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Twenty Hours of Insight from the World's Foremost Experts on Multiresolution Modeling (MRM)

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David K. Hale
Senior Transportation Project Manager
Leidos, Inc.

Hyungjun Park
Highway Research Engineer
Federal Highway Administration (FHWA)

U.S. Department of Transportation
Federal Highway Administration

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MRM Project Overview

- Project objectives:
  - Assess gaps.
  - Conduct case studies.
  - Develop guidebook.
- Project sponsors:
  - Traffic Analysis and Simulation Pooled Fund Study (TAS PFS).
  - FHWA.
- Key staff:
  - Government Task Manager: Hyungjun Park (FHWA).
  - Principal investigators: Mohammed Hadi (Florida International University) and Xuesong Zhou (Arizona State University).

Task 3: (State-of-the-Practice Report) Outreach

- Conducted 13 web conferences with 9 practitioners and 4 developers.
- Assembled preliminary findings (i.e., trends):
  - Software features.
  - Common practices.
  - Computer capabilities.
  - Convergence and feedback.

Task 3: Industry Discussion Topics

- How do you define MRM?
- How many MRM projects have you conducted, are involved in, or do you know of in your State/region?
- How have you implemented MRM?
- How much effort does it takes to set up an MRM?
- What are the limits of your MRM size?
- What are the benefits and costs of MRM?
- What are the barriers to applying MRM?
- What defines your hesitation to apply MRM?
- What is your agency's interest level in MRM?
- What will be the short-term and long-term impacts of MRM?

Task 3: Vendor Discussion Topics

- How do you define MRM?
- What MRM advertising do you have?
- How important do you think MRM is?
- What MRM case studies do you have?
- What MRM features (e.g., feedback, convergence) do you currently offer?
- What is your company's interest level in MRM?
- What MRM features are you planning to develop?
- What interest level in MRM do you perceive from your customers?
- Can you provide any documentation or guidance related to MRM models in your tools and the implementation of these models?

Task 3: State-of-the-Practice Feedback Summary

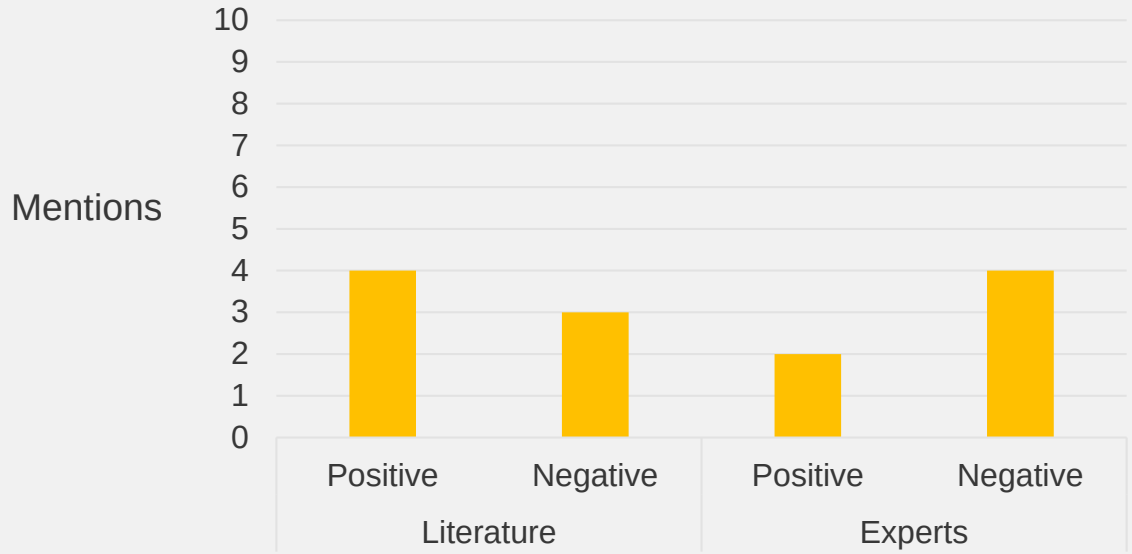
- Typical sequences of MRM analysis:
  - Regional macro, subarea macro, meso, subarea micro, micro.
  - Activity-based model plus dynamic traffic assignment, subarea micro.
- Less common is feedback to the upper level; hybrid simulation.
- Publicity for MRM success stories could be helpful.
- MRM can make analysis results more defendable.
- Interest in MRM is increasing very slowly (inertia).
- MRM tools can still be improved.

