeling	No	50%
2) Change in Congestion Extent	Absolute change in regional vehicle hours of delay (VHD) in the build vs no build scenario for the worst traffic time period	Numerical; derived from ARC's modeling	No	50%

Metric for Evaluating the Roadway Expansion Reliability Criterion

Measure	Metric	Nature of Metric	Sponsor Provided
Worst Travel Time Reliability	Aggregated 80% travel time / 50% travel time for all weekdays	Numerical; derived from real-world data	No

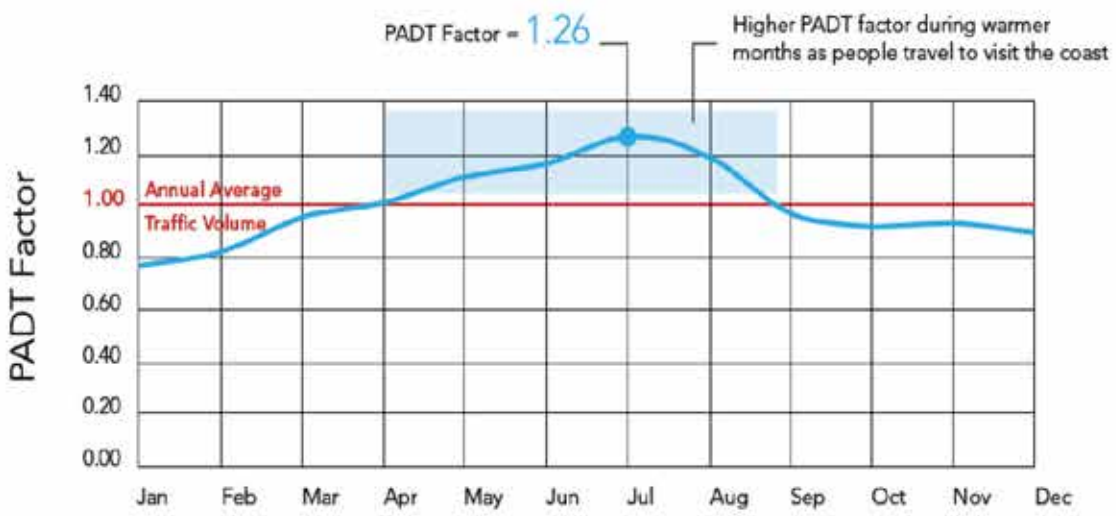
Peak Average Daily Traffic

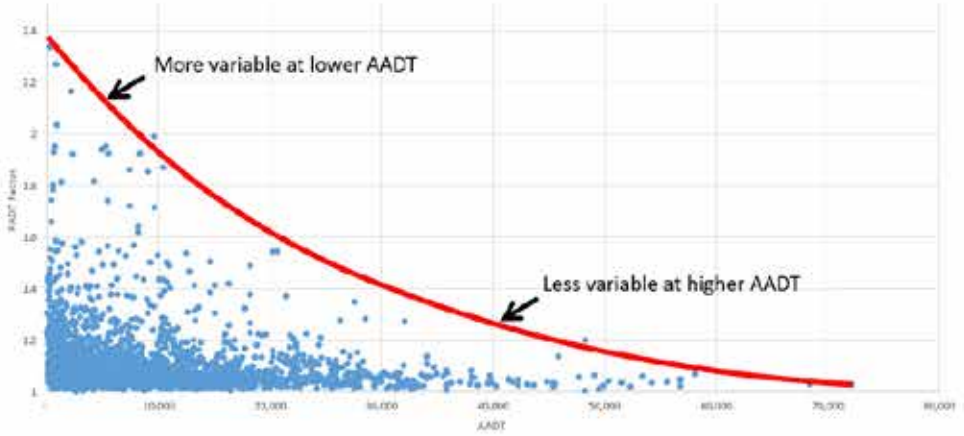
PADT = ADT occurring in peak month (includes weekday & weekend)

Factor AADT to the peak month:

PADT = AADT x PADT Factor

- An example for I-40 near Wilmington:





