Future Uncertain

January 9, 2024

Ask questions here!

Welcome

- AEP 50 Travel Forecasting - Sponsoring
- AEP 15 Transportation Planning Analysis and Application
- AEP 30 Travel Behavior and Values
- AEP 40 Network Modeling
- AEP 80 Transportation-Related Noise and Vibration
- AED 20 Urban Transportation Data and Information Systems
- AED 60 Statistics

Agenda

1. DMDU Background
2. State and Future of the Practice
3. DMDU Game!
4. Break
5. Panel Discussion

DMDU Background

Ask questions here!

What do we mean when we say *DEEP Uncertainty*

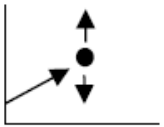
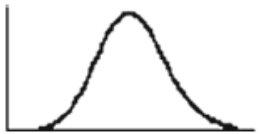
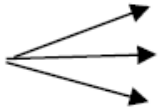
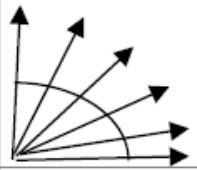
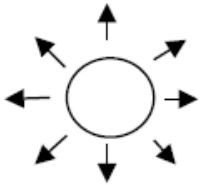
In these situations, the experts do not know or the parties to a decision cannot agree upon

1. The external context of the system,
2. How the system works and its boundaries, and/or
3. The outcomes of interest from the system and/or their relative importance

Marchau, V.A.W.J., Walker, W.E., Bloemen, P.J.T.M., Popper, S.W. (2019)
Introduction. In:
Marchau, V., Walker, W., Bloemen, P., Popper, S. (eds) Decision Making under Deep Uncertainty. Springer

Uncertainty to Deep Uncertainty

Table 1.1 Progressive transition of levels of uncertainty

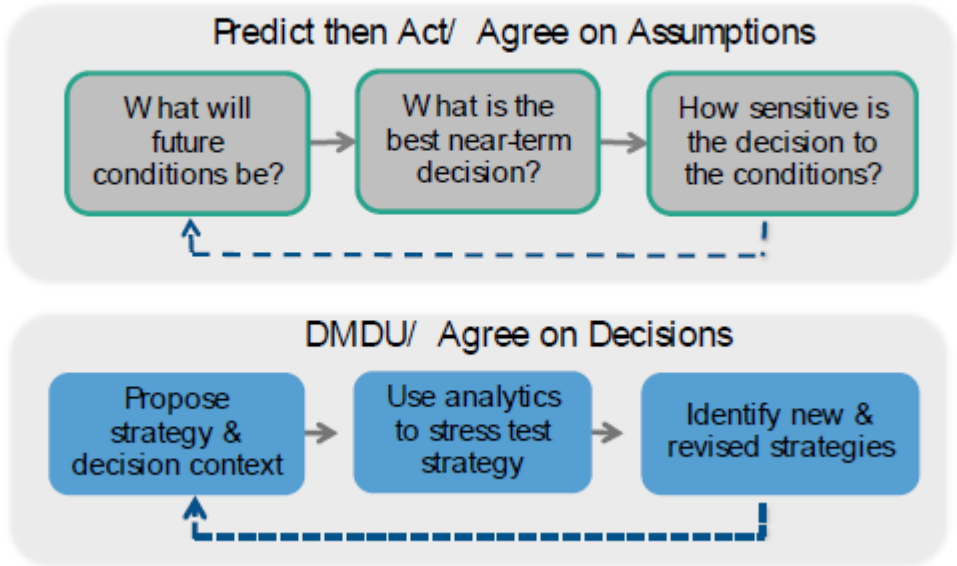
	Complete determinism	Level 1	Level 2	Level 3	Level 4 (deep uncertainty)		Total ignorance
					Level 4a	Level 4b	
Context (X)		A clear enough future 	Alternate futures (with probabilities) 	A few plausible futures 	Many plausible futures 	Unknown future 	
System model (R)		A single (deterministic) system model	A single (stochastic) system model	A few alternative system models	Many alternative system models	Unknown system model; know we don't know	
System outcomes (O)		A point estimate for each outcome	A confidence interval for each outcome	A limited range of outcomes	A wide range of outcomes	Unknown outcomes; know we don't know	
Weights (W)		A single set of weights	Several sets of weights, with a probability attached to each set	A limited range weights	A wide range of weights	Unknown weights; know we don't know	

Marchau, V.A.W.J., Walker, W.E., Bloemen, P.J.T.M., Popper, S.W. (2019). Introduction. In: Marchau, V., Walker, W., Bloemen, P., Popper, S. (eds) Decision Making under Deep Uncertainty. Springer, Cham. https://doi.org/10.1007/978-3-030-05252-2_1

Implications of Uncertainty on the Process

ELEMENTS OF DECISION

- Future states of the world
- Alternative decision options
- Outcomes resulting from each option in each future
- Preferences over outcomes



PURPOSE OF ANALYSIS

- Rank decision options
- Identify more robust options
- Illuminate key tradeoffs among them

