Planning for Vehicle Automation

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Overview

- Automation is a Disruptive Technology
- Performance-Based Planning to the Rescue
- New Roles for Scenarios and Models

Disruptive Technology

- "Disruptive" = threat to "business as usual"
  - Automation could upend how transportation works

- Most disruptive elements:
  - How or when will it happen?
  - What will the net effects be?
  - What to do now (or next)?

What makes Automation Disruptive?

- Behavior
  – Drive farther, buy fewer cars, use more taxis

- Infrastructure
  – Better/different markings, less new road capacity, fewer parking spaces, "internet of cars"

- Agency roles
  – Transit vs. shared mobility, "hands on" system management & operations

What Else is Disruptive?

- Self-driving cars are not the only thing

  - Shared Mobility (Uber/Lyft)

  - Freight Management (self-driving trucks, drones, 3D printing)

  - Bicycle and pedestrian travel ("Return to the City")

  - Generational shifts ("Millennials hate driving")

  - Externalities (new energy sources, climate change)

Potential Implications on Roadway Infrastructure and Related Policies and Programs

Physical Infrastructure

Roadway Operations

Digital Infrastructure

Programs and Practices

Potential Implications on Roadway Infrastructure and Related Policies and Programs

Physical Infrastructure

- Unclear infrastructure requirements for AVs (signs, signals, markings)

- Possible need for adaptations to design standards, greater consistency

- Implications for maintenance and investment

Potential Implications on Roadway Infrastructure and Related Policies and Programs

Roadway Operations

- **Short-term challenges of managing a mixed traffic environment (AVs, CVs, non-AVs, C/AVs)**

- **New challenges in harmonizing traffic flow**

- **Potential travel demand changes**

- **Potential long-term efficiency, congestion benefits**

Potential Implications on Roadway Infrastructure and Related Policies and Programs

- AVs as new sources of roadway data

- Data updates on construction and road closures

- Maintenance of digital infrastructure
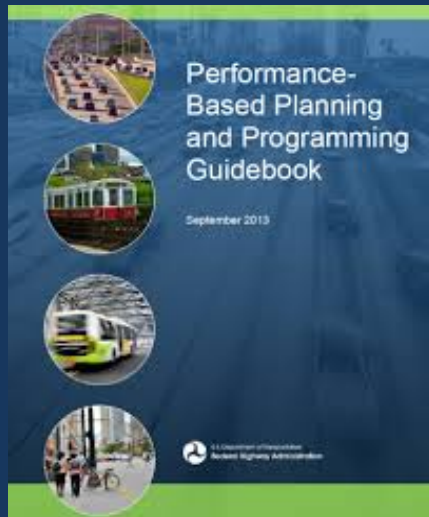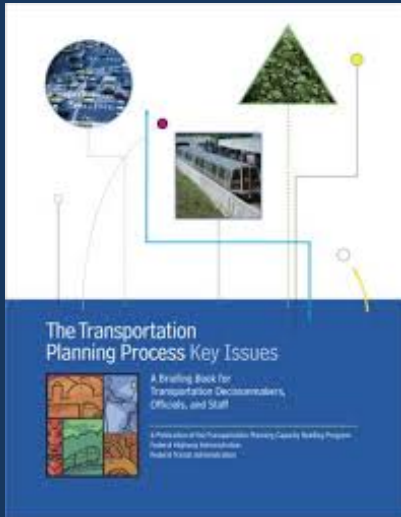
Digital Infrastructure

- **Accounting for AVs and potential land use impacts and uncertainty in long range planning process**

- **Implications of shared vehicle fleets and new mobility models on travel demand modeling/forecasting**