Multi-Criteria Prioritization Model

Performance Measure Category	Project-Level Performance Measures	Expansion	Enhancement	SGR
Market		42	27	15
	Existing, Projected Population Density	6	4	3
	Existing Population - Communities of Interest	8	6	6
	Existing Employment Density	5	3	2
	Existing Low Wage Employment Density	7	5	4
	Land Use Mix - Existing, Planned (+/- Community Impacts)	8	4	0
	(Re) Development Potential	8	5	0
Performance		30	50	70
	Transit Trips	10	10	15
	Transit Reliability	15	20	25
	Increased Useful Life	0	10	25
	Elements to Improve Safety/Security/Environment	5	10	5
Deliverability		28	23	15
	Financial Plan	15	10	10
	Documented Project Support	4	4	0
	Project Readiness - Schedule, Environmental Impacts	4	4	0
	Regional Integration / Connectivity	5	5	5
Cost-Effectiveness	Cost per Point	NA	NA	NA

Transit Prioritization Metrics

 # - quantitative measur

Mobility

- ridership (#)
- person throughput (#)
- travel time reliability
- service frequency

Accessibility

- Population served by frequent transit (#)
- transit dependent households served (#)
- Improved system connectivity
- access to parks and open space (#)

Economy

- TOD potential (#)
- Access to jobs (#)
- $ invested in disadvantaged communities (#)

Safety

- Fatal/severe injury collision area addressed (#)
- Transit system safety addressed

Sustainability & Quality of Life

- GHG emissions (#)
- Heat island effect & storm water runoff potential
- Habitat & open space preservation
- Clean option in environmentally sensitive community

	Ped Segment	Ped Intersection	Bike Segment	Shared Use
Stakeholder Input				
Requests & Comments	Proportionate	Proportionate	Proportionate	Proportionate
Included in Adopted Plan	Proportionate	Proportionate	Proportionate	Proportionate
Constraints				
Available Right of Way	Proportionate	Proportionate	Proportionate	Proportionate
Major Utility Relocation	Inv. Proportionate	Inv. Proportionate	Inv. Proportionate	Inv. Proportionate
Existing Conditions				
Total Vehicle Lanes	Proportionate	X	X	Proportionate
Posted Speed Limit	Proportionate	Proportionate	X	Proportionate
Average Daily Traffic (ADT)	Proportionate	Proportionate	X	Proportionate
Traffic Stress	X	X	Proportionate	X
Type of Traffic Control	X	Inv. Proportionate	X	X
Presence of Raised Median for Refuge	X	Proportionate	X	X
Distance from Nearest Traffic Signal	X	Inv. Quantile 10	X	X
ADA Compliance	X	Proportionate	X	X
Longest Crossing Distance	X	Quantile 4	X	X
Connectivity				
Connects to Existing Sidewalk/Path	X	Proportionate	X	X
Connects to Proposed Sidewalk/Path	X	X	X	X
Connectivity	Proportionate	X	Proportionate	Proportionate
Safe Routes to School	Proportionate	Proportionate	Proportionate	Proportionate
Located on Transit Route	Proportionate	X	X	Proportionate
Equity				
Equity Score	Proportionate	Proportionate	Proportionate	Proportionate
Population Density	Quantile 10	Quantile 10	Quantile 10	Quantile 10
Activity/Employment Density	Quantile 10	Quantile 10	Quantile 10	Quantile 10

City of Harrisonburg Bicycle and Pedestrian Plan, https://www.harrisonburgva.gov/bicycle-pedestrian-plan

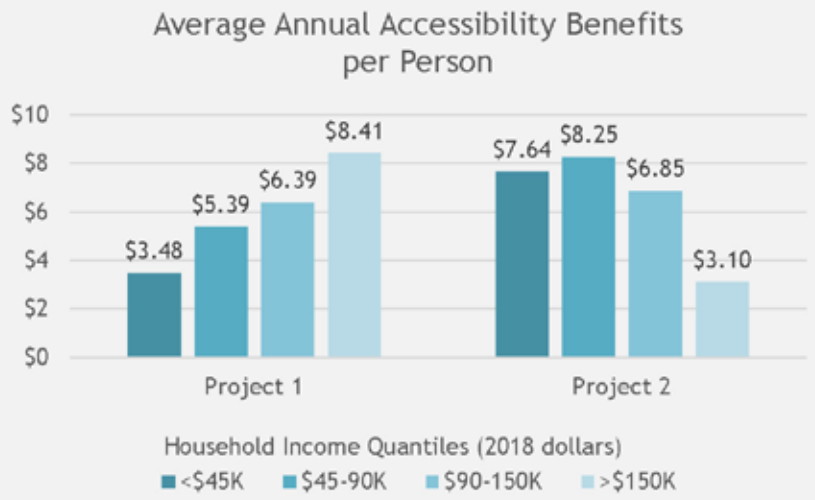
SmartTRAC project selection (HDOT)