Qualitative Data Analysis

- Turns text responses into quantifiable information.
- Used to examine the literature reviews and outreach feedback.
- Key concepts of interest:
  - Run times.
  - Edge models.
  - Hybrid models.
  - Re-use of models.
  - Activity-based models.
  - Micro for large networks.
  - Success stories or pilots.
  - Desire for consistency and feedback.

Run Times (13 mentions)

- Mixed messages.
- For example, run times are a source of hesitation, but things are getting better.



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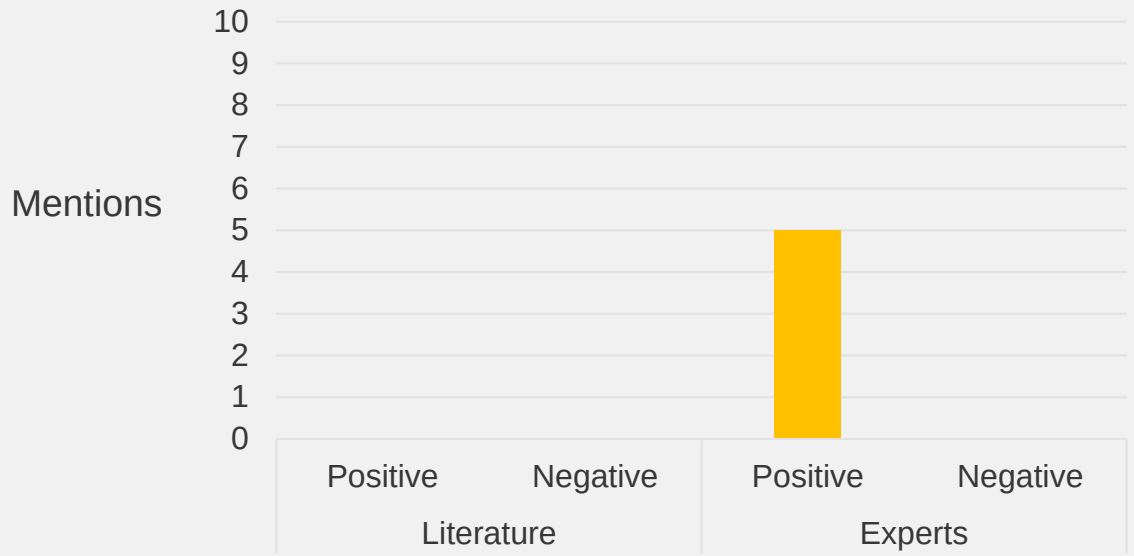
Edge Models (5 mentions)

- Between macro and meso; between meso and micro.
- Practice ahead of research.



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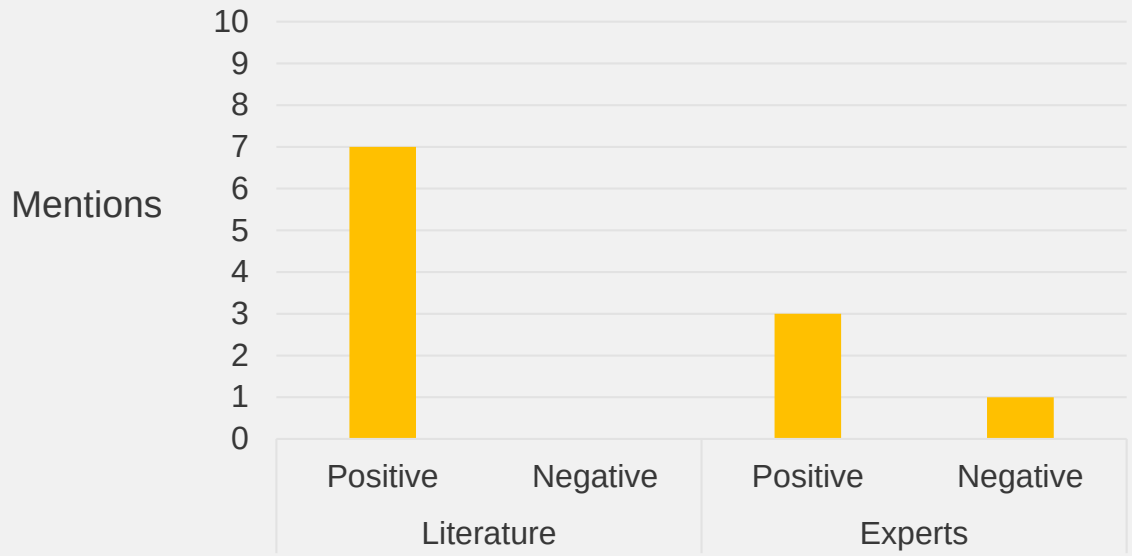
Hybrid Models (11 mentions)