- **Revenue and budget implications**

THE HIGHWAY TAX DOLLAR AT WORK

Performance-Based Planning and Programming Guidebook

September 2013
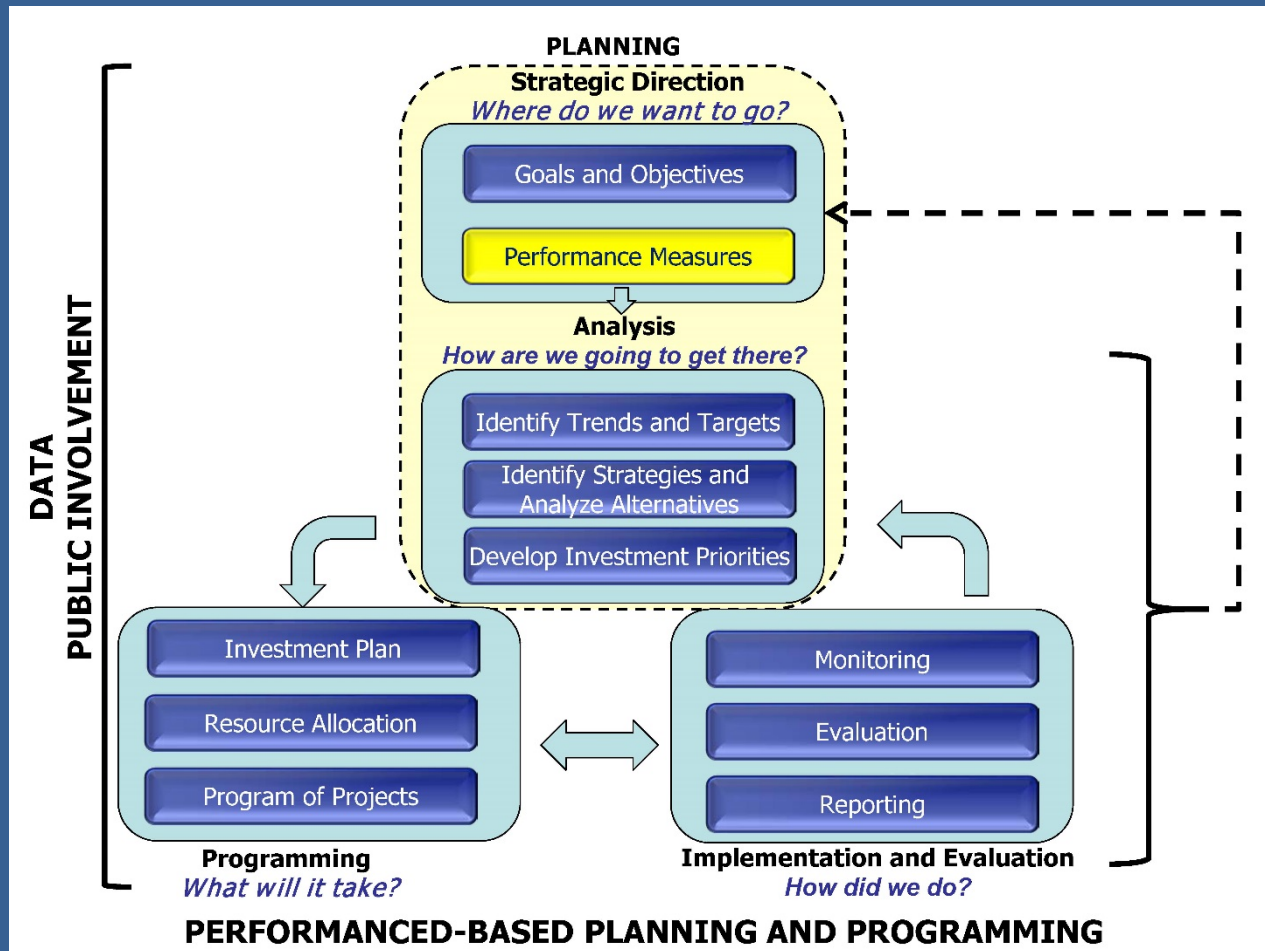
The Transportation Planning Process Key Issues

Programs and Practices

The Future…

- … is **Wide Open**
  - More opportunity than ever to improve
- … is **Radically Uncertain**
  - Know less than ever about what will happen
- … calls for **New Planning Strategies**
 - Extrapolate less, experiment more, get more data

Performance-Based Planning to the Rescue

PLANNING

Strategic Direction
Where do we want to go?

Goals and Objectives

Performance Measures

Analysis
How are we going to get there?