Mode	Metric	Accessibility points	
Transit	Access to jobs by transit (percent of jobs accessible by auto)	100	
Biking	Access to jobs by biking (percent of jobs accessible by auto)	50	100
	Bike accessibility index	50	
Walking	Access to non-work destinations by walking	100	

ID	Project Title	File Folder	Department	Section or Office	Cost	Total Score	Total Score / Cost ($m)
H11	Waianuenue Avenue Pavement Maintenance, Kaiulani Street to Rainbow Drive (South Hilo, Routes 1950 and 2720)	Hawaii	Hawaii County	Public Works	$ 1,331,000	14.36	10.79
H15	Mamalahoa Highway Pavement Maintenance, Phase 2 of 3, Keopuka Heights Road to Hokukano Road (North Kona, Route 11)	Hawaii	Hawaii County	Public Works	$ 1,351,000	14.36	10.63
H10	Kilauea Avenue Pavement Maintenance: Wailoa Bridge to Puainako Street, MP 0.7 to MP 2.2 (South Hilo, Route 1920)	Hawaii	Hawaii County	Public Works	$ 1,506,000	14.36	9.54
H12	Mamalahoa Highway Pavement Maintenance, Phase 1 of 3, Kiloa Road to Keopuka Heights Road (North Kona, Route 11)	Hawaii	Hawaii County	Public Works	$ 1,506,000	14.36	9.54
H01	Mamalahoa Highway Safety Improvements from MP 98.7 – 105.3, Mamalahoa Highway, 1.0 Mile North of Haleili Road to the vicinity of Bruner Road	HWY-TS	HDOT	HWY-TD	$ 1,100,000	10.36	9.42
H02	Mamalahoa Highway Safety Improvements from MP 17.9 – 20.8 and MP 21.3 – 26.2	HWY-TS	HDOT	HWY-TD	$ 1,100,000	10.36	9.42

Equity Assessment - New Approach (for 3 Futures)

Equity Score Example



Equity (income) score = **Benefits per person of lower income groups / Benefits per person of all groups**

Project 1: 37%
Project 2: 61%

Three Score Categories

Impedes Equity
<40%

Even Distribution of Benefits
40%-60%

Advances Equity
>60%

Speed Data[ing] (Data & Tools used in project evaluation that feeds the TIP/STIP

- Kentucky's SHIFT Tool
- North Carolina's SPOT On!ine
- New York City Strategic Plan Scoring System
- Georgia's Mark1 and Numetric Platform
- North Carolina's Signal System Retiming Program
- Texas Corridor Prioritization Tool