- Simulate key areas in more detail.
- Research ahead of practice.



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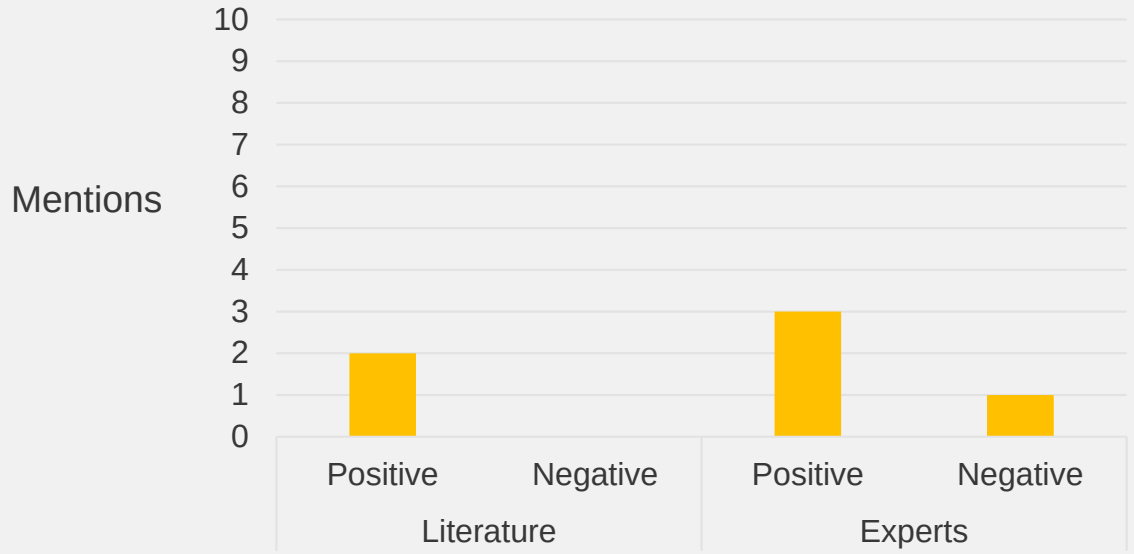
Re-Use of Models (6 mentions)

- Unsurprisingly, not a common research topic.
- Stakeholder quote: “Save money on data entry, spend more on calibration.”