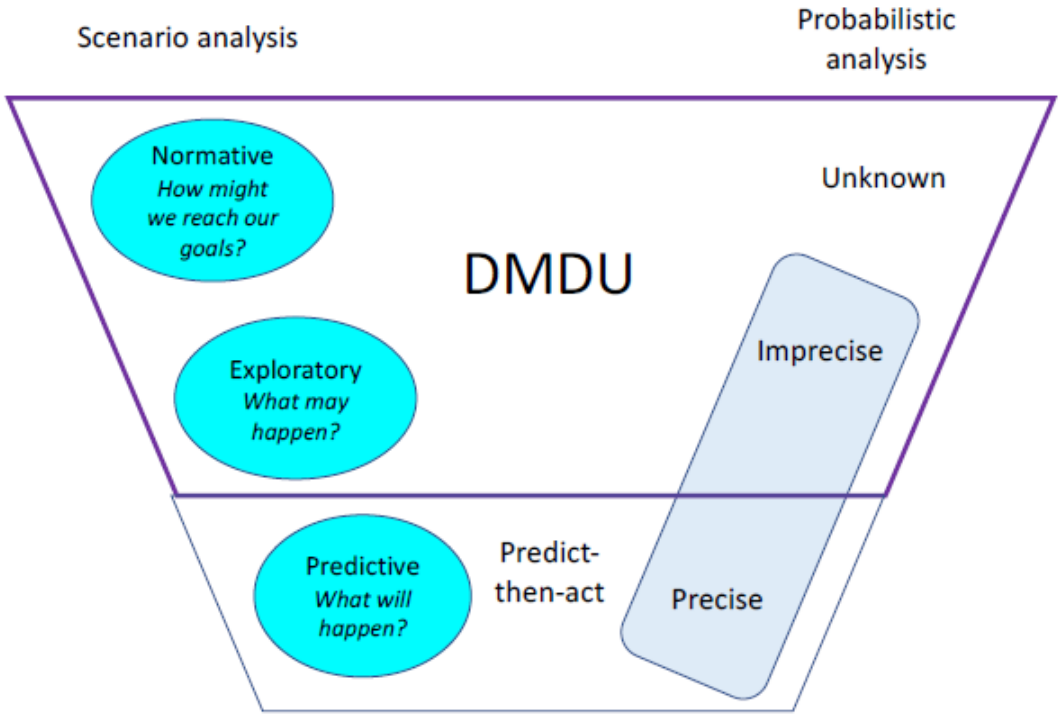
Source: RAND, adapted from Kalra, N., S. Hallegatte, R. Lempert, C. Brown, A. Fozzard, S. Gill and A. Shah (2014)

How to talk about uncertainty: XLRM

X: Uncertainties	L: Policy Levers
What uncertain factors outside decision makers' control affect their ability to pursue their goals?	What actions might decision makers take to pursue their goals?
R: Relationships	**M: Performance measures**
How might policy levers (L) and uncertainties (X) be related to decision makers' goals (M)?	What are decision makers trying to achieve?

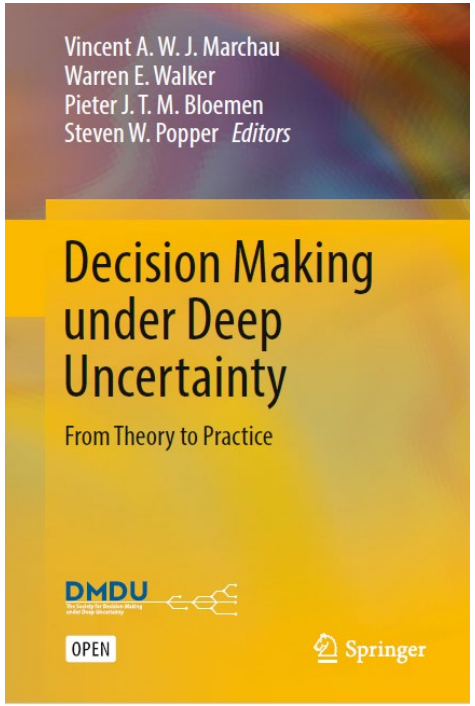
Source: FHWA

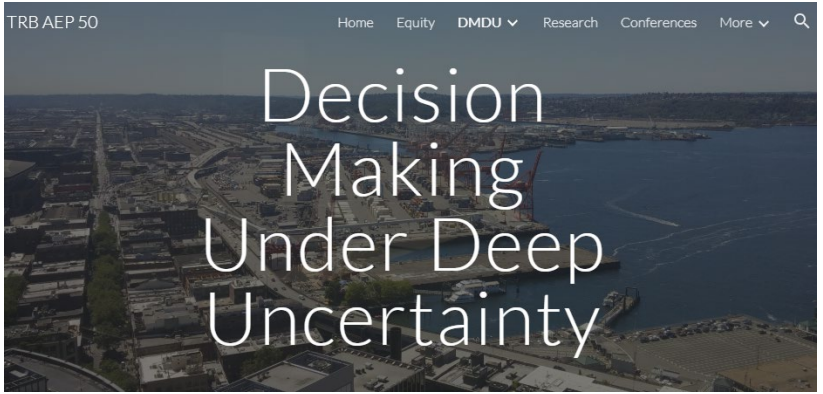
Analysis Types by Uncertainty



Source: RAND

References





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State and Future of the Practice

Ask questions here!

Panelist Quick Talks

Naomi Stein, Vice President, EBP

Tara Weidner, Climate Impact Analysis Program Lead, Oregon DOT-Climate Office

Rachel Copperman, Vice President, Cambridge Systematics

Prateek Bansal, Assistant Professor, National University of Singapore

Chandra Bhat, University Distinguished Teaching Professor, University of Texas at Austin

Ask questions here!

Decisions for the Decade

Ask questions here!

Panel Discussion

Ask questions here!

Wrap

Next Steps

- Workshop summary will be posted on trbtravelforecasting/dmdu
- Book Club
  - Next: Wednesday, January 27
  - Planning for uncertain transportation futures: Metropolitan planning organizations, emerging technologies, and adaptive transport planning
  - Reach out with suggestions!
- Research Needs Statements

Keep at it!

Failure is a reality; we all fail at times, and it's painful when we do. But it's better to fail while striving for something wonderful, challenging, adventurous, and uncertain than to say, “I don't want to try because I may not succeed completely.”

Jimmy Carter
Sources of Strength: Meditations on Scripture for a Living Faith