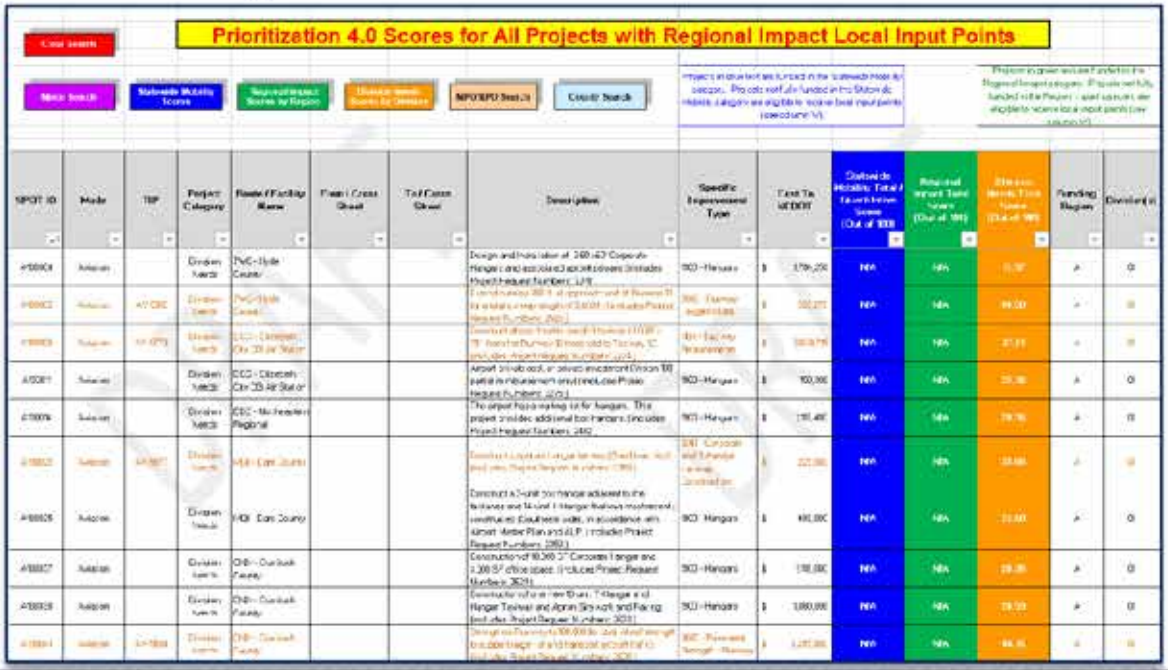
Prioritization Results

Evaluated ~3100 projects (P3.0)

~530 funded (17%)

Increased Transparency

- All data used in scoring available for review


Prioritization 4.0 Scores for All Projects with Regional Impact Local Input Points

Scorecards PDF Version

SMART SCALE — Funding the Right Transportation Projects in Virginia

For more information on how to read a scorecard, click here.

Route 301 University Drive/Market Ctr Double RCUT — Project Id: 3488

Reconfigure intersections of University Drive at US 301 and Market Center at US 301 respectively to Restricted Crossing U-Turn intersections & install marked pedestrian crossings.

Submitting Entity:	King George County
Preliminary Engineering:	Not Started
Right of Way:	Not Started
Construction:	Not Started
Eligible Fund Program:	District Grant
VTRANS Need:	Urban Development Area (click here for details)

10.5 SMART SCALE SCORE	#32	OF 433 STATEWIDE
	#1	OF 32 DISTRICTWIDE

SMART SCALE Requested Funds	$3,500,000
Total Project Cost	$3,500,000
Project Benefit	3.7
Project Benefit / Total Cost	10.5

SMART SCALE Area Type D

Factor	Congestion Mitigation		Safety		Accessibility			Economic Development			Environment		Land Use	
Measure	Increase in Peak Period Person Throughput	Reduction in Peak Period Delay	Reduction in Fatal and Injury Crashes	Reduction in Fatal and Injury Crash Rate	Increase in Access to Jobs	Increase in Access to Jobs for Disadvantaged Populations	Increase in Access to Multimodal Travel Choices	Square Feet of Commercial Industrial Development Supported	Tons of Goods Impacted	Improvement to Travel Time Reliability	Potential to Improve Air Quality	Other Factor Values Scaled by Potential Average Impacts	Support of Transportation-Efficient Land Use	Increase Transportation-Efficient Land Use
Measure Value	0.0	0.0	36.5	1,108.1	10.5	17.2	10.2		43,777.2		13.0	2.9		
Normalized Measure Value (0-100)	0.0	0.1	11.0	2.3	0.2	0.3	0.0	5.2	0.9	0.4	0.1	8.8		
Measure Weight (% of Factor)	0.5	0.5	0.5	0.5	0.6	0.2	0.2	0.8	0.2	0.2	0.5	0.5		
Factor Value	0.1		0.7		0.2			3.4			4.5			
Factor Weight (% of Project Score)	10%		30%		15%			30%			10%		N/A	
Weighted Factor Value	0.0		2.0		0.0			1.2			0.4			
Project Benefit	3.7													
SMART SCALE Cost	$3,500,000													
SMART SCALE Score (Project Benefit per $10M SMART SCALE Cost)	10.5													

Revised: 01/15/2019 — 03-18

Always Be Ready…

- ❑ Politics  Know Political Projects
- ❑ Transparency  Show Your Data
- ❑ Explain Data  Graphs & Simplicity
- ❑ Show Tradeoffs  Scenario Planning

Programming and Investment Prioritization Key Take Aways

- Know your political climate
- Have champions (internal and external)
- Build process incrementally
- Involve stakeholders
- Data and tools are your friends – but test first
- Communication is key