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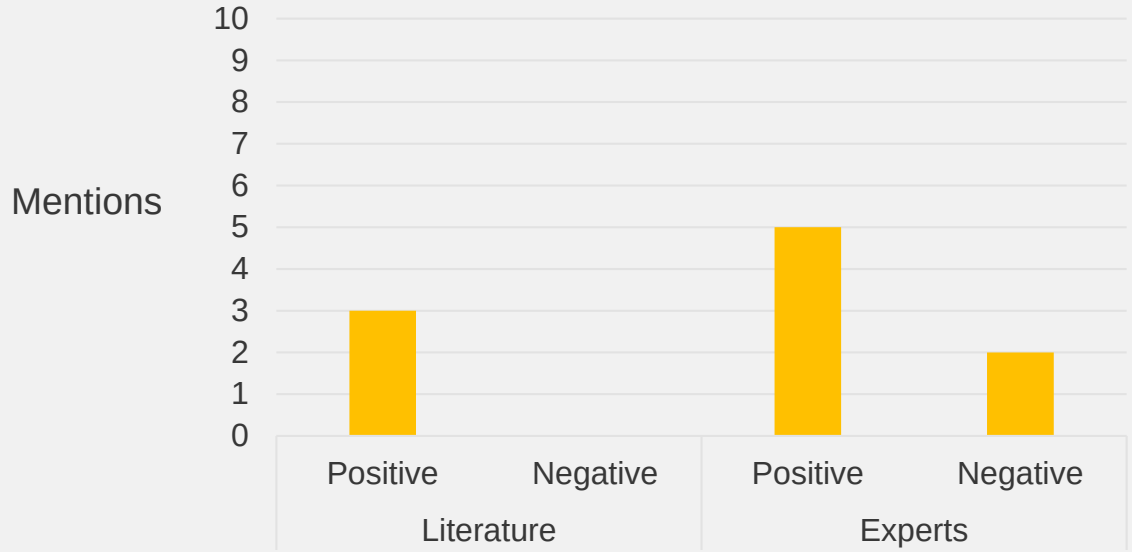
Activity-Based Models (10 mentions)

- Sometimes used as a substitute for four-step models.
- Stakeholder quote: “ABM-DTA completely sidesteps the MRM problem.”



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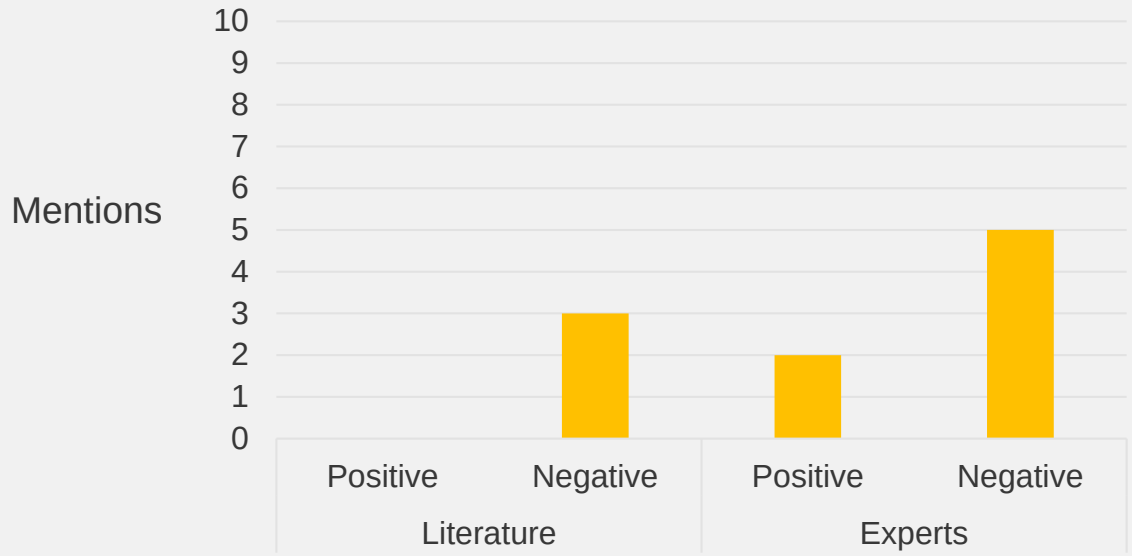
ABM-DTA = activity-based model plus dynamic traffic assignment

Microsimulation for Large Networks (10 mentions)