Identify Trends and Targets

Identify Strategies and Analyze Alternatives

Develop Investment Priorities

DATA
PUBLIC INVOLVEMENT

Investment Plan

Resource Allocation

Program of Projects

Monitoring

Evaluation

Reporting

Programming
What will it take?

Implementation and Evaluation
How did we do?

PERFORMANCED-BASED PLANNING AND PROGRAMMING

Performance-Based Planning and Scenario Planning

Supporting Performance-Based Planning and Programming through Scenario Planning

June 2016
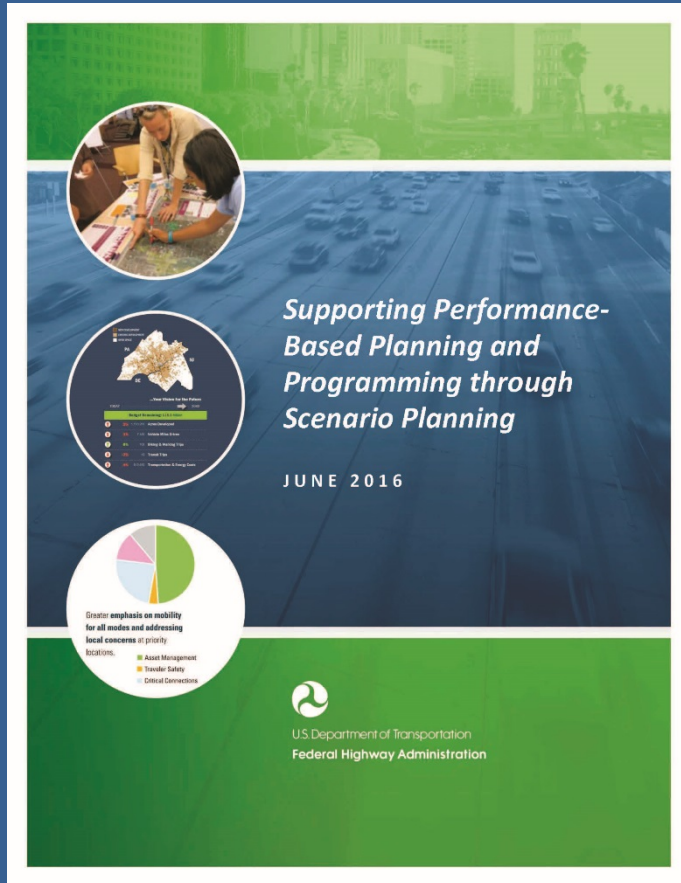
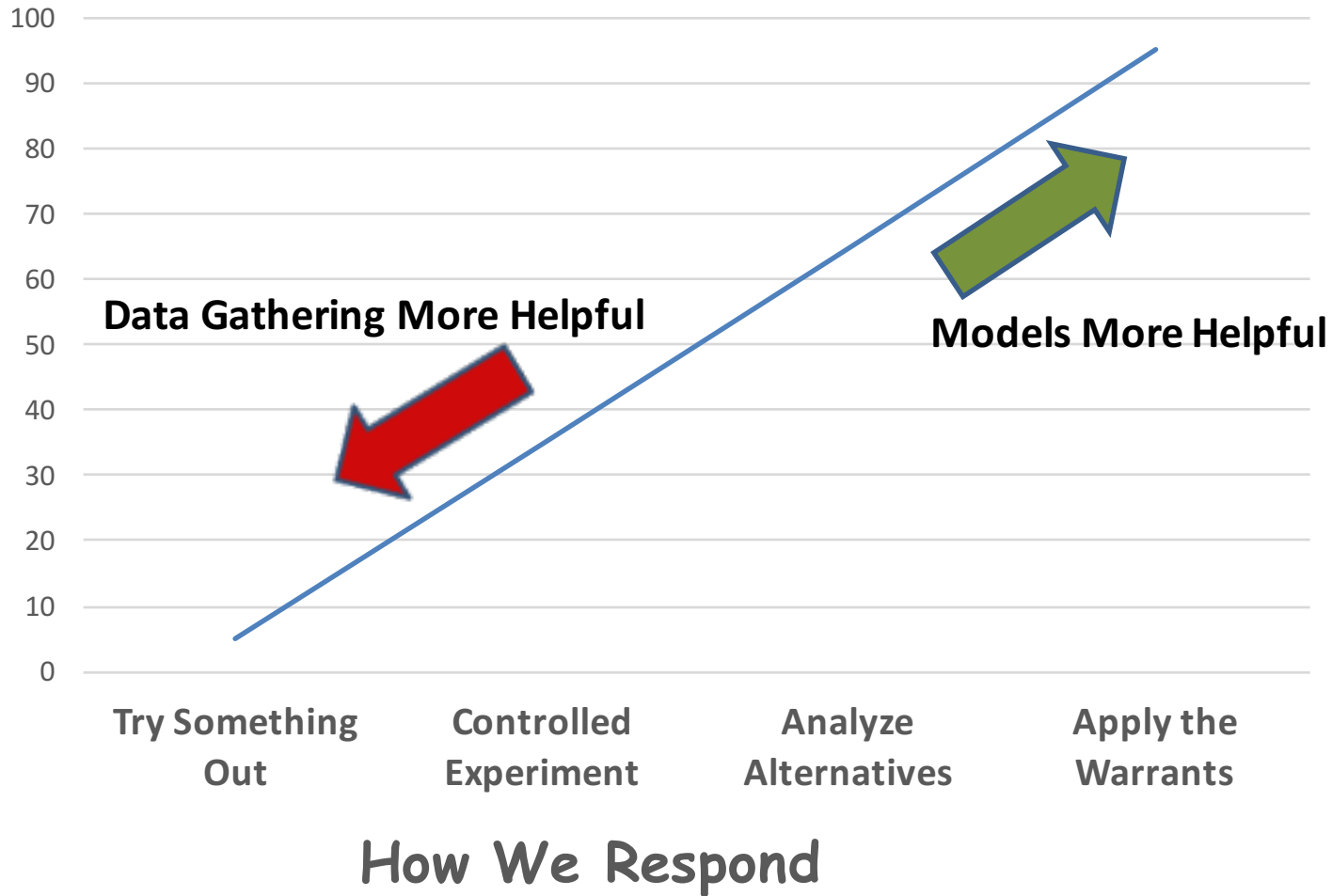# Handling the Unknown with Performance-Based Planning