Performance and Data in Transportation Decision Making

Communications and Stakeholder Engagement

Hannah Twaddell

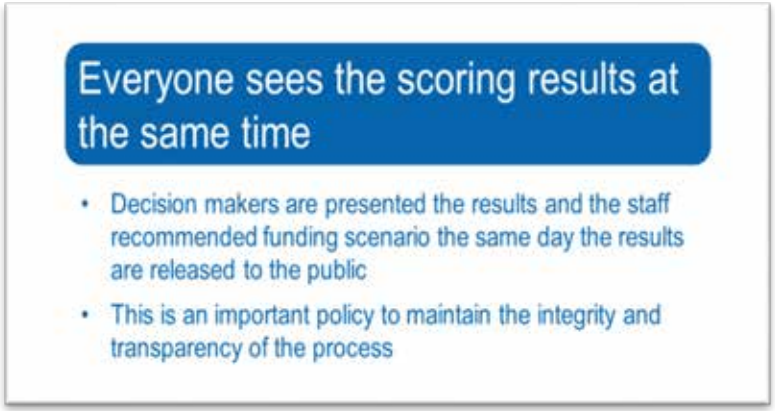
ICF

Communication-Related Presentations	Circular Page
Plenary: What Performance-based Decision-making Looks Like	1-6
Plenary: Structuring Your Agency to Disseminate Information	103-105
Session 5C: Integrating Equity and Resilience	153-155
Session 7C: Communicating Project Results	160-167
Chapter 9: Communications and Stakeholder Engagement • Session 1D: Engaging the Public and Local Officials in Data Driven Decision Making • Session 2D: Fostering Local Accountability for Regional and Statewide System Performance • Session 3D: Fostering Employee Accountability for Agency Performance • Session 4D: Statewide Frameworks for Collaborative Performance Management • Session 5D: Dashboard Demo	171-198
Plenary: Bringing It All Together	222-223
Appendix C: Mobile App Surveying Technique	240-241

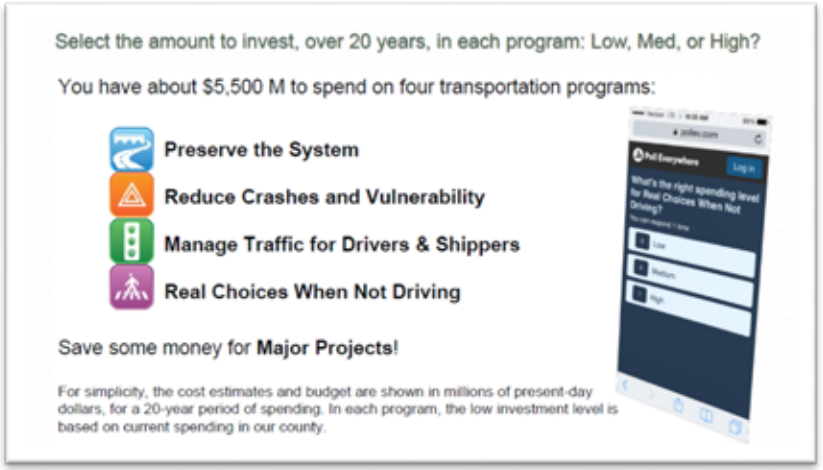
Data Driven Communication Can Improve Our Ability To ….