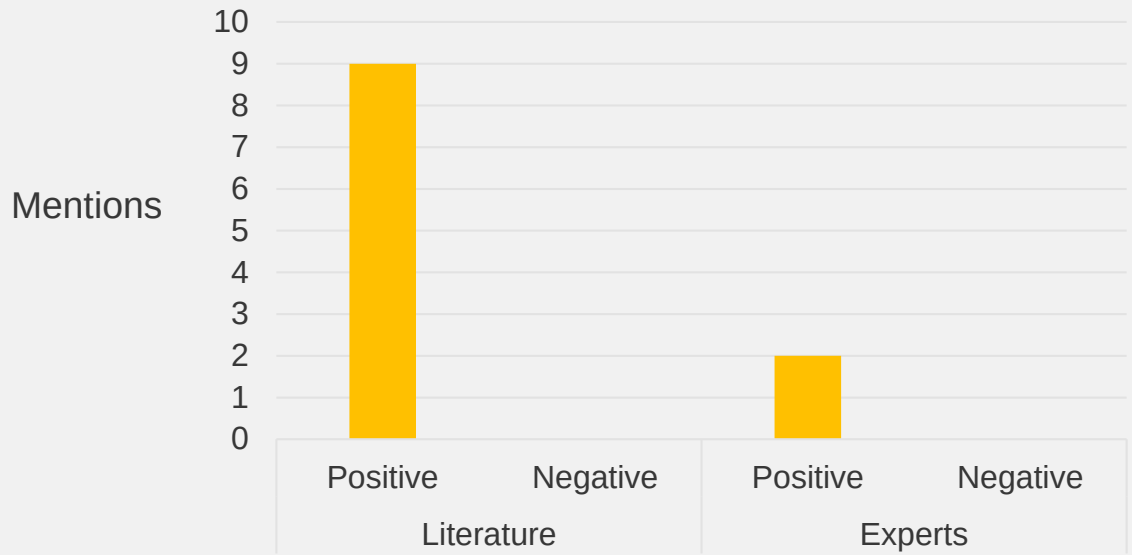
- Sometimes used as a substitute for MRM.
- Challenges with data, calibration, and computer run times.



Source: FHWA

Success Stories or Pilots (11 mentions)

- Could help to accelerate MRM adoption.
- Real-world projects: not designed to illustrate MRM benefits?



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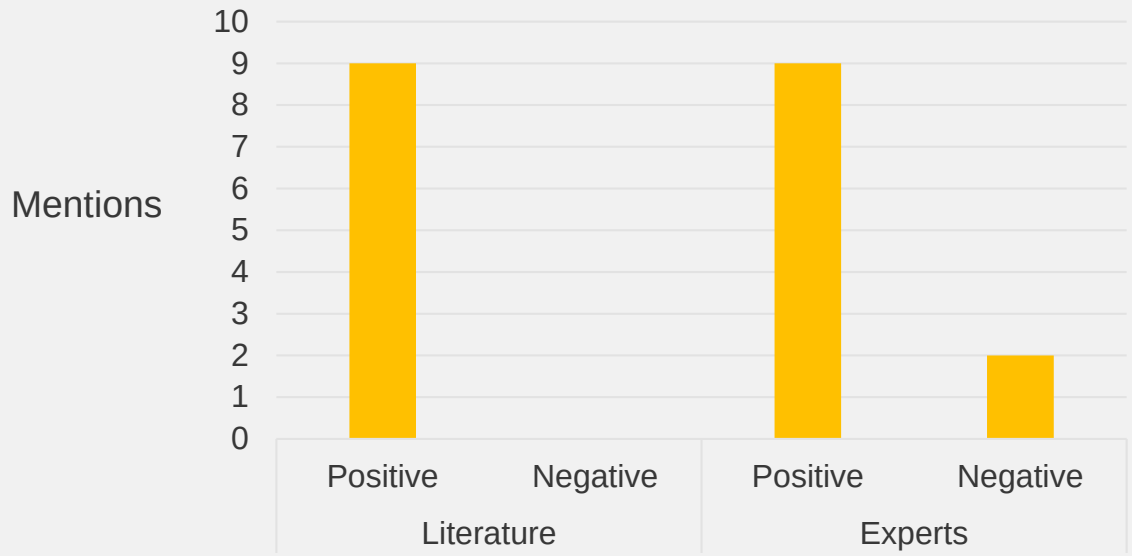
Desire for Consistency and Feedback (20 mentions)

- Even the MRM experts are just scratching the surface.
- Not always viewed as helpful or cost-effective.