- Scenario Development and Visioning
- Performance Measure Development
  - Performance Targets
  - Data Collection
- Try Things and Evaluate Them
- Revisit Assumptions Regularly

Where do we want to go?

- Exit the era of "Manifest Destiny"
  - Certainty about interventions and outcomes
  - Consensus vision of what matters

- Enter the era of "New Horizons"
  - Uncertainty about interventions and outcomes
  - Diverse visions of what might be possible

From Chaos to Confidence

How Much Future is Like Past (y-axis)
100
90
80
70
60
50
40
30
20
10
0

Data Gathering More Helpful

Models More Helpful

How We Respond (x-axis)

Try Something Out   Controlled Experiment   Analyze Alternatives   Apply the Warrants

From Chaos to Confidence

How Much Future is Like Past (y-axis)

y-axis values: 0, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100

Develop New Knowledge

Data Gathering More Helpful

Models More Helpful

Explore New Phenomena

x-axis labels: Try Something Out | Controlled Experiment | Analyze Alternatives | Apply the Warrants

How We Respond
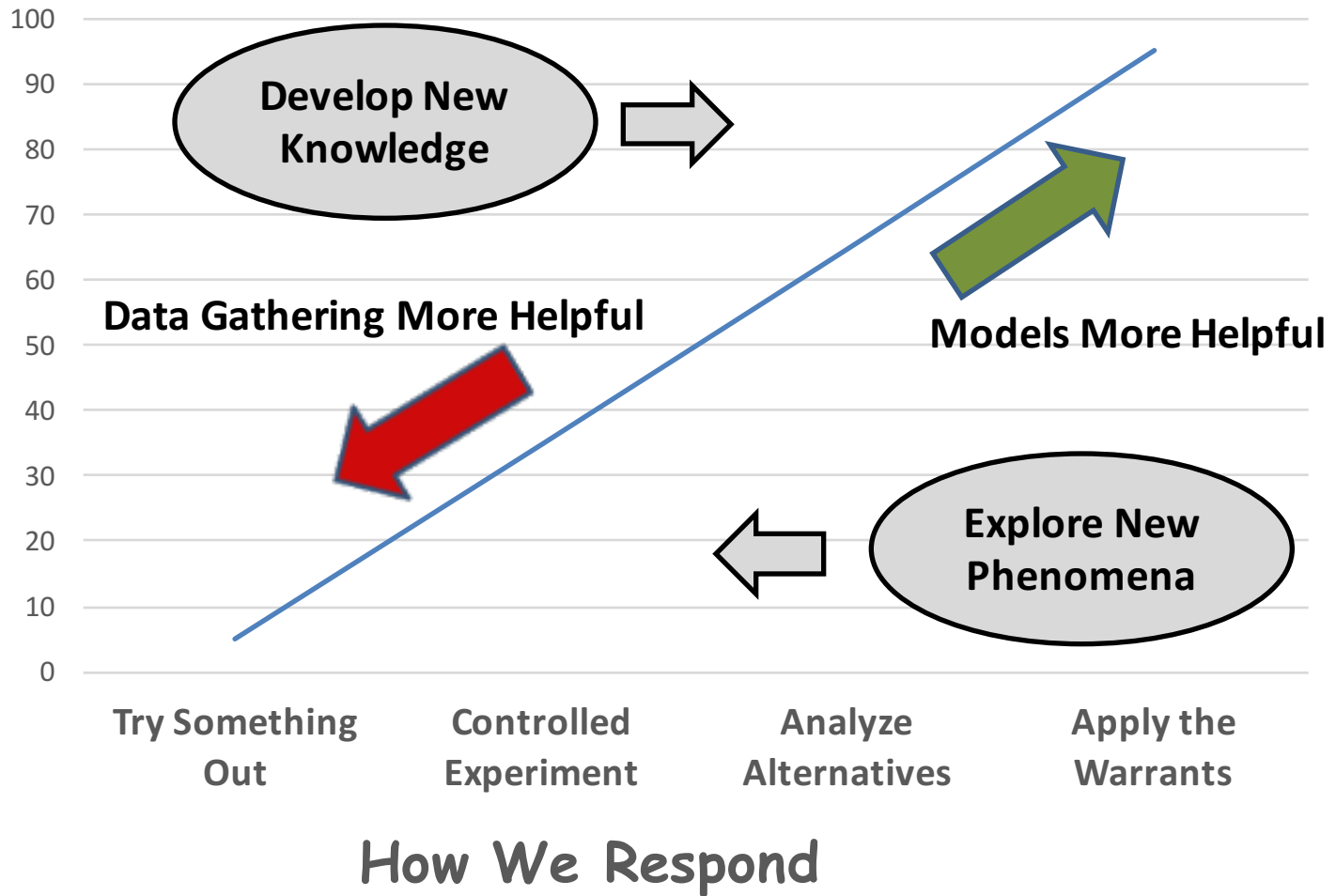
Rethinking the Role of Scenarios

- Old: Scenarios help decide what will happen
  - Identify factors everyone can agree on
  - Compute outcomes based on known relationships

- New: Scenarios help decide what we want
  - Identify outcomes we hope for (or fear)
  - Identify indicators of where we're headed

Rethinking the Role of Models

- Old: Models are predictive
  - Visualize outcome of well-understood interventions

- New: Models are exploratory
  - Explore possibilities of hypothetical scenarios

Imagine the Possibilities

- Use planning cycles (TIP / LRP) to review
  - Scenario Planning, early and often
  - Focus on "where do we want to go?"
  - Use models sparingly to explore alternatives
- Prioritize Data Collection and Interpretation
  - What is happening and what does it mean?
- Hold onto the Vision
  - Now more than ever, the future is ours to define