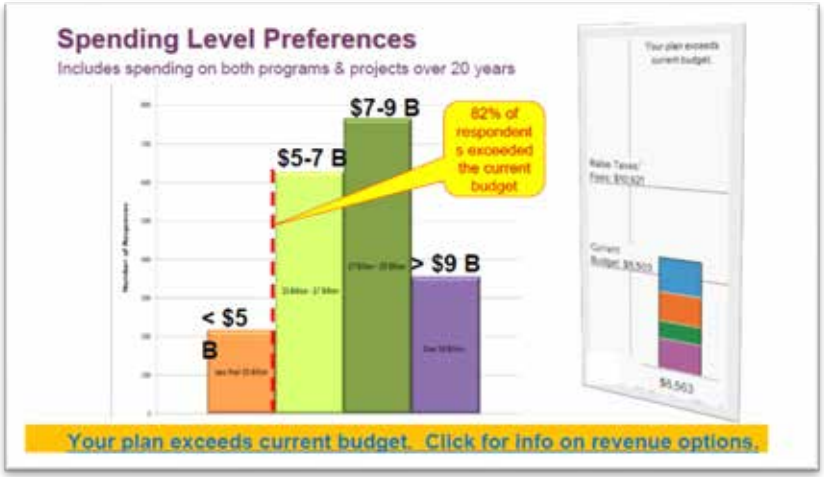
Engaging People

- Eliciting useful input
- Building trust



Session 7C: Virginia Office of Intermodal Planning and Investment

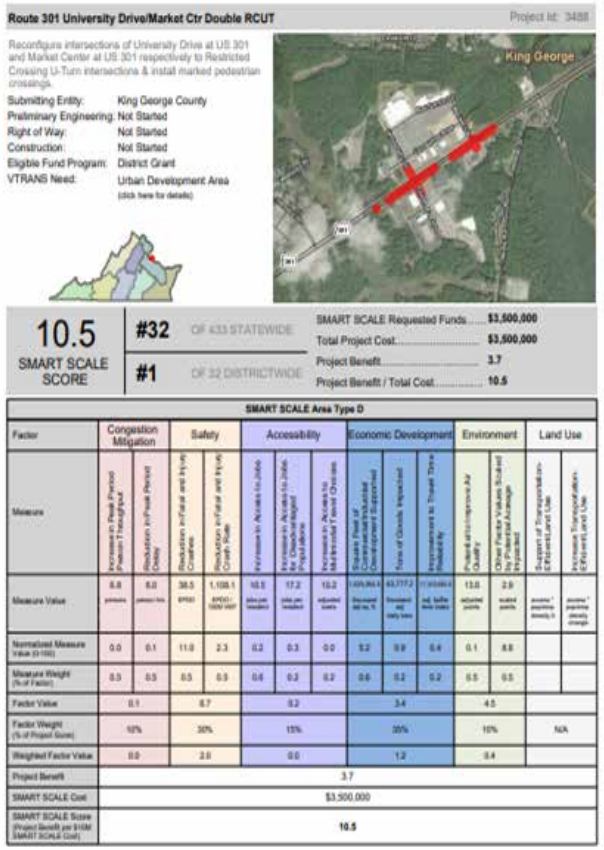




Session 1D: #FloridaMan Makes Rational Choices

Informing Decision Makers

- Providing useful information
- Supporting defensible decisions



Session 7C: Virginia Office of Intermodal Planning and Investment

Shaping Compelling Stories

Who is the audience?

- How much time to they have to absorb the information?
- Are they really interested in the topic?

What are you trying to convey?

- What is the process for identifying and deciding upon projects?
- What are the decision-making criteria?

Why is your message important?

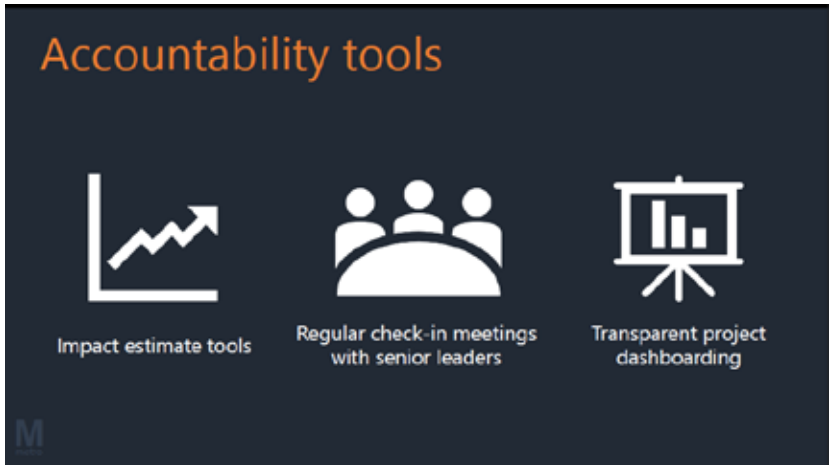
- What are the interests and concerns of the politicians or decision-makers?
- How can you keep them focused on the topic at hand?

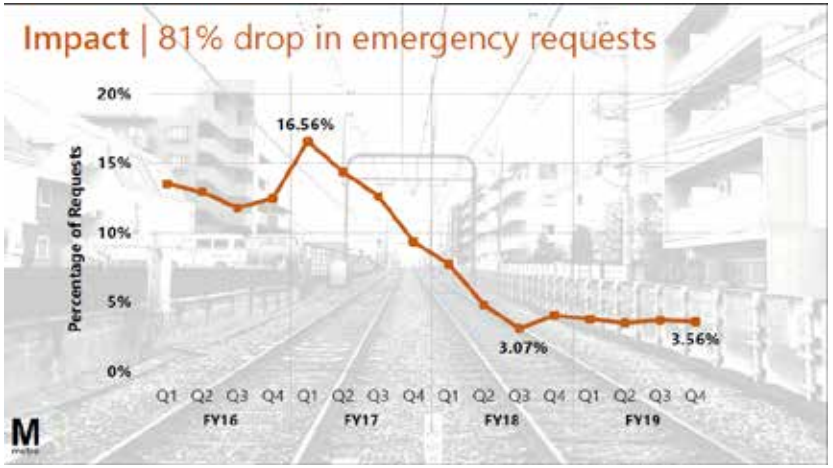
How are you communicating complex information to your audience?