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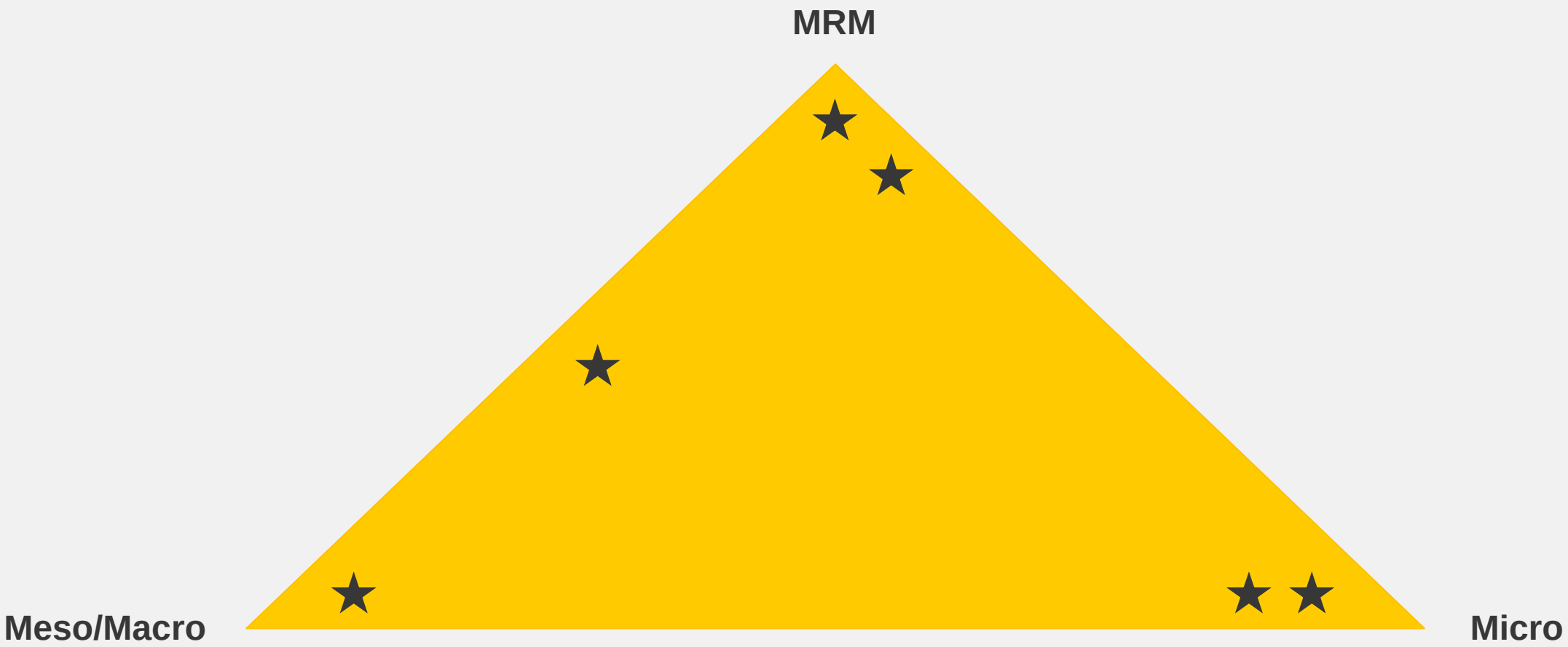
Qualitative Data Analysis (Cont'd.)

- Interesting outcomes:
  - Practitioners innovating more than researchers with edge models.
  - Stakeholder quote: "Save money on data entry, spend more on calibration."
  - Stakeholder quote: "ABM-DTA completely sidesteps the MRM problem."

Task 3: State-of-the-Practice Vendor Viewpoint



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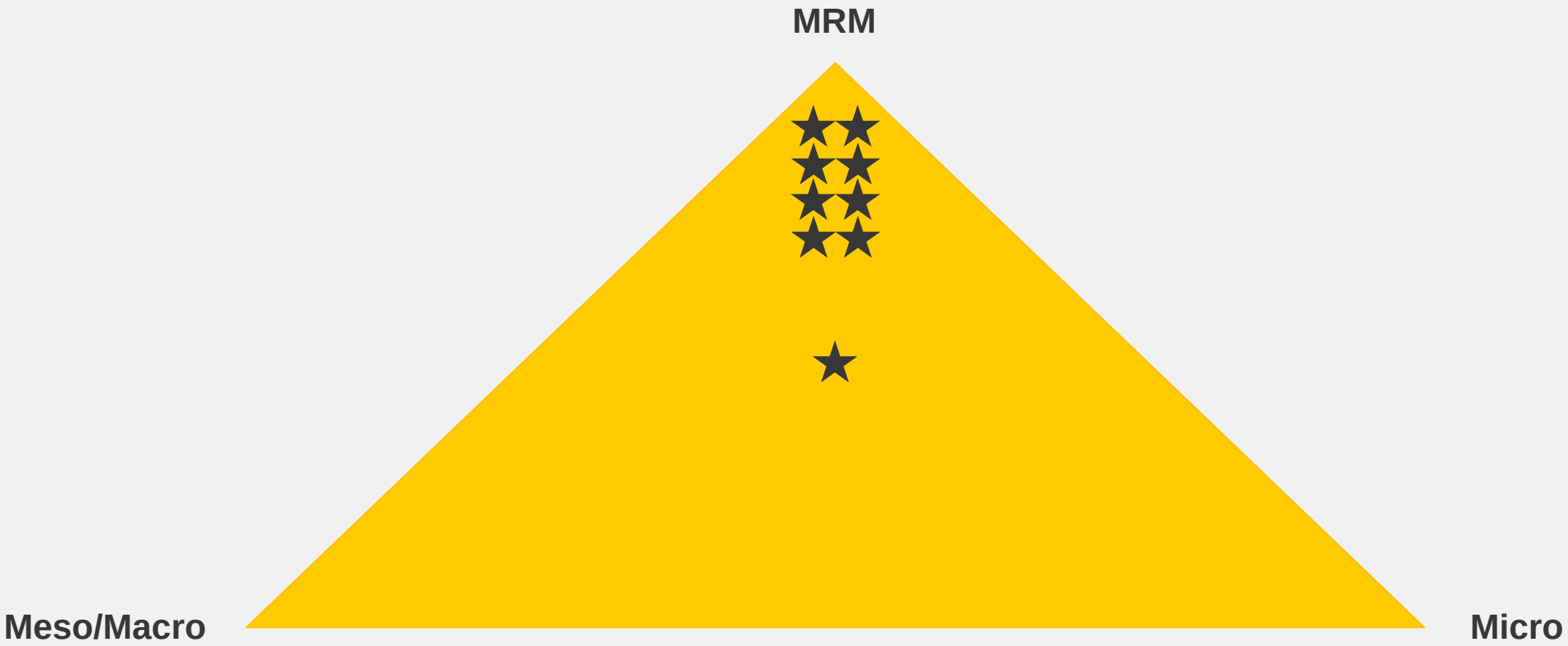
Task 3: State-of-the-Practice Practitioner Viewpoint



Source: FHWA

Task 4: Gap Analysis

- Five web conferences conducted in May and June 2020.
- Sample topics discussed:
  - What types of traffic modeling do you commonly perform?
  - What is your agency's interest level in MRM?
  - What are the benefits and costs of MRM?
  - What are the barriers to applying MRM?
  - What defines your hesitation to apply MRM?
  - Do you have the resources, funds, and expertise for MRM?
  - Do your business processes include simulation and/or MRM?
  - What performance measures and features do you need?
  - What additional data sources do you need?

Gap Analysis Feedback Summary

- Reasons to avoid MRM:
  - Start-up costs.
  - Learning curves.
  - Insufficient guidance.
  - Tools not well integrated.
  - Functions not well automated.
  - Few success stories or pilot projects.
  - Uncertainty about cost-effectiveness.
  - Current analyses not being challenged.
  - Little need for large spatiotemporal scopes.

Barriers

Incentives

Interactive Session

- Questions, comments, or suggestions?

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Questions?

Hyungjun Park
Highway Research Engineer
✉ Hyungjun.park@dot.gov

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