- What was discussed and decided before?
- Where are we at this moment?
- What decisions move the audience forward?

Improving Agency Performance

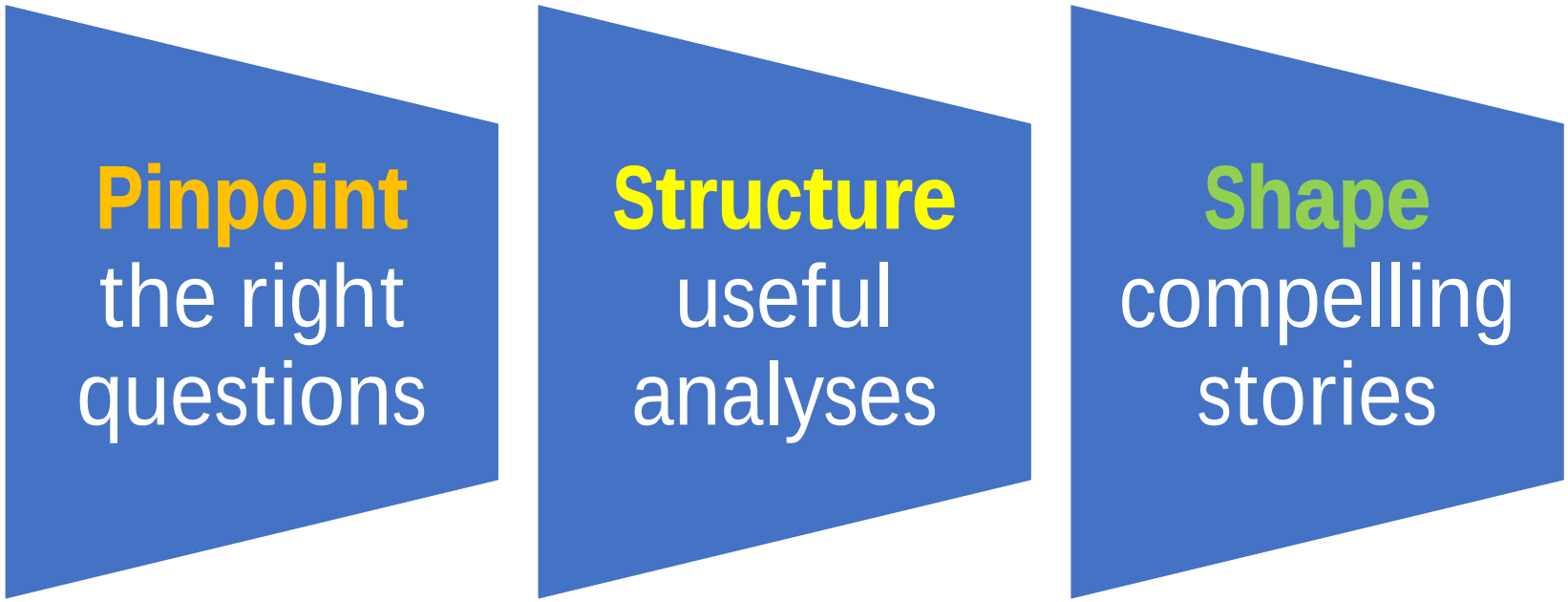
- Building a culture of accountability
- Resolving hidden hindrances





Session 3D: I Need Track Rights!

Communication Key Takeaways



Performance and Data in Transportation Decision Making

Key Takeaways and Opportunities to Advance the Practice

Hannah Twaddell

ICF

Invest in Good Data

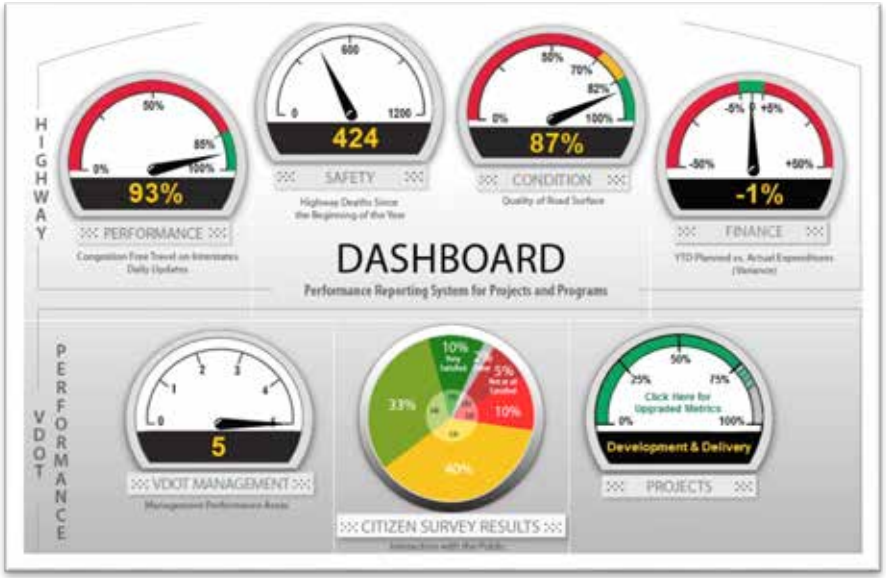
- Defining
- Sourcing
- Collecting
- Cleaning
- Maintaining
- Updating
- Applying

Appendix C: Mobile App Survey (Lessons Learned by Conference Participants) Top: After Day 1. Bottom: After Day 2

Invest in Useful Tools

- Defining
- Developing
- Training
- Applying

Session 5D: MNDOT Dashboard



Session 5D: VDOT Dashboard

Session 1D: #Florida Man Makes Rational Decisions

Build Skills Across the Board

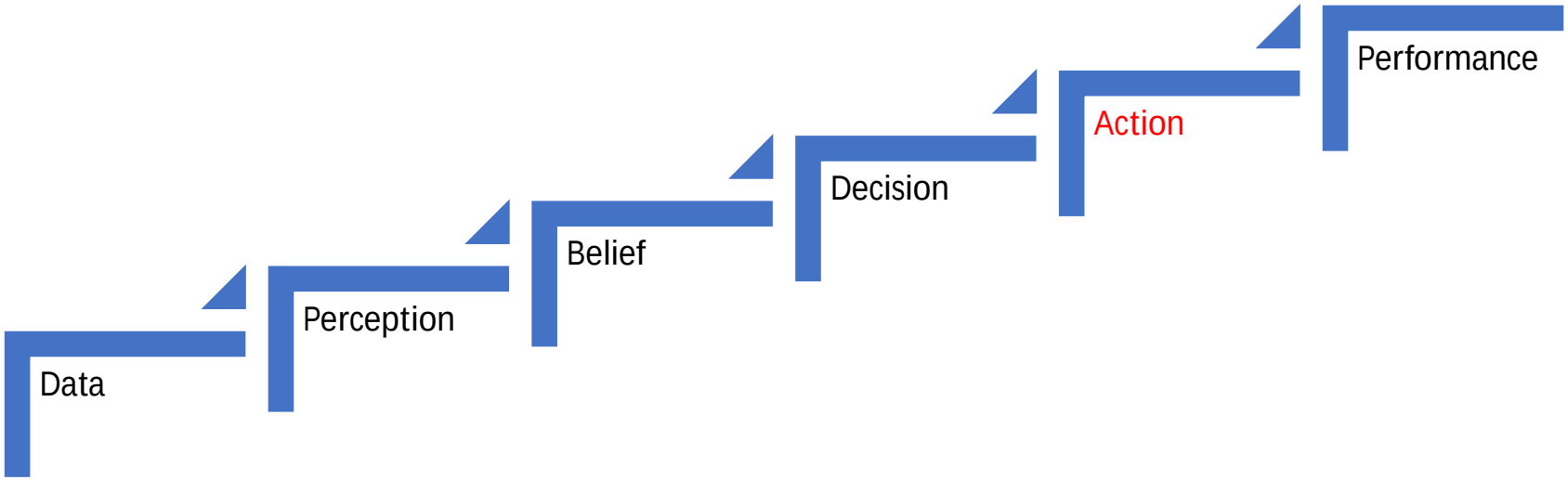
- Leaders
- Managers
- Analysts
- Communicators
- Facilitators
- Implementers

Session 5D: CTA Performance Management Daily Flash Reports

And Remember

Data Doesn’t Change Performance …

People Change Performance



Today's Panelists

- David Wasserman, *North Carolina Department of Transportation,* dswasserman@ncdot.gov
- Jerri Bohard, *Oregon Department of Transportation,* Jerri.L.bohard@odot.state.or.us
- Jordan Holt, *Washington Metropolitan Transit Authority,* JHHolt@wmata.com
- Hannah Twaddell, *ICF,* hannah.twaddell@icf.